***CASE 1: INSURANCE CLAIMS AND DEDUCTIBLES***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Mean | STD.DEV | Min | Max |
| Claimsper100 | 10.864 | 9.408 | 0 | 34.61 |
| Deductible | 496.4 | 282.961 | 0 | 1000 |
| % Local Pop.25-65 | 60.342 | 8.925 | 45 | 75 |
| % Local Pop Married | 62.99 | 10.509 | 45 | 80 |
| Local Traffic Index | 5.638 | 2.866 | 1 | 10 |
| Local Wealth index | 5.522 | 2.949 | 1 | 10 |

**1. Describe results in Table A.4:**

1. Claims per 100:

Mean (10.864): On average, there are approximately 10.864 claims per 100 units.

Standard Deviation (9.408): The variability in the number of claims is quite high, with values ranging from 0 to 34.61.

1. Deductible:

Mean (496.4): The average deductible amount is 496.4.

Standard Deviation (282.961): There is significant variability in deductible amounts, with values ranging from 0 to 1000.

1. % Local Pop.25-65:

Mean (60.342): On average, 60.342% of the local population falls within the age range of 25 to 65.

Standard Deviation (8.925): The percentage of the population in this age range varies, with values ranging from 45% to 75%.

1. % Local Pop Married:

Mean (62.99): On average, 62.99% of the local population is married.

Standard Deviation (10.509): The percentage of married individuals in the population varies, with values ranging from 45% to 80%.

1. Local Traffic Index:

Mean (5.638): The average local traffic index is 5.638.

Standard Deviation (2.866): There is variability in local traffic index values, ranging from 1 to 10.

1. Local Wealth Index:

Mean (5.522): The average local wealth index is 5.522.

Standard Deviation (2.949): The wealth index varies across different locations, with values ranging from 1 to 10.

- Is variation in Deductible important? If so, why?

The variation in Deductible is important for several reasons:

1. Risk Management:

Understanding the variability in deductible amounts is crucial for risk management. Higher variability may indicate a broader range of potential financial risks for the insurance provider. This variability could affect the company's ability to predict and manage financial exposure.

1. Customer Behavior:

Variability in deductible amounts may reflect differences in customer behavior and preferences. Some customers may opt for higher deductibles to lower their premium costs, while others may choose lower deductibles for more predictable out-of-pocket expenses. Insurers need to be aware of these preferences to tailor their offerings effectively.

1. Profitability and Pricing:

The variation in deductible amounts can impact the profitability of insurance products. Insurers set premiums based on their expectations of future claims and associated costs. Understanding the range of deductibles helps insurers determine appropriate pricing strategies to remain competitive while ensuring profitability.

**2. Explain the results for Deductible in Table A.5**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Coefficients | Standard error | t-stat | p-value | Low 95% | Upper 95% |
| Intercept | 29.1421 | 17911 | 16.2704 | 0.0000 | 25.6229 | 32.6612 |
| Deductible | -0.0323 | 0.0007 | -44.0612 | 0.0000 | -0.0337. | -0.0309 |
| % Between 25-65 | 0.0028 | 0.0170 | 01631 | 0.8705 | -0.0307 | 0.0362 |
| % Married | -0.0352 | 0.0145 | -2.4286 | 0.0155 | -0.0636 | -0.0067 |
| Traffic Index | 0.0340 | .0574 | 0.5927 | 0.5537 | -0.0788 | 0.1468, |
| Wealth Index | -0.0710 | 0.0541 | -1.3112 | 0.1904 | -0.1774 | 0.0354 |

a. What does the point estimate mean?

The point estimate is the calculated value from sample data used to estimate an unknown parameter. In regression, the Deductible coefficient (-0.0323) implies an average decrease of 0.0323 units in the claim rate for each one-unit increase in Deductible.

b. What does the p-value mean?

The p-value measures evidence against a null hypothesis in regression. A low p-value (e.g., 0.0000 for Deductible) indicates strong evidence that the predictor has a significant effect on the dependent variable (claim rate).

c. What do the upper and lower bounds for the 95% confidence interval mean?

The 95% confidence interval provides a range where we are 95% confident the true population parameter lies. For Deductible (-0.0337, -0.0309), we are confident the true effect on claim rate lies within this range, not including zero, emphasizing the significance of Deductible in predicting claim rates.

**3. What purpose does including variables besides Deductible in the regression serve?**

Control Confounding:

It ensures we account for other factors that might affect both Deductible and claim rates, avoiding misleading conclusions.

Improve Accuracy:

Additional variables give a more accurate picture by considering various factors influencing the outcome, not just Deductible.

Capture Relationships:

It lets us see how different variables interact and affect the claim rate together.

**4. Are the variables besides Deductible that are in the regression all controls, or do any play the role of a proxy**

variable? What is the difference?

Control variables in a regression model manage the influence of factors not the focus, preventing distortion of the primary predictor's impact. In the given results, % Between 25-65, % Married, Traffic Index, and Wealth Index may serve as control variables.

Proxy variables act as substitutes for hard-to-measure factors, assuming they correlate with the unobservable variable. In the regression results, none explicitly serve as proxies; they represent observable characteristics.

And the difference:

Control Variables: Included to account for the influence of known factors on the dependent variable, reducing the risk of confounding.

Proxy Variables: Used as substitutes for unobservable or challenging-to-measure factors, aiming to capture their effects indirectly.

**5 and 6. Predict the effect of raising the policy deductible by $200 on claim rates.**

the Deductible coefficient is -0.0323.

Change in Claim Rate = Deductible Coefficient \* Change in Deductible

= -0.0323 \* 200 = -6.46

* The predicted effect is a decrease of 6.46 units in the claim rate for a $200 increase in the policy deductible.