Teaching Pricing and Revenue Optimization

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Abstract

Pricing and revenue optimization, defined as the formulation and solution of tactical pricing decisions using constrained optimization, is becoming an increasingly popular subject to be taught at the MBA level. Perhaps the best-known example of pricing and revenue optimization is revenue management whereby airlines, hotels, and other companies seek to maximize operating contribution by opening and closing fare classes. However, a number of other important business problems including markdown management, dynamic pricing for e-commerce, and customized pricing are also parts of pricing and revenue optimization. This article gives an overview of the field for those who are considering teaching the topic to MBA students. I outline the scope of the area, describe specific topics that can be included, present a sample syllabus and provide some guidance based on my own experience and links to additional resources.

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There is growing interest among business schools in teaching MBA courses in revenue management and pricing optimization. In the Fall of 2002, I developed and taught an MBA elective course entitled "Pricing and Revenue Optimization" at the Columbia University Graduate School of Business. This was the first MBA-level course at Columbia on this topic and one of the first of its kind in the United Sates. Among the few previous courses covering similar material are "Dynamic Pricing and Revenue Management", developed and taught by Ioana Popescu at INSEAD[1] and "Demand and Revenue Management" taught by Anton Kleywegt as part of the Executive Masters of International Logistics program at Georgia Tech. In addition, there have been a number of specialized courses within Hotel Administration schools such as the "Yield Management" and "Restaurant Revenue Management" course developed by Sheryl Kimes at Cornell. There have also been a number of PhD-level seminars that have been offered in Operations Research or Management Science departments. Finally, business schools that do not offer a separate course are increasingly including a module on "revenue management" or price optimization within an Operations Management or Decision Models core course. However, more and more business schools are considering the possibility of teaching a full course devoted to the topic. In the Spring of 2003, Michael Harrison and I co-taught a course on pricing and revenue optimization at the Stanford University School of Business and I have talked to a number of instructors who are planning (or at least contemplating) to teach similar courses.

While interest is growing, there is no uniformity of thought on what should (or should not) be included in such a course or even in what the course should be named. There is no textbook or canonical reading list and cases are scarce. Someone developing a course will need to assemble reading lists, formulate problems, and develop lecture material largely from scratch. For me, the extra effort required to create a course in a relatively new area was outweighed by the freedom to craft the course in a way that reflected my own experience developing and implementing revenue management systems over the previous fifteen years.

In the remainder of this article, I will give my perspective on why an instructor might be interested in developing and teaching an MBA-level course on pricing and revenue optimization, what the overall scope of the course should be and the topics that should be covered.

[1] Popescu 2003.

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1. Why Teach Pricing and Revenue Optimization?

Why go through the effort to develop a course in Pricing and Revenue Optimization? There are at least three reasons:

1. Pricing and revenue optimization is a "hot" topic. Software companies such as Manugistics, DemandTec, Profit Logic, are actively selling Pricing and Revenue Optimization software. Newspapers and magazines regularly run articles on the application of revenue management (or dynamic pricing) in new industries. (See, for example, the article on theater ticket pricing in The New York Times (Leonhardt, 2003) and the article on revenue management of retail automobile sales in The Wall Street Journal (White, 2003)). An AMR Research January 2003 report estimated that applications of pricing and revenue optimization outside retail will grow at a compound average growth rate of 55% over the next five years. Since the field is gaining such attention and growing rapidly, many students believe that an understanding of pricing revenue management will give them an edge in their future careers.
2. PRO has its roots in management science/operations research. I believe that pricing and revenue optimization represents the next important success story for management science in business after financial engineering and supply chain management. Pricing and revenue optimization draws on many of the quantitative tools that students learned in their modelling and statistics courses. A pricing and revenue optimization course is not only useful in itself, but it extends students' abilities to apply techniques such as linear programming, probabilistic modelling, forecasting, and statistical reasoning to real business problems.
3. PRO is a relatively "green" field. Since the field is so new, there are lots of opportunities for students to find innovative ways to apply pricing and revenue optimization in different industries. Some of the most successful projects that I have seen have been in on-line golf reservation pricing, ski-lift pricing, Internet Service Provider (ISP) advertisement pricing, and health-club pricing each a topic with a twist that had not been covered in the literature to date. A good course is likely to result in at least one innovative application and one new area for research.

A course in a "hot" area such as pricing and revenue optimization can be a business-school differentiator. And there is a market. Student interest and enrollment in these courses has been high at Columbia, Stanford, and INSEAD.

2. Setting the Goals

"Revenue management" and "pricing and revenue optimization" have been on the periphery of management consciousness for years. There has been at least one popular business book on the topic (Cross, 1997) and a steady stream of articles in the business press (see "Which Price is Right?", 2003 from Fast Company for a recent example). Automated revenue management systems are commonplace at airlines, hotels, and rental car companies; markdown management systems are in a period of rapid adoption at retailers; and dynamic pricing and customized pricing systems are being developed for a number of other industries. In this environment, an increasing number of companies in different industries are becoming convinced that they need to "do something" about pricing although they are often unsure what it is that they should be doing.

In setting the goals for an MBA-level course, I think in terms of helping a future manager answer the following types of questions:

1. Do I have a pricing and revenue optimization opportunity at my company?
2. If so, how should I go about capturing it?
3. What type of opportunity is it? What techniques are appropriate?
4. Do I need an automated system? If so, should we develop it in-house or use a vendor?
5. If we plan to develop or purchase a system, how will it work?
6. What changes will be needed to business processes and organization to be successful
7. What are realistic expectations for improvement if I do implement pricing and revenue optimization? How do I measure this improvement?
8. How do explain all of this to my management in a way that they will understand?

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Of course, a single course cannot cover all of the material needed for students to answer these questions in every possible corporate setting. A realistic set of goals is to provide the insights and tools that will enable students to:

1. be able to identify pricing and revenue opportunities.
2. understand the critical differences among different types of opportunity and the approaches needed to address them.
3. understand key concepts including the impact of constrained capacity, opportunity costs, customer response, demand uncertainty, and market segmentation.
4. be able to formulate and solve pricing and revenue optimization decisions as constrained optimization problems at the level necessary to estimate potential benefits. This implies that the focus should be on imparting a broad understanding and grasp of basic techniques rather than the technical nuances of a particular algorithm.

3. Defining the Topic

So far, I have used the term "pricing and revenue optimization" without precise definition. This reflects the fact is that there is no single, universally accepted name for this young field that holds the currency and general recognition of "Supply Chain Management" or "Operations Management". Names other than pricing and revenue optimization that have been proposed include Demand and Revenue Management, Value Chain Management, Demand Management, Revenue Management, and Dynamic Pricing. Some of these names were explicitly coined in order to position the new field as the "demand side" analog to Supply Chain Management. Like most new names, they were created not only to reflect current reality, but also to create a new field with the hope that it will ultimately become a recognized category for management, teaching, and research.

The upshot of this situation is that the first choice a prospective teacher faces is what to call the course (which will also influence the scope of the course). My definition of pricing and revenue optimization (PRO) is the formulation and solution of tactical pricing decisions using constrained optimization. The decisions to be optimized are the prices or allocations of different products or services to different customers through different channels. The objective function is usually to maximize expected net contribution although it may be to increase sales or meet market share goals in some cases. Some constraints reflect physical limitations in capacity or fixed inventory, others result from business or marketing constraints (never selling a product for a higher price through the internet than through a retail outlet, for example.). "Pricing and revenue optimization" is an expansive title to the extent that it includes a wide variety of pricing and allocation problems across a wide range of industries. However, it is narrow in the sense that it does not include all of the demand-side decisions that an organization needs to make. Planning product lines and optimizing advertising expenditures are examples of decisions that would be included in "Demand Management" but are not part of pricing and revenue optimization as I have defined it.

My view of pricing and revenue optimization is illustrated in Figure 1. The foundations are the economics of customer price response and market segmentation. Resting on these foundations are a series of tactical pricing decisions, each of which is applicable in a specific situation or industry. For example, "revenue management" is the problem of determining optimal allocations to fixed fare classes in industries that sell constrained, perishable assets in markets where customer willingness to pay increases over time. Airlines and hotels are the canonical examples. "Markdown management" applies to pricing in industries with fixed and perishable inventory, when customer willingness-to-pay decreases over time. "Customized pricing" refers to the situation where sellers have the option to set different prices to different buyers based both on the customer and the products being purchased, and so on.

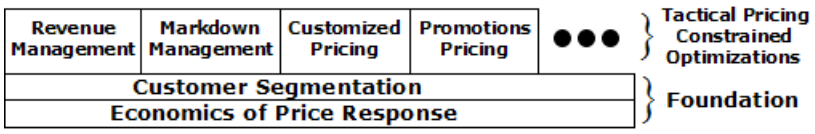

Figure 1: Elements of Pricing and Revenue Optimization.

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This view emphasizes the unity among different tactical pricing and allocation decisions across different industries. It is based upon the premise that systematic quantitative analysis can improve these decisions and increase profitability. This is the ultimate motivation for teaching pricing and revenue optimization at the MBA level.

4. Building the Course

A course based on the structure in Figure 1 would begin with several classes covering economic fundamentals and customer segmentation and then proceed on to presentation of specific PRO applications. A typical class schedule for a such a course assuming 19 classes of 100 minutes per class would be:

Class 1: Introduction to PRO. Purpose of the course. History of PRO. The PRO process. Customer commitments. The role of product segmentation, market segmentation, and channel pricing. Cost-based pricing, market-based pricing, and "value pricing".

Class 2: Review of Pricing Theory. Monopoly Pricing. Producer and Consumer surplus. Types of price discrimination (first-degree, second-degree, and third degree). Twopart tariffs and quantity discounts. Bundling.

Class 3: Pricing Analysis. Price response functions and willingness-to-pay. Tactical pricing as constrained optimization. Basic pricing optimality conditions. Pricing with a capacity constraint. The calculation and use of opportunity costs.

Class 4: Market Segmentation. Defining market segments. Impact of segmentation on pricing. Establishing "fences". Limits to segmentation. Segmenting by product definition. "Inferior" products. Effects of cannibalization. Effects of real and potential arbitrage.

Class 5: Peak-load Pricing. The peak-load pricing problem. Formulation as a constrained optimization problem. The impact of demand shifting. Applications to discount airlines, electric power, and theme-p-ark pricing. Baseball pricing example.

Class 6: Basics of Revenue Management. The problem setting. Airline customer segmentation. Booking limits and protection levels. Littlewood's rule. "Critical fractile" method for overbooking. EMSR heuristics. Booking control mechanisms.

Class 7: Case Study: American Airlines. Harvard Business School case study (Dhebar and Brandenburger, 1989).

Class 8: Advanced Revenue Management. Network management problem. Linear programming approach. Bid pricing. Revenue management in hotels, rental cars, freight transportation and other industries.

Class 9: Guest Speaker. Airline, hotel, or rental car speaker.

Class 10: Markdown Management. Retail markdown management. Retail customer segmentation. Two-period segmentation model. Formulation as a constrained optimization problem. Markdown management software.

Class 11: Customized pricing. The customized-pricing problem. Response to RFP and RFQ's. Win-loss curves. Maximizing expected profitability. Basics of logistic regression.

Class 12: Guest Speaker. Retail or automotive industry speaker.

Class 13: Dynamic List Pricing. The problem setting. Retail list pricing. E-commerce pricing. On-line bookseller example. Optimizing list prices. Interaction with replenishment decisions.

Class 14: Case Study: TNG. Columbia Business School case study (van Ryzin, 1998).

Class 15: Customer Acceptance. Customer perceptions of dynamic price differentiation. Implications from prospect theory. Dual entitlement. Price image. Examples from Amazon.com and Coca-Cola. Tactics for avoiding perceptions of unfairness.

Class 16: Legal issues. The Robinson-Patman act. Bait-and-switch laws. Implications for pricing strategy.

Classes 17 - 19: Project Presentations.

Of course, specific topics do not fit quite as cleanly into class boundaries as this schedule implies. For example, I have found that customized pricing requires

more than one class while legal issues can be covered in less than a class.

Much of the material in the first three classes should be review from previous economics courses. However, I believe it is important to cover the topic of customer segmentation in some detail. In almost all cases where there are variable or dynamic prices, there is also customer segmentation although it may not be obvious to the students at first glance. The airline segmentation between "early-booking but price sensitive" leisure travellers and "late-booking but less price-sensitive" business travellers is well known. An interesting class discussion is to focus on the difference between the airline passenger industry and "markdown management" industries such as fashion goods in which prices tend to decline over time. The decline in prices results (at least in part) from a time-based segmentation between customers who will pay more to have an item sooner (fashion lovers) and those who are willing to wait for bargains (bargain hunters). The segmentations underlying markdowns and promotions are discussed in Narasimhan (1984), Lazear (1986), Pashigian (1988) and Pashigian and Bowen (1991) among other sources. I believe that, each time a new pricing and revenue optimization topic is introduced, it is important that the students understand the underlying market segmentation.

4.1. Choosing Topic Areas

There is considerable freedom within the general structure of Figure 1 for an instructor to customized a course. One area of customization is in the choice of specific PRO topics to cover. I will describe each of the topics that I have considered below and then discuss some of my criteria for choosing which ones to include in a course.

- Revenue Management is the set of techniques used to manage constrained, perishable inventory using availability controls when customer willingness-to-pay increases toward departure. This is a narrow definition, yet every aspect of it is necessary to motivate key analytic tools such as Littlewood's rule and Expected Marginal Seat Revenue (EMSR) heuristics. Revenue management has, by far, the most substantial literature of any pricing and revenue optimization and must be included. On the other hand, its applicability (at least in the narrow sense) is limited to a handful of industries and the instructor should avoid the temptation to overemphasize revenue management at the expense of other topics.[(2)]
- Peak-Load Pricing is the tactic of varying the price of constrained and perishable capacity to reflect imbalances between supply and demand. Peak-load pricing is often confused with revenue management, with which it shares a number of characteristics. However, unlike revenue management, peak-load pricing is based on changing prices (not availabilities) and requires neither advanced bookings nor market segmentation to be effective. It is more broadly applicable than revenue management and can be used in industries such as electric-power pricing where revenue management is not applicable.
- Markdown Management is the set of techniques used to clear excess perishable inventory by lowering prices over time. It is a commonplace problem in retail, where fashion goods and short-lifecycle items (like consumer electronics) need to be cleared by a specified time. Markdown management differs from revenue management in the respect that customer willingness-to-pay tends to decrease as the obsolescence date approaches as opposed to the airline industry where it increases toward departure.
- Customized Pricing occurs whenever a seller has the opportunity to offer a unique price to a buyer. The setting may be a single large transaction or a contract for future products or services. In many cases, the seller is quoting a price in response to a Request for Proposal (RFP) or Request for Quote (RFQ). The ideal of customized pricing is to achieve perfect "first-degree price discrimination", that is, to sell to each customer exactly at her willingness-to-pay. Since willingness-to-pay is unobservable, customized pricing analysis requires estimating the probability that a customer will purchase at a given price and using this estimate to calculate expected net contribution as a function of price. Customized pricing is one of the most widespread pricing practices. It is the rule in many industrial sales settings such as made-to-order manufacturing, heavy equipment sales, freight transportation and package delivery. Despite its importance, there is little available research in this area.

(2) Netessine and Shumsky (2002) present some ways to present basic revenue management techniques to MBA students.

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- Promotions Pricing. Promotions are ubiquitous in the retail world: a recent retail survey estimated that 60% of all retail sales involved some sort of promotion. There are some settings, such as retail automotive sales, where the vast majority of sales involve some sort of promotion such as customer rebates, dealer rebates, or reduced APR[3]. The power of promotions derives from the fact that they can often be targeted to particular customer segments in ways there are not possible through list prices. The promotions pricing problem is to determine the portfolio of promotions that a seller should offer over time to meet his goals while maximizing expected profitability.

- Dynamic List Pricing is the tactic of varying list prices over time in response to changing market and supply conditions. Dynamic list pricing varies from peak-load pricing in the sense that products are not necessarily constrained (they can be re-ordered) or perishable. For a variety of reasons, most companies have tended to hold list prices fairly constant, while using promotions and markdowns as the primary mechanisms to vary tactical prices. Some of this reluctance has come from the effort and expense required to change list prices (For example, one larger retailer estimates that it costs eighteen cents in labor costs each time it changes a price at a store.). However, the rise of the Internet means that pricing velocity is increasing in many industries, and with it, the need for better dynamic list pricing.

- Auctions include any situation where more than one buyer bid sequentially for an item. The seller's problem is primarily to design the auction mechanism and secondarily to choose a reservation price for the items being sold. Auctions have been the subject of intensive research and their theory is well-developed. On the other hand, auctions play a relatively small part in the operation of most businesses[4], although they may become increasingly important if business-to-business hubs become more prevalent.

4.2. Guest Speakers

I believe that guest speakers should be a critical part of any pricing and revenue optimization course. I have invited two guest speakers per course one from the airline industry (Continental and Delta) and one from a non-airline industry (Ford Motor Company and the cruise-lines). The non-airline speaker is important in order to emphasize the broad applicability of the pricing and revenue optimization across industries. Each speaker has been someone who either was responsible for introducing revenue management to a company or significantly expanding its use. Needless to say, hearing Lloyd Hansen, Vice President of Revenue Management for Ford Motor Company describe how he has used revenue management to compete effectively with General Motors, is worth more than many hours of lectures on the details of buy-up algorithms.

4.3. Projects

I also believe that group projects are valuable. I have assigned projects where group consists of three or four students and I base 50%-60% of their grades on the project. The purpose of the projects is for the students to find a real-world pricing and revenue optimization problem and perform an analysis and generate recommendations using real data. Each group presents its final results in front of the class. My ideal project is a "mini-consulting engagement" in which a real opportunity is identified, analyzed and the results communicated in a concise and persuasive fashion. It is important to me that the presentation be done exactly as if the students were presenting the results of a consulting engagement to a corporate executive.

Of course, there are the usual problems with industry-based projects. A team may not be able to find an appropriate organization that is willing to work with them. Initially promising project opportunities sometimes suddenly evaporate as a key employee leaves, promised data turns out to be unavailable, or the company is acquired. (If nothing else, this will give the students first-hand experience of some of the real-world challenges in pricing and revenue optimization.) For these reasons, it is a good idea to have a handful of alternative projects "in the pocket" for teams who cannot find a project or whose planned project hits an impassable roadblock midway through. Such alternatives could include corporate contacts willing to sponsor a project on short notice or an alternative project concept. For example, I allowed teams who

[3] For example, according to Autodata, the "Big Three" (Ford, GM, Daimler-Chrysler) spent an average of more than $3,500 in promotions for every vehicle sold in June, 2003.

[4] This, of course, depends upon how broadly or narrowly you define the term "auction". A good discussion of the relationship between dynamic list pricing, customized pricing and auctions on the Internet can be found in Elmaghraby (2003).

could not find a good business problem to pitch an idea for a new pricing and revenue optimization company as if they were doing so to a group of venture capitalists.

4.4. Finalizing the Syllabus

As I have learned from experience, pricing and revenue optimization cannot possibly be covered in its entirety in a single quarter-long class. In developing a syllabus, I have used two criteria to determine what to include: the extent of the literature on a topic (which determines how much there is to teach) and the business importance of the topic (which determines the likelihood that a student is likely to encounter it in his future career). As shown in Table 1, there is not much correlation between the two. For example, there is a vast literature on auctions but auctions play a fairly small (but arguably growing) role in the overall world of business transactions. On the other hand, customized pricing is extremely common, and yet there is very little research or reading material available on the topic.

In my courses at Columbia and Stanford, I deemphasized promotional pricing (which is covered to some extent in marketing courses) and dynamic list pricing (where there is little available reading material) and eliminated discussion of auctions all together (not only are there are relatively few practical applications, auction theory is usually covered in other courses.). However, not only do I expect that other teachers will make other choices, my own choices and emphases are likely to change as the field continues to evolve.

Topic	Extent of Literature	Business Importance	Comments
Revenue Management	High	Medium	Very important in many service industries.
Peak-load Pricing	Medium	Medium	Often not distinguished from revenue management.
Markdown	Medium	Medium	Increasingly important in retail.
Management			
Customized Pricing	Low	High	Very important in B-to-B.
Promotions Pricing	High	High	
Dynamic List Pricing	Low	Medium	Growing in importance due to the Internet.
Auctions	High	Low	Growing in importance due to the Internet.

I believe that the class on customer acceptance and legal issues is important since these issues play an important part in determining what is and what is not possible in many industries. Two useful "mini-cases" are the announcement by Coca-Cola that it was developing vending machines that would vary prices based on outside temperature and Amazon's brief experiment with variable pricing for DVD's. In both cases a seemingly logical pricing tactic elicited a widespread and visceral negative response on the part of consumers. Why consumers rejected these tactics while routinely accepting other types of variable pricing such as senior-citizen discounts, early-booking discounts, happy hours, and differential pricing by city is an excellent topic for class discussion, despite (or perhaps because) of the fact that there is no comprehensive theory of consumer perceptions of pricing "fairness"[(5)].

An important word of advice is not to focus too much on the airlines and the airline industry. Of course, the origin of revenue management was in the commercial airlines and the vast bulk of the revenue management literature is airline oriented. Given this, there is a natural temptation to spend several classes on the airline industry and to use airlines as the "example at hand" to answer questions. To the extent possible, resist this temptation. The majority of the students have no spe-

(5) Prospect theory and the theory of dual entitlement explain some seemingly paradoxical price-response behaviors, but they are "single consumer" theories. Many of the most intense negative responses to pricing tactics involve perceptions of "fairness" relative to other consumers.

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cial interest in the airline industry which is, by and large, not hiring at the present time. Secondly, the airlines who have most mastered revenue management American, United, Delta, etc. have been making the news recently more for their economic distress than anything else.

On the other hand, I think it is productive and interesting to have the class discuss why so many major airlines are currently struggling. The "founding myth" for the field of revenue management (as presented, for example, in Cross, 1997, chapter 4.), is that American Airlines invented revenue management and used it to drive its low-cost rival Peoples Express into bankruptcy. Given this, why isn't the same tactic working today? Why are "non revenue management" carriers like Southwest and JetBlue thriving while the revenue management experts such as American and United are floundering? Discussion of these questions should lead to insights on the strategic dimensions of pricing and revenue optimization and the way that companies need to adapt their approaches to changing business environments.

5. PRO as part of a Service Operations Course

At the current time it is more likely that PRO or revenue management is taught as a module within an Operations Management, Service Operations, or Applications of OR course that as a course of its own. In this case, the instructor could be devoting 2 to 6 90 minute sessions to the topic. In this case, what topics should be covered will depend, of course, on the objectives of the overall course. The core ideas of Revenue Management can be well covered in two classes Netessine and Shumsky (2002) describe the "decision tree" approaches that can be used effectively to communicate the underlying tradeoffs as well as the way that "Littlewood's rule" can be related to the "critical fractile" approach from Inventory Theory.

A more in-depth discussion should include more background on the specific market segmentation utilized by the airlines and a discussion of the application to at least one further industry, using either Carroll and Grimes (1995) or Geraghty and Johnson (1997) as a starting point for discussion. With additional time available, I would lead a discussion on why airline revenue management doesn't seem as effective today as it does when American first introduced it. With one or two additional classes, I would discuss the markdown management problem, emphasizing both the similarities in the problem (constrained and perishable inventory that needs to be sold by a particular date), the differences in time-based market segmentation used in both industries, and how these lead to different formulations and different types of solution.

6. Resources

At the present time, the most valuable source of teaching resources are the web sites of professors who have developed similar courses. I found following two sites to be particularly useful:

- Anton Kleywegt's at Georgia Tech
  http://www.isye.gatech.edu/~anton/IL6451/IL6451syllabus.pdf
- Ioana Popescu's at Insead
  http://faculty.insead.fr/popescu/rm/index.htm

The field is still short of case studies. As noted above, I have used both the American Airlines Case Study from the Harvard Business School (Dhebar and Brandenburger, 1989) as well as the Transportation National Group Case Study from Columbia (van Ryzin, 1988). Good rental car discussions that can provide a starting point for case studies include the papers on National Car Rental (Geraghty and Johnson, 1997) and Hertz Rent-a-Car (Carroll and Grimes, 1995). Another source for resources are the Pricing and Revenue Optimization vendors, including DemandTec, Khimetrics, Manugistics, Profit Logic, and PROS Solutions among many others. (Ioana Popescu's web site referenced above includes links to many of the vendors' web-sites.) These web-sites include a number of white papers and even mini-case studies that can be useful if handled with care, since they are oriented toward selling a particular solution or point of view. I have also found it useful to do short demonstrations of pricing and revenue optimization systems as part of the class. I have demonstrated a prototype baseball ticket pricing system, a markdown management system, and a customized pricing system. The benefits of these demonstrations is to go beyond the theory and show the kinds of information and actions that are taken by real-world systems. Seeing actual screens helps the students understand how pricing and revenue optimization fits inside the tactical pricing processes. Many of the vendors would be happy to demonstrate their system to an MBA class upon rea-

sonable request. Of course, it is important for the instructor to manage the demonstration so that it is informative without being overly sales-oriented.

7. Future Prospects

I fully expect that the number of business schools offering pricing and revenue optimization courses will increase over time. PRO is a hot topic with increasing relevance to the issues that MBA's will be facing in their future careers. It draws upon a wide range of management science techniques and applies them to real business problems. As a "new field", it provides the instructor with some freedom to tailor the course to his strengths and interests. There is a growing market for these courses, not to mention the fact that, pricing and revenue optimization is a fertile area for new research topics.

Of course, the downside is that support materials are relatively scarce. Fortunately, the situation is improving. There are at least two books due to be published shortly Revenue Management by Kalyan Talluri and Garrett van Ryzin and my own Pricing and Revenue Optimization. There are a number of new cases in preparation; for example, Michael Harrison, Terry August, and I are in the process of preparing a case on on-line golf pricing based on a Stanford MBA project. Within a year or two, there will be substantially greater resources for a PRO instructor to draw from.

There is no question that the next few years will be the formative years for this new discipline to be taught at business schools. There is a unique opportunity now for those instructors willing to take on the effort of teaching a course in this area to shape the future scope and content of the field.

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