Rent-A-Car: An integrated team-based case study for managerial economics
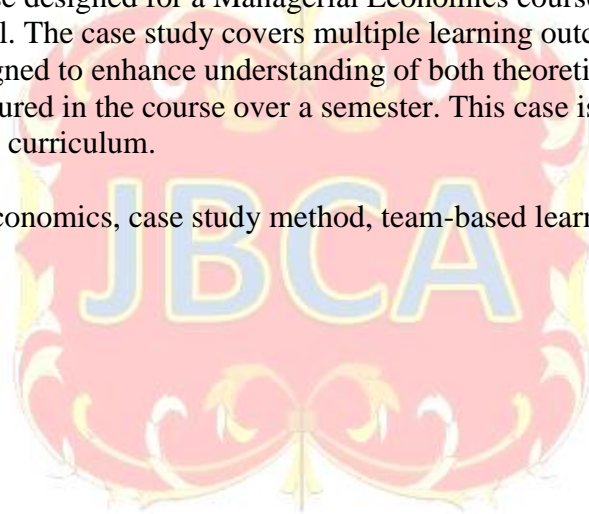
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ABSTRACT

Courses in Managerial Economics face the challenge of having theoretical focus different from more applied disciplines in business school curricula. The case study method has been proposed as a means of enhancing student learning and motivation in these courses. This article presents an integrated case designed for a Managerial Economics course at the M.B.A. or the upper undergraduate level. The case study covers multiple learning outcomes and consists of several assignments designed to enhance understanding of both theoretical concepts and quantitative methods featured in the course over a semester. This case is particularly appropriate for a team-based learning curriculum.

Keywords: Managerial economics, case study method, team-based learning, M.B.A. curriculum

INTRODUCTION

Managerial economics courses at the M.B.A. level encounter several pedagogical challenges, including the fact that the economics component in business curriculum is a theoretical standout compared with more applied business disciplines. The students may fail to see the applicability of course concepts, which leads to a lack of motivation. Furthermore, employers value quantitative and communication skills in M.B.A. graduates but the traditional lecture-based delivery model makes it difficult to address these skills within one course. Case study method has been recommended as a way of increasing student involvement, motivation, and learning in the economics classroom at both the undergraduate and the graduate levels (Becker and Watts, 1995, 1998; Carlson and Schodt, 1995; Carlson and Velenchik, 2006). Cases have become an accepted part of popular Managerial Economics textbooks (Baye, 2010).

The case study project described herewith aims to enrich and solidify students' understanding of the course material by letting them apply it to a specific case and exchange ideas and approaches within a group. The goal of the project is to make students more comfortable with the use of various quantitative techniques and their application in an environment where creativity is encouraged. This case is designed to take advantage of the principles of team-based learning (TBL). TBL is a teaching method that involves students working together in specially formed groups for the purpose of promoting more active and effective learning (Fink, 2002, p. 5). Using the TBL approach encourages students to learn from their peers, not solely from the instructor. The role of the instructor is transformed to that of a mediator (Fry et al., 2009). TBL has been used effectively in medical and science education (Michaelsen et al., 2002), as well as business schools (Hernandez, 2002).

This case study is also building upon the problem-based learning approach popular in European higher education (Gijselaers and Tempelaar, 1995). With this approach, not all assignments have a uniquely correct answer. This provides the students an opportunity to solidify their knowledge of theoretical concepts by trying various solutions without being punished for mistakes. The questions in this case often ask students to select among several alternatives, for instance among variables available for analysis. The need to compare and contrast the alternatives develops critical thinking, encourages creativity, and allows the instructor to facilitate learning by focusing on the analysis process and the assumptions used.

This case study project is fully integrated in the Managerial Economics course and contains ten assignments for use over the typical semester. The integrated format works best if the case becomes part of the course syllabus from the beginning (Carlson and Velenchik, 2006). Assignments in this case are not isolated. Students are encouraged to revisit their earlier findings and conclusions and either reuse or revise them. This allows the students to develop a more holistic approach to each question and the case in general at the final submission stage. This approach also provides the instructor with the opportunity to revisit course concepts multiple times and improve student learning.

CASE DESIGN AND PEDAGOGICAL APPROACH

This case study is integrated around a common theme and presents a series of assignments designed to cover the entire range of learning outcomes in a Managerial Economics course at the M.B.A. or upper undergraduate level. The data used for the assignments are synthesized. The assignments are presented in the form of 'memos' simulating communication

with the upper management. Each assignment is handed out after the relevant theoretical foundation is discussed in class. The instructor has flexibility in choosing questions to assign, and does not have to complete the entire sequence. In order to avoid the need to assemble student teams every week, and to minimize the class time losses resulting from switching between traditional lecture format and team discussion, the case "memos" can be assigned every three-to-four weeks in combinations the instructor deems appropriate.

This case has been tested in M.B.A. Managerial Economics classes at two business schools over several semesters. Class sizes ranged from fifteen to thirty-six students. The best practices for using the case study involve the TBL approach. The assignments have been tested in teams of three to five students. Another best practice involves team presentations and discussions of each team's findings in class at several points of the semester. As the teams work on the assignments, the instructor provides feedback on each submitted or presented part of the case. The teams are allowed to make changes to their work based on that feedback. The project grade is based on the final written summary of all answers to the case assignments due at the end of the semester.

Quantitative assignments ask the students to perform statistical analysis using some of the variables defined in Table 1 and presented in Table 2 of the Appendix. One way in which the case promotes critical thinking, is that the teams need to select appropriate variables for their analysis, and the instructor provides only a subset of the entire dataset to each team. In the end, no two teams have exactly the same results. This provides the instructor with the opportunity to discuss the methodology of analysis in Managerial Economics and its impact on results. The full text of the case introduction and assignments is presented in the following sections.

CASE INTRODUCTION

Rent-a-Car is one of the two car rental agencies serving a small regional airport in the U.S. Midwest. Forty percent of its customers are airline passengers and the remaining sixty percent are dwellers of the nearby college town who use rental cars for business and leisure trips. The airport is within two miles from campus and approximately six miles from the city center. It is easy to reach by car, taxi, or city bus.

You are a manager of Rent-a-Car. Your fleet consists of 72 cars, of which 47 fall into the 'economy' class and 25 in the 'luxury' class. Whenever demand for cars in some class exceeds the number of cars available, additional vehicles can be delivered from the nearest company hub in the state capital located 70 miles away. Alternatively, some customers unable to rent an economy-class car may be upgraded to a luxury-class car at no extra cost to them.

Your only competitor at this location has a more sophisticated system of car category tiers, which consist of Compact, Economy, Mid-size, and Large cars. More detailed data will be provided to you at a later stage. Upon receiving the data, you will be asked to examine various ways to improve the performance of this enterprise.

CASE ASSIGNMENTS

Assignment 1

In order to better understand your unit's operating environment, you are asked to provide your estimate of the demand equation that would account for various factors that affect your customer traffic. This will be done by using regression techniques. Estimating the demand equation is useful for future analysis of your unit performance.

You need to request the data for your empirical study. Specifically, (1) What are you planning to use as the dependent variable in your regression? What units of measurement for that variable are you going to adopt? (2) What other data would you need and can realistically get? You may request information about up to five independent variables.

For each variable you request, provide reasons why you expect it to be important for your analysis and explain the expected sign of the relationship between the proposed independent variable and the dependent one.

Assignment 1 Teaching Notes

This assignment requires familiarity with demand and supply analysis, demand and supply functions, and regression analysis. The assignment forces students to think critically about the design of their empirical study instead of including every possible variable in a non-discriminatory "kitchen-sink" fashion. In the process of working on this assignment, students will: (1) explain the difference between dependent and independent variables; (2) support their variable selection and explain why the variables are expected to be significant and relevant; (3) justify the expected sign of each variable's relationship with the dependent variable; (4) use their creativity in selecting appropriate proxy variables if desired data is not available; (5) examine the limitations of linear regressions which tend to work best on monotonic relationships; (6) recognize that there has to exist a sufficiently large variation in a variable in order for it to play a meaningful role in a regression (such metrics as the population of the town/county are not likely to be particularly helpful in explaining week-to-week changes in customer traffic); (7) use their common sense and understanding of causal, economic, and functional relationships between variables.

This exercise provides an opportunity to remind students that revenue or profit are not good choices for dependent variables, due to the complexity of factors involved in deriving those metrics and their resulting non-monotonic relationship with the price charged. A superior approach is to focus on clear-cut, easy-to-understand relationships whenever possible. In this case, the best candidate for the dependent variable would be some proxy for quantity demanded.

Sometimes, students request data that would be hard or impossible to obtain in a real-world business setting. The role of the instructor is to help them understand that. After an in-class discussion of Assignment 1, each team is given one opportunity to alter the set of variables they request. Based on the final request, students are provided the parts of the dataset that most closely match their request. Some of the data is intentionally made 'fuzzy' to ignite student creativity and critical thinking while they perform data analysis. Tables 1 and 2 in the Appendix provide complete details on the possible dependent and independent variables.

Assignment 2

Is there any way to use last year's data to forecast the demand for our "economy" vehicles in a specific week? (Week number is selected by the instructor as appropriate.) It would be even better if you could suggest a specific rate that we should charge for the "economy" category to maximize revenue. How many vehicles do you expect to be rented at the rate you are suggesting? Do we need to worry about increasing our fleet if we follow your demand forecast?

Assignment 2 Teaching Notes

This assignment requires familiarity with demand equations, the concepts of elasticity, total and marginal revenue, and revenue maximization techniques. In the process of working on this assignment, students get an opportunity to: (1) Practice regression analysis techniques; (2) Recognize and interpret the economic and statistical significance of regression variables; (3) Evaluate regression results and present them in the form of a demand equation; (4) Practice the relevant course material by performing revenue maximization.

Students are expected to select appropriate dependent and independent variables, use correct procedures for step-by-step elimination of insignificant variables, and select the best regression model from many possibilities, using such metrics as adjusted R-squared and p-values. Students are also expected to formulate the demand equation and present it in the form appropriate for forecasting. The demand equation may include variables that are exogenous and not controlled by the manager. The students have to develop their judgment on the appropriate assumptions about these variables in forecasting demand, and perform revenue maximization correctly. The data set described in Table 2 provides the choice between the two proxies for quantity demanded – the number of rental agreements initiated (*QE*) and the total number of rental days (*Q_length*). Students face the need to choose the most appropriate data variable among these. A possible conclusion here is that there is lack of correlation between a consumer decision about the length of rental and their decision to rent from a specific firm. There are numerous ways to demonstrate this idea, which helps the instructor to encourage student creativity and at the same time provide a basic introduction to alternative data-analysis techniques and approaches.

Provided the analysis is done correctly, the resulting demand equations and revenue-maximizing prices obtained by different teams are usually similar, even when they start with slightly different subsets of variables selected in Assignment 1. The advantage of this approach is that students are made aware of suspicious discrepancies in their results and therefore possible mistakes in their analysis not via the instructor's verdict but by comparing their results including demand equations and revenue-maximizing prices with those of other teams.

Depending on the variables selected by the students (teams) in Assignments 1 and 2, the instructor can lead the discussion in the desired direction by asking the following additional question: *The variable Q_length is the product of the number of customers (QE) and the length of the contract. Perhaps separating the number of customers from the average length of a contract and studying each separately could provide us with additional insights. I am asking you to do that and report any interesting patterns that could help explain the behavior of total sales. If you find anything worth mentioning, can you suggest any strategies that would utilize that information to increase your overall sales?*

Presenting the question in this format allows the instructor to achieve the following learning objectives: (1) Show how "data visualization" may reveal striking patterns in the data; (2) Demonstrate how breaking a composite variable down into simpler ones makes the analysis cleaner, produces more intuitively clear results, and helps with understanding complex relationships; (3) Discuss correlation analysis and potential multi-collinearity problems.

Another possible follow-up to this assignment involves the following questions: *While making the recommendation to adjust our own price, what assumptions did you make regarding the competitor's pricing? How realistic are those assumptions? Can you suggest a better way to perform the analysis?*

In answering these questions, the students are expected to realize that changes in own pricing may induce a response from a competitor. Ideally, this response needs to be incorporated into forecasts. Allowing the teams to share their thoughts on the issue may serve as a good opener for the discussion of game theory.

Assignment 3

We've been going back and forth on our philosophy regarding local advertising. As you know, each branch currently gets a $20,000/month advertising allowance but not everyone uses it completely. Does it make sense for us to spend money on advertising locally? Why or why not?

Assignment 3 Teaching Notes

Students are expected to be familiar with regression analysis and be able to read and interpret regression results. In the process of working on this assignment, students will: (1) Review regression analysis techniques; (2) Derive the demand specification from the regression model; (3) Interpret the economic and statistical significance of the estimated coefficients; (4) Apply cost-benefit analysis to business decision-making.

Assignment 3 requires the students to examine and interpret the effect of a single variable – advertising – on quantity demanded. The students are expected to rely on quantitative analysis while developing their recommendations. For this case study's data set, the estimated coefficient for the *TotalAd* variable in a multiple regression has low statistical and economic significance. This leads to a discussion of the optimality of advertising spending. Students are expected to relate the advertising expenses to the increase in revenue it brings about.

Those students who follow the stereotypical notion that advertising is always a good idea are led to think about advertising critically. When their preconceived notion is not supported by the data, the students either accept the empirical result or are forced to look for alternative explanations and missing variables. One potential explanation for the lack of significance is that advertising has a lagged effect. Another possible explanation is missing information on competitors' advertising expenses. It is possible that competitors' advertising actually negates the positive effect of own ads. Once again, this discussion may help the instructor transition to game-theoretic topics.

A possible extension for Assignment 3 includes the following question that requires the parts of the data set that describe advertising spending on various media: *If advertising looks like a good idea, then what media would work best for our advertising needs and what aspects of our product offering should we highlight the most?*

Assignment 4

Previously, we established our revenue-maximizing price. What if we want to maximize not revenue, but profit? Would the revenue-maximizing price do the trick, or should we raise or lower it? What additional information do we need to answer that question accurately?

Assignment 4 Teaching Notes

This assignment offers an opportunity to show the effectiveness of the marginal approach in obtaining intuitive answers. In the process of working on this assignment, students will: (1) Review the concept of marginal revenue; (2) Recognize the relationship between marginal revenue and price for an imperfectly competitive firm; (3) Identify relevant components of marginal cost for a business unit; (4) Analyze and contrast revenue and profit maximization in a graphical format.

For a firm that operates in an imperfectly competitive market, the marginal revenue (MR) is decreasing in quantity produced and sold. Total revenue is maximized when MR=0, whereas the profit maximizing quantity corresponds to MR=MC. Since the marginal cost (MC) of renting the vehicle is always positive, a firm facing a smooth demand curve will always maximize its profit at a smaller quantity (and therefore higher price) compared with revenue maximization. Therefore, students are expected to recommend a price increase, the exact size of which is open for discussion.

This assignment also initiates the discussion of what the marginal cost of renting a vehicle out includes. Some students incorrectly claim that, since the vehicle has already been purchased by the company, its cost is sunk and MC=0. This is incorrect and allows the instructor to review the concept of opportunity cost. The vast majority of rental vehicles are later resold in the secondary market, and the resale value of a vehicle depends heavily on the mileage. (As an option, the instructor can ask students to research the effect of mileage on a vehicle resale value using web sites such as www.kbb.com or www.edmunds.com .) Additionally, every vehicle has to be serviced periodically and re-conditioned for each new customer. Coming up with an all-encompassing estimate for the marginal cost of each rental is a useful exercise in data mining.

In cases when time constraint is an issue in managing the project, this assignment can be modified, merged with the next one, or dropped entirely.

Assignment 5

When we develop our pricing recommendations, do you think we should focus on maximizing revenue or profit? Please provide your thoughts and argumentation for which approach is better and make recommendations for pricing our economy vehicles in these weeks of the year (weeks are selected by the instructor as appropriate).

Our accounting department estimated that the cost of a rental is $16.37/day for an economy vehicle and $24.34/day for a luxury vehicle, plus $8.70 per rental contract for re-conditioning, for either type of vehicle. Delivering an additional vehicle from our state capital hub costs the company $35 on top of all of the above.

Assignment 5 Teaching Notes

In the process of working on this assignment, students are expected to: (1) Use the demand equation obtained from Assignment 2 above to derive the analytical expression for marginal revenue as a function of quantity; (2) Analyze unstructured data to quantify marginal cost; (3) Use the marginal revenue to marginal cost comparison to arrive at the profit-maximizing price-quantity combination.

This assignment presents a chance to remind students to exercise care distinguishing between average and marginal costs. Students can either use the estimates for the marginal cost of each day of rental they obtained for Assignment 4, or rely on data provided by the accounting department. In the latter case they should be reminded that reliance on average costs can produce misleading results in terms of profit maximization. First, the average cost figures may include fixed costs independent of the decision to rent the vehicle out. Second, they are often based on aggregate historical data and therefore fail to accurately reflect the cost to the firm of the decision to rent out an additional vehicle, which should be the focus of cost-benefit analysis.

Assignment 6

Currently, all our customers are charged the same daily rate. (The only exception is customers under 25 years of age who have to pay the $12.50 daily surcharge according to the company policy.) What are your thoughts on our chances to increase our revenue and profit charging different prices to different groups of customers? If you think we should explore such a possibility, make sure to include the details of the implementation plan.

Assignment 6 Teaching Notes

This assignment follows the discussion of pricing strategies and requires familiarity with the concept of consumer surplus, as well as various pricing strategies, including price discrimination, volume discounts, and tiered pricing. The following pedagogical objectives are achieved by this assignment. Students will: (1) Recognize the necessary conditions for successful price discrimination; (2) Compare and contrast cost-based and value-based pricing approaches; (3) Apply theoretical foundations to forecast the expected outcomes of various pricing strategies.

The biggest potential shortcoming of student work submitted in this assignment is the lack of depth in applying pricing models. Some student teams may claim a certain pricing strategy is bound to be successful simply because other firms, sometimes from entirely different markets, employ it. Ideally, the students need to apply economic theory along with critical thinking and take the product and market characteristics into account to develop their conclusions. A good answer to this assignment would test the proposed pricing schemes for feasibility and profit potential. This requires a review of necessary conditions for price discrimination and the rationale for the beliefs regarding price elasticity of demand for various groups of customers.

One possible additional discussion question is: *Is the 'under-25' surcharge an example of price discrimination?*

For this question, students are expected to recognize the fact that younger customers are likely to have lower income than general population, which may affect the elasticity of their

demand. The instructor may facilitate a discussion of the optimal number of pricing tiers in this context.

Assignment 7

Our customers who choose to keep a car for an extra day are currently paying the same base daily rate. Do you see any potential in exploring alternative schemes? If so, what changes should we implement – price those extra days at a higher rate? Lower rate? What considerations are involved in this decision? Provide your thoughts on this issue.

Assignment 7 Teaching Notes

This assignment builds further on the topic of pricing strategies. Learning outcomes for this assignment include the following. Students will: (1) Explain the reasoning behind volume discounts; (2) Recognize the impact of increasing marginal cost on supply; (3) Describe the negative impact of uncertainty on firm's operations.

Students are expected to contrast the volume discount philosophy with the need to account for increasing marginal cost due to uncertainty resulting from customers keeping a car for an extra day. The former consideration suggests the optimality of charging a lower rate for additional days whereas the latter one calls for an increasing rate to cover the rising inventory costs. Both considerations are valid and need to be weighed against each other. Students may also be able to reflect on the possibility of moral hazard created by consumers who would take advantage of the lower-extra-day-rate scheme by renting a vehicle for a short term at the base rate and then extending the length of the rental as needed, reducing the company profit potential. The best answers would recognize and explore the distinction between attracting customers willing to rent a car for a longer term and spontaneous decision to extend the lease. The discussion of uncertainty issues serves as a preamble to an in-depth coverage of the economics of uncertainty and information typically done later in the course.

Assignment 8

Our competitor has launched an aggressive ad campaign, advertising the $24.99/day rate for an economy car starting next week. This is a sharp $8 decrease from their average price over the last four months. Based on their prior pricing patterns, we expect the same price reduction to occur in their other vehicle categories.

How strong of an effect, if at all, do we expect this announcement to have on our weekly revenues if we maintain the price you have recommended previously? Should we try to respond to their price reduction with one of our own, or should we ignore it and proceed doing business as usual? If we decide to reduce the price, how deep should our discount be?

Assignment 8 Teaching Notes

In this assignment students will: (1) Reinforce the understanding of the demand function and revenue maximization methodology; (2) Apply the best-response technique and other game-theoretic concepts.

In order to answer this question properly, students are expected to go back to the demand equation that included the competitor's price (*Pcomp*) as one of the independent variables. The procedure is no different from the one used in assignment 2. In both cases, students have to pick a value for *Pcomp* to plug into the demand equation before they proceed to revenue maximization. In the present assignment, the lower value of *Pcomp* will result in a smaller vertical intercept of the demand curve for Rent-A-Car vehicles and consequently in the lower optimal price it should charge.

Optional additional questions include the following: *(1) Estimate the maximum attainable revenue we can achieve if the competitor offers a discount and if they don't.*

This question reminds students they should carry out the revenue maximization procedure.

(2) Would your answer differ if the forthcoming week is expected to be heavy in the volume of rentals?

This is an intentionally 'tricky' question. Students need to realize that an increase in demand would be reflected in the demand equation. Therefore, this question de facto overrides the preceding quantitative analysis done for the 'regular' demand conditions. While students should be able to answer the question based on intuition, a quantitative approach based on a modification of the demand equation is also possible and preferred.

These questions also give the instructor the opportunity to highlight the differences in optimal behavior of a firm in monopolistic and duopolistic markets. For a monopoly, higher demand always calls for higher profit-maximizing or revenue-maximizing price. For a duopoly, during the periods of higher demand, market share is important, which contributes to the possibility of a price war.

Assignment 9

Trying to avoid the need to assemble our think tank every time our competitor alters their price, could we possibly come up with some sort of a magic formula than would help us quickly pick our price in response to theirs?

Assignment 9 Teaching Notes

This assignment works well as a follow-up to an in-class discussion of Assignment 8. It utilizes a more general approach to revenue maximization, suitable for more quantitatively inclined students. Student will: (1) Practice the best-response technique on a general-form demand function; (2) Apply quantitative analysis skills.

It is possible to carry out the entire revenue maximization procedure while keeping the competitor's price (*Pcomp*) in the equation as an unknown parameter. The resulting own optimal price will then be a function of *Pcomp*. Another possibility is to try several levels of *Pcomp* and find corresponding optimal own prices using a spreadsheet. This method is more labor intensive but some less advanced students may find it easier to understand. The utilization of this approach also provides the instructor with an opportunity to demonstrate that the formula obtained through the use of the more general approach produces the same result as a spreadsheet but does it in a more concise way.

Note that Assignments 8 and 9 are stated in the context of revenue maximization. If the students' quantitative proficiency allows, both assignments can be easily modified to include profit-maximization.

Assignment 10

One of the board members inquired about the use of a "price match guarantee" which would mean we promise to match our competitor's price for a certain vehicle category if their price happens to be lower than ours. I need your opinion about the viability of such a policy in our case – would it be a good idea? Separately, how widely should we advertise such a policy if we decide to adopt it?

Assignment 10 Teaching Notes

In this assignment students will: (1) Recognize the theoretical basis for price matching; (2) Apply game-theoretic concepts to pricing decisions.

Two themes tend to prevail in the discussion of price-matching policies. On one hand, a price-matching policy can serve as a tool for price discrimination between informed and uninformed customers. The rationale is that price-sensitive customers put more effort into searching for discounts and are more likely to receive the reduced price matching that of a competitor. Groups with less elastic demand continue to pay the price that may exceed that of the competitor. According to this logic, the availability of information should be limited.

On the other hand, price-matching guarantees may help facilitate implicit price collusion and avert price wars in concentrated markets. This is because once a merchant adopts this marketing tactic, its rivals can no longer lure away its customers by charging a lower price, and therefore have little incentive to initiate a price cut. According to this logic, it is better to make the price-matching policy widely known. Once advertised, it effectively places the responsibility for pricing policy onto the competitor. An important caveat to this approach is that it is effective only if the firm offering the price-matching guarantee has a cost advantage over the competitor. Otherwise, commitment to such a policy can be self-destructive in the case of a price war.

Current theoretical and empirical research on the issue recognizes both sides of the argument and is inconclusive on this issue. Students would benefit from a discussion involving both points of view. For best results, the assignment should follow a discussion of repeated prisoners' dilemma type pricing games.

Additional readings on this topic may be recommended to students including Korts (1997), Jain and Srivastava (2000), and Moorthy and Winter (2006), among others.

CONCLUSION

The case described above contains a mix of quantitative and qualitative questions that are designed for integration within a Managerial Economics course at the M.B.A. or upper undergraduate level. These assignments focus on the application of the course's theoretical base to applied questions and develop a variety of skills including quantitative analysis, critical thinking, writing, presentation, and group work.

In addition to the assignments presented and discussed above in detail, this case can be extended in various additional directions at the discretion of the instructor. The modular nature

of the case assignments allows for certain flexibility in terms of order of questions that can be grouped into blocks and assigned in different order after a corresponding topic is discussed.

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APPENDIX

The data set used in this case study is presented in this appendix.

Table 1. Description of the variables in the data set

PownE	Average daily rate Rent-A-Car charged for its economy cars in a given week
PownL	Average daily rate Rent-A-Car charged for its luxury vehicles in a given week
Pcomp	Average daily rate of the only competitor across all vehicle categories
Session	Binary variable with 1 indicating weeks when college is in session
Weather	Number of days in a week with severe weather
Unemployment	Number of unemployed workers in the county as of Tuesday each week
FlghtWk	Number of flights (in- and outbound) serving the local airport that week
CancWk	Total number of flights cancelled that week
Holiday	Binary variable with 1 indicating weeks of national holidays (long weekends)
Wrecks	Number of major accidents that week
Discount	Number of customers in a given week using the 15 percent discount off the base rate offered through our affiliate partner, a credit card company
Upgrade	Number of customers who received a free upgrade to a luxury vehicle due to the unavailability of economy vehicles
TotalAd	Amount spent on local advertising each week
AdBlbd	Weekly spending on billboard ads
AdPaper	Weekly spending on ads in local newspapers, including the online version
AdTV	Weekly spending on ads placed with local TV
QE	Number of rental contracts initiated each week in the economy category
Q_length	Number of paid days of rentals, grouped by the agreement starting date
Age<25	Number of rental agreements in a given week for which the person listed as the primary driver on the rental agreement was less than 25 years old
Age25_50	Number of rental agreements for which the person listed as the primary driver on the rental agreement was between 25 and 50 years of age
Age51+	Number of rental agreements in a given week for which the person listed as the primary driver on the rental agreement was 51 years of age or older
FleetAge	Average age of our fleet measured in weeks
BedTax	Amounts collected from the 1% local hospitality tax in the county - this information is reported only on a monthly basis

Note: At times, students request information on gas prices. To make the case more realistic, the following web resource may be used: www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm Students will select the appropriate geographic area and time period. This serves as an exercise in data collection and a good opportunity to remind students that some publicly available information they may collect themselves.

Table 2. Data set

Week	PownE	PownL	Pcomp	Session	Weather	Unempl	FlghtWk	CancWk	Holiday	Wrecks	Discount	Upgrades	TotalAd	AdBlbd	AdPaper	AdTV	QE	Q_length	Age<25	Age25-50	Age51+	FleetAge	BedTax
1	29.99	37.99	37.75	0	4	701	41	9	0	22	12	8	430	430	0	0	87	334	9	64	14	50.3	104025.67
2	29.99	41.99	41.5	0	1	739	41	2	0	16	7	0	430	430	0	0	76	327	13	46	17	51.3	
3	24.99	26.99	35.25	0	2	814	41	3	0	12	6	5	430	430	0	0	82	315	20	51	11	52.3	
4	28.99	37.99	35.5	1	1	880	47	0	1	6	8	2	430	430	0	0	77	275	24	42	11	53.3	
5	24.99	36.99	24.5	1	0	881	47	0	0	10	10	0	430	430	0	0	76	316	20	51	5	54.3	70251.75
6	29.99	43.99	28.75	1	3	799	47	6	0	17	2	4	430	430	0	0	78	301	15	59	4	55.3	
7	28.99	44.99	34.5	1	1	857	47	0	0	20	3	1	815	815	0	0	81	355	14	55	12	56.3	
8	21.99	25.99	33	1	0	871	47	0	0	4	1	8	815	815	0	0	91	332	20	61	10	57.3	
9	26.76	48.99	29.5	1	0	870	47	0	0	12	1	0	815	815	0	0	77	260	20	40	17	58.3	80998.15
10	28.99	42.99	38.25	1	2	889	47	3	0	19	9	1	815	815	0	0	84	317	22	44	18	59.3	
11	25.99	37.99	28	1	0	855	47	0	0	9	4	1	2197	815	1382	0	76	291	14	49	13	60.3	
12	25.99	37.99	30.25	1	0	911	48	2	0	4	5	0	2520	815	1705	0	75	350	10	54	11	61.3	
13	25.99	28.99	31.5	1	0	894	48	0	0	15	1	0	1646	815	831	0	68	448	22	36	10	62.3	
14	24.99	38.99	28.5	0	0	909	48	0	0	5	11	0	815	815	0	0	89	481	38	38	13	63.3	72072.62
15	24.99	40.99	30.25	1	1	956	48	0	0	12	6	11	815	815	0	0	68	261	21	35	12	64.3	
16	23.99	34.99	28.25	1	0	988	48	0	0	8	5	0	815	815	0	0	63	227	16	32	15	28.5	
17	30.99	41.99	36	1	0	983	48	0	0	9	6	0	815	815	0	0	52	186	9	31	12	29.5	
18	24.99	41.99	30.5	1	1	938	62	3	0	1	10	7	815	815	0	0	94	405	20	64	10	30.5	83166.36
19	26.99	41.99	31	1	0	939	62	0	0	1	0	1	815	815	0	0	78	314	14	54	10	31.5	
20	25.99	45.99	32	1	0	948	62	0	0	3	3	3	1455	815	640	0	87	338	12	66	9	32.5	
21	26.99	45.99	32.5	1	0	902	64	0	0	7	4	0	4965	815	640	3510	70	248	19	34	17	33.5	
22	29.99	45.99	31	0	2	888	64	1	0	17	5	3	4325	815	0	3510	86	287	27	45	14	34.5	
23	29.99	41.99	33.75	0	0	937	64	1	0	12	5	0	4325	815	0	3510	68	264	21	31	16	35.5	92470.99
24	29.99	41.99	31.25	1	0	953	64	0	0	12	11	2	4325	815	0	3510	84	405	15	51	18	36.5	
25	24.99	41.99	32.5	1	0	983	58	0	0	8	9	2	4325	815	0	3510	86	374	15	52	19	37.5	
26	28.99	40.99	34.75	1	0	988	58	2	0	9	6	4	4325	815	0	3510	84	458	9	60	15	38.5	

Table 2. Data set (Continued)

week	PownE	PownL	Pcomp	Session	Weather	Unempl	FlghtWk	CancWk	Holiday	Wrecks	Discount	Upgrades	TotalAd	AdBlbd	AdPaper	AdTV	QE	Q_length	Age<25	Age25-50	Age51+	FleetAge	BedTax
27	24.99	46.99	33	1	0	995	58	0	1	11	11	4	4325	815	0	3510	92	400	10	68	14	39.5	91174.48
28	29.99	40.99	31.5	0	0	961	58	0	0	2	3	0	4325	815	0	3510	81	459	11	53	17	40.5	
29	28.99	37.99	37.75	1	0	996	58	0	0	6	6	2	4325	815	0	3510	85	396	14	60	11	41.5	
30	27.99	37.99	37.5	1	0	945	58	0	0	1	8	2	4018	508	0	3510	84	458	14	63	12	42.5	
31	29.99	37.99	37.25	1	0	986	59	0	0	5	8	0	6268	508	0	5760	80	344	16	48	16	43.5	
32	26.99	40.99	31	1	1	953	59	0	0	5	5	0	4018	508	0	3510	80	269	17	48	15	44.5	182486.48
33	30.99	39.99	37.25	0	0	989	59	3	0	6	3	5	4018	508	0	3510	85	332	15	56	14	45.5	
34	31.99	46.99	38.25	0	0	1031	59	0	0	13	10	0	4018	508	0	3510	77	303	22	37	18	46.5	
35	30.99	46.99	31.25	1	0	1042	59	0	0	5	8	0	4853	508	835	3510	67	297	23	28	16	47.5	
36	27.99	38.99	32.25	1	0	1023	59	0	1	2	9	2	3477	508	835	2134	81	478	14	51	16	48.5	56038.77
37	28.99	40.99	37	1	0	1045	61	0	0	7	6	1	4485	508	1843	2134	84	263	21	48	15	49.5	
38	29.99	37.99	38.75	1	0	1065	61	0	0	11	6	0	2642	508	0	2134	78	367	20	44	14	50.5	
39	31.99	41.99	37.75	1	0	1037	61	0	0	15	3	0	2642	508	0	2134	71	263	22	32	17	33.2	
40	30.99	42.99	39.5	1	0	1052	61	0	0	11	11	1	2642	508	0	2134	77	222	14	43	20	34.2	123935.45
41	26.99	41.99	31	1	0	1055	61	0	0	12	9	3	508	508	0	0	89	279	9	63	17	35.2	
42	31.99	38.99	31.25	1	1	1071	61	3	0	12	2	0	508	508	0	0	71	343	16	38	17	36.2	
43	34.99	39.99	35	0	0	1104	61	0	0	11	4	0	1237	1237	0	0	61	294	16	27	18	37.2	
44	28.99	40.99	35.75	1	0	1145	61	0	0	7	8	0	1237	1237	0	0	72	349	14	42	16	38.2	
45	25.99	41.99	37.5	1	0	1157	61	0	0	6	3	4	3117	1237	0	1880	101	441	14	71	16	39.2	99591.43
46	34.99	46.99	31.5	1	0	1136	61	0	0	9	0	0	1237	1237	0	0	52	215	16	24	12	40.2	
47	25.99	37.99	33.25	1	2	1140	61	2	1	15	2	5	1237	1237	0	0	103	388	17	74	12	41.2	
48	28.99	42.99	39.5	1	0	1146	58	2	0	12	9	0	1237	1237	0	0	75	354	12	49	14	42.2	
49	27.99	45.99	37	1	2	1156	58	4	0	14	1	0	3852	1237	0	2615	95	372	7	71	17	43.2	70942.70
50	34.99	40.99	30.5	1	0	1166	53	0	0	18	11	2	1237	1237	0	0	73	452	9	53	11	44.2	
51	34.99	39.99	30	0	1	1175	53	0	0	21	2	7	1237	1237	0	0	89	362	15	55	19	45.2	
52	26.99	41.99	35.25	0	0	1155	53	0	1	6	7	0	1237	1237	0	0	82	353	14	51	17	46.2	