Research questions for XXX

The Bottom Line: Your goal is to develop a pricing strategy. The company reports that it has been pricing at about 3 times the cost, so if marginal cost is $10, the company charges $30. They report that they do not always charge exactly this price; they experiment and vary the price around this target. They also mentioned that costs tend to be higher in areas with more sales, at least on average if not month-to-month. Your task is to determine whether this pricing rule is optimal for maximizing profit, and it not, suggest an alternative (should they increase or decrease the price).

Customer Service: The company prides itself on having excellent customer service. They are worried that there are too many complaints and want their customer service department to help reduce them. Historically the company has hired more employees in areas and months where it has more sales. It also hires more employees in areas where it has historically had high wait times. The company says that it does not make month-to-month changes in customer service employment in response to wait time. Your goal is to determine the effect of the number of customer service employees on the number of complaints.

Production: The goal of the production department is to keep the rate of faulty output low. When demand is high, machines run for more hours and are more likely to produce faulty output. Older machines are also more likely to generate faulty output. The company believe that more frequent maintenance can reduce the fault rate, but this is expensive. Currently they do more maintenance in regions and months with older machines and machines that run longer. They would like you to analyze the effect of the maintenance rate on the rate of faulty output.

Human Resources: One of the key human resource challenges facing the company is turnover. Employee turnover is costly because it takes time to fill a vacancy, recruiting costs are high, and once the vacancy is filled, it requires considerable time before the new employee is fully trained. The company is considering raising wages to reduce turnover, but this is costly. They would like you to analyze the effect of wage on turnover. The company pays higher wages when more of its workforce has a college degree, when the unemployment rate is low, and when the labor market is strong (which generally means that turnover is high). They have experimented with giving some regions a "budget boost" to raise wages. They believe the budget boost has no direct effect on turnover.

Advertising: Each region runs 30-second television commercials in an effort to increase sales. They are more likely to run ads in larger markets and in markets with greater demand for the company. However, ads are expensive and they are less likely to run ads in markets

where the price of ads is higher. The company records the price of ads, but they do not believe that this variable has any direct impact on sales. Your job is to analyze the effect of TV ads on quantities sold.

Data notes for XXX

You have received files with information on several variables related to XXX's business. The business is organized around 112 regions, and have up to 48 months of data, covering 2014- 2017. Make sure to discuss how you found confounding factors, what tool(s) you used to solve the endogeneity issue, how the tool(s) resolve the endogeneity issue, and also the impact any additional outstanding confounding factors might have on your results. All relevant output should be presented (but not all information is relevant). The following is information on some of your variables.

*You will not have all of these and your data will likely include some not on here.

1. Identifying information

    a. region: A number 1-112, identifying the region to which the data pertain

    b. month: 1-12, month of year

    c. year: 2014-2017

2. Regional information (not company specific):

    a. population: number of people living in the region

    b. education: average education of adults in the region

    c. hh_size: average household size of the region

    d. age: average age of people in the region

    e. income: Average household income in the region

    f. unemployment_rate: the prevailing unemployment rate in the region and month

    g. precipitation: average inches of rainfall in the region

3. Bottom line information

    a. Log Price: the natural log of price

    b. Log Profit: the natural log of profit

4. Customer service information

a. Log of Complaints per day: This is the natural log of the number of complaints that occurred per day in that month in that region.

b. Log of Help Desk Employees: The natural log of the number of employees working in customer service for that region and month

5. Production information

a. Log of Faulty Units: The natural log of the number of faulty units

b. Machine Maintenance Rate: Monthly share of machines with repairs or maintenance

c. Workers per Machine: The number of workers per machine in that county-month

6. Human Resources information

a. Avg. Longevity: The average amount of time employees at this location have been with the company.

b. Avg. Salary: Average salary in thousands of dollars

d. Budget Boost: Did the region get a budget boost for raising wages?

7. Sales & Marketing information

a. Ads: Number of tv ads aired

b. Ad Price Index: Price of a 30 second tv Ad in this market

c. Log Sales: Natural log of sales

d. Log Advertising: Natural log of advertising spend