TEST PREPARATION SERVICES: A MARKET ANALYSIS WORKSHOP

Short title for running header: Market Analysis Workshop

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Abstract: This article describes consecutive transdisciplinary workshops for entrepreneurial economics and quantitative methods courses, which challenge students to work in groups to prepare to enter into an existing market. Price and quantity data is fabricated to represent the market for tutoring services for standardized test preparation. Groups analyze the data, conduct market research on existing firms, choose the type of service to offer, determine how much to borrow to cover fixed costs, target a specific market segment, and pick a price. For the second workshop, groups are provided with follow up data based on their initial decisions and asked to adapt their strategies. Using their unique data, groups performs a regression analysis to identify their demand function, develops a sophisticated pricing strategy, and identifies ethical concerns.

According to its mission statement, Babson College "prepares and empowers entrepreneurial leaders who create, grow and steward sustainable economic and social value—everywhere." One of the programs that is designed to achieve this mission is the Masters of Science in Entrepreneurial Leadership (MSEL), a one year program for recent graduates who wish to refocus their careers in business. In the second half of the fall, students are required to take paired courses in Entrepreneurial Economics and Quantitative Methods. These seven-week courses culminate in a series of joint workshops that require students to apply data analysis techniques and economic theory in order to successfully enter a simulated market for test preparation services.

This article describes the design of each workshop, then discusses results from running it in three MSEL sections in fall 2022, and finally concludes. Descriptions of the data are included in an appendix and are available upon request to verified college instructors. Gauss files used to generate the starting data and the follow-up data are also available upon request.

WORKSHOP DESIGN

These workshops do not require any preliminary prepatory work by students. They arrive in already assigned groups, but unaware of what the content of the project entails. Over the course of two four-hour time blocks, groups create a mock company to enter into a simulated market that has already been populated by four existing firms. Two of these firms sell in-person tutoring services, while the others sell access to online tutoring software. Successfully entering the market requires analyzing existing data, conducting market research, and applying economic theory.

Workshop I

To begin, the instructors take about twenty minutes to explain the agenda for the first event. Students have roughly two and a half hours to analyze fabricated data about the market for test preporatory services, and then to use that analysis to make a series of strategic decisions. The initial data consists of price and quantity values in 120 U.S. zip codes for each of the fours existing firms. In addition to this information, each group is provided with five tokens (poker chips), which represent $10,000 each in seed money. This money can be used to purchase extra data at a cost of $10,000 per series or to conduct a market analysis on one of the existing firms in the market for $10,000 per firm.

Once the setting is presented, the instructors then lay out the deliverables for the first workshop. Groups must start by analyzing the given data in combination with newly acquired data to draw conclusions about the market in general. Specifically, they are required to (1) provide summary statistics, (2) create confidence intervals for the prices and quantities, and (3) conduct at least one hypothesis test. The last requirement consists of a difference in means test based on market segmentation. This segmentation can only be done with additional data, so students must figure out what data is available and buy it before conducting their analysis.

Students are also encouraged to conduct research on the existing firms in the market. When a group pays to research a particular firm, they are provided with a breakdown of its cost structure as well as a short written analysis of its market and pricing strategies. Based on this research, students must describe the market structure and decide which type of product to sell: in-person tutoring services or access to an online tutoring algorithm. Groups must also estimate their own cost structure, which will be similar to the existing firms in their market segment. They have to identify which costs are fixed and borrow enough money in the form of a startup loan to cover those costs.

After the initial analysis, groups formulate a strategy for entering the market. This begins by focusing marketing on a specific segment of the population. Groups should aim to support their decision with the data work they have already completed.[1] In addition, groups are required to select one of Porter's five competitive forces (Porter, 2008)—buyers, suppliers, substitutes, direct competitors, or new entrants—and explain how they will exploit weakness of that force to maximize their profits.

Finally, firms must select a price to charge for their product. It is explained to students that part of the goal of the first workshop is to gather information so that they may form a succesful strategy in the second workshop. As a result, the price charged in each zip code will have a random component, with the mean price set by the group. This will allow for successful regression analysis in the subsequent workshop.

Appendix A describes the extra zip code data that student groups may purchase. This data impacts firm demand and is necessary for the hypothesis test. Appendix B provides the market research available for the four existing firms in the market. This research is supplimented with a table of the cost breakdown for each firm. Students need this cost data to estimate their own costs.

Workshop I Deliverables

Groups provide two deliverables at the end of the workshop. The first is a five minute presentation using a PowerPoint template that has been provided by the instructors. The first slide in the deck identifies the team's group number and firm name. The second slide diplays data results, such as the difference in means hypothesis test, and uses it to determine which product to produce and which market segment to target with their marketing. The third slide requires groups to list anticipated firm costs and decide how large a loan they need to take to cover their fixed costs. The final slide includes a basic market analysis to determine the market structure of the industry they are entering, and then to use that analysis to choose a competitive force as the focus of their strategy as well as a price for their product.

The second deliverable consists of a one-page reflection essay, which must be submitted by midnight on the day of the workshop. In it, students explain why they made the decisions that they did. Further, they are instructed to reflect on how well their group worked together, if they used their time effeciently, and what decisions they might wish to change in the future to increase their profitability. These deliverables are each worth 20 percent of the overall workshop grade.

Workshop II

The instructors take the following five pieces of information and input them into a Gauss program to determine how the market responds to each group's entry into their market: (1) which product the firm is selling, (2) which market segment the firm is targeting with their marketing, (3) how large a startup loan the firm takes, (4) which of Porter's competitive five forces drive their strategy, and (5) what price they will charge.

First, the program will determine if the firm took out a large enough loan to cover its fixed costs. Any firm that does not borrow enough will either not be able to become operational in its

first year and will have sales of zero in all zip codes, or will not be able to support full operation and will have reduces sales in all zip codes. In these cases, groups are simply given the orginial data a second time.

Second, the program constructs a demand function for the new firm based on its targeted marketing and strategic focus. It also adjusts the demand fuctions for existing firms as customers react to the new service option. The program then plugs in the chosen price in order to determine the reaction of the existing firms to new competition and to find the market demand in each zip code. The price of the new firm is adjusted with a uniform random shock in order to create variantion for the regression analysis.

Groups are provided with data and an analysis of their previous decisions. For groups that did not borrow enough to cover their fixed costs, the data is the same as from the first workshop. For groups that successfully entered the market, a new data set is provided with updated prices and quantities for all five firms by zip code. All groups are given all four supplemental data series (as described in Appendix A) and the market research of the original four firms. In addition, the group's firm now starts with a certain amount of capital: it is assumed that depreciated capital is replaced. The group learns about their economic profits, which net total revenue with depreciation, interest payments, marketing costs, overhead, and variable costs. Finally, each groups' outstanding loan combines the starting loan with economic profit.

Teams are given approximately two and a half hours to analyze their new data and make a series of strategic decisions. First, groups must run a regression analysis to determine the market demand for their product. Groups that did not borrow enough to cover their fixed costs in the first workshop must use an existing firm as a proxy for themselves when estimating their demand function. Based on the regression results, students can estimate the price elasticity, cross-price

elasticity, and income elasticity of demand for their product. Based on the data analysis, groups should formulate a sophisticated pricing strategy. Finally, they should consider the ethical implications of their pricing strategy.[2]

Workshop II Deliverables

Groups provide two deliverables at the end of the workshop. The first is a five minute presentation using a PowerPoint template that has been provided by the instructors. The first slide in the deck identifies the team's group number and firm name. The second slide diplays regression results and estimates of various elasticities of demand. The third slide describes the pricing strategy and includes any motivating calculations on which the strategy is premised. The final slide addresses the potential ethical implications of the firm's pricing strategy.

The second deliverable consists of a one-page reflection essay, which must be submitted by midnight on the day of the workshop. In it, students reflect on the entire workshop and consider which tools from each class they used. Student must also explain how they arrived at their overall strategy for entering the market. These deliverables are each worth 20 percent of the overall workshop grade.

After the second workshop, the instructors input the sophisticated pricing strategy into the same Gauss code and find the final profitability of the firm. This profit is divided by the assumed market interest rate of 0.03 in order to find the present discounted value of the future stream of profits. This stream of profits is added to the existing capital stock and outstanding loans are subtracted to determine value of the newly created firm. The firm with the highest market value is declared the winner and receives a bonus of five points on the workshop grade.

Finally, students are required to submit peer evaluations of their group members. These evaluations make up the final 20 percent of the workshop grade.

RESULTS

Possible use of pre and post workshop questions

Quotes from student reflection essays.

CONCLUSIONS

The workshop have not yet been conducted, so we cannot yet draw any conclusions about the effectiveness of the workshop.

NOTES

[1] For example, if a group notices that in-person tutoring services do not have much market penetration in rural areas of the country, they might decide to focus on that segment of the market.

[2] Larson, Mattu, and Angwin (2015) find that Asians are more likely to be quoted a higher price for SAT tutoring services by The Princeton Review.

REFERENCES

Larson, J., Mattu, S., and Angwin, J., 2015. Unintended Consequences of Geographic Targeting. *Technology Science*.

Porter, M. E., 2008. The Five Competitive Forces that Shape Strategy. *Harvard Business Review*, 86, 79-93.

Appendix A

Groups can buy the following data about each zip code: average disposable income, median home price, regional indicators, and community type indicators. There are 120 observations in the data and they are evenly split into four geographic regions: South, Midwest, West, and Northeast. Each of the 30 observations in a given region are evenly subdivided into three community types: rural, suburban, and urban. Average disposal income and median home price are dependent on region and community dummy, with additional variation added.

The demand functions for each of the existing firms is weighted to make them dependent on these four data series. As a result, groups can run difference in means tests to determine which zip code the firms are targeting with their marketing campaigns.

Appendix B

There are four existing firms in the industry at the start of the first workshop. The Princeton Review offers synchronous tutoring sessions for small semi-private groups of two to four to students at a time. It provides content for these sessions and relies mostly on word of mouth for its marketing. Calls to customer service are answered by actual people in under 20 minutes. The Princeton Review's pricing strategy is quite sophisticated and they appear to price discriminate based on the location of customers.

Tutor the People offers synchronous tutoring sessions for small semi-private groups of two to four to students at a time. It provides content for these sessions and uses targeted online ads to market its product. Calls to customer service are answered promptly by actual people. Tutor the People's pricing strategy is naïve; however, they do appear to price discriminate based on customer wealth.

Sylvan Learning offers an asynchronous tutoring platform, which is powered by artificial intelligence that adapts content and test questions based on student performance. It develops its own content and targets its product marketing across a wide variety of media. Sylvan Learning's pricing strategy is sophisticated.

Kaplan offers an asynchronous tutoring platform, which is powered by artificial intelligence that adapts content and test questions based on student performance. It develops its own content and aggressively markets its product across a wide variety of media. Kaplan price matches Sylvan as a way to disincentivizes price competition.

Each market research summary includes a breakdown of the firm's costs as seen in Table 1; however, variable costs are only given in aggregate and costs are not differentiated between fixed and variable. Thus, students must identify which costs are fixed and what the marginal costs are themselves.

[Insert Table 1 here]

Table 1: Cost Structure of Existing Firms

	Princeton	Tutor	Sylvan	Kaplan
Content Development	$1,000,000	$1,000,000	$2,000,000	$2,000,000
AI Development	$0	$0	$10,000,000	$10,000,000
Depreciation Rate	0.1	0.1	0.1	0.1
Cost of Depreciation	$100,000	$100,000	$1,200,000	$1,200,000
Marketing	$150,000	$110,000	$370,000	$320,000
Overhead	$100,000	$240,000	$115,000	$115,000
Loan size	$1,250,000	$1,350,000	$12,485,000	$12,435,000
Interest Rate	0.03	0.03	0.03	0.03
Interest Costs	$37,500	$40,500	$374,550	$373,050
Data Service per Customer	$0	$0	$2	$2
Customers	0	0	113,341	113,165
Data Service Costs	$0	$0	$226,682	$226,330
Tutors per Hour	$30	$30	$0	$0
Hours	23,644	19,098	0	0
Tutors Total Costs	$709,320	$572,940	$0	$0
Total Cost	$1,096,820	$1,063,440	$2,286,232	$2,234,380
Total Fixed Cost	$387,500	$490,500	$2,059,550	$2,008,050
Total Variable Cost	$709,320	$572,940	$226,682	$226,330
Marginal Cost	$30	$30	$2	$2