**Exercise #1:**

The attached dataset, provides some information about hospitals in 2011 and 2012, download the data and then complete the descriptive table. Please use the following format to report your findings.

Table 1. Descriptive statistics between hospitals in 2011 & 2012

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Hospital Characteristics** | 2011 | | | 2012 | | | p-value |
| N | Mean | St. Dev | N | Mean | St. Dev |
| 1. Hospital beds |  |  |  |  |  |  |  |
| 2. Number of paid Employee |  |  |  |  |  |  |  |
| 3. Number of non-paid Employee |  |  |  |  |  |  |  |
| 4. Total hospital cost |  |  |  |  |  |  |  |
| 5. Total hospital revenues |  |  |  |  |  |  |  |
| 6. Available Medicare days |  |  |  |  |  |  |  |
| 7. Available Medicaid days |  |  |  |  |  |  |  |
| 8. Total Hospital Discharge |  |  |  |  |  |  |  |
| 9. Medicare discharge |  |  |  |  |  |  |  |
| 10. Medicaid discharge |  |  |  |  |  |  |  |

Based on your findings in which years hospitals had better performance? Please write a short paragraph and describe your findings.

(Note: Master RStudio script is available for this exercise, but you may need to modify that for this analysis)

**Exercise #2:**

Use the dataset from week1 exercise and then answer the following questions:

1. Compare the following information between teaching and non-teaching hospitals.
2. What are the main significant differences between teaching and non-teaching hospitals? (use ttest)
3. Comparing hospital net-benefit which hospitals has better performance? To answer this question first compute the hospital net benefits with subtracting hospital costs and revenues and then use ttest to compare the significant differences between teaching and non-teaching hospitals.
4. Use a box-plot and compare hospitals-cost and hospital-revenues between teaching and non-teaching hospitals.
5. Write a short paragraph and describe your findings.

Table 2. Descriptive statistics between teaching and non-teaching hospitals, 2011 & 2012

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Hospital Characteristics** | **Teaching** | | | **Non-Teaching** | | | **p-value** |
| **N** | **Mean** | **St. Dev** | **N** | **Mean** | **St. Dev** |
| 1. Hospital beds |  |  |  |  |  |  |  |
| 2. Number of paid Employee |  |  |  |  |  |  |  |
| 3. Number of non-paid Employee |  |  |  |  |  |  |  |
| 4. Internes and Residents |  |  |  |  |  |  |  |
| 5. System Membership |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 6. Total hospital cost |  |  |  |  |  |  |  |
| 7. Total hospital revenues |  |  |  |  |  |  |  |
| 8. Hospital net benefit |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 9. Available Medicare days |  |  |  |  |  |  |  |
| 10. Available Medicaid days |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 11. Total Hospital Discharge |  |  |  |  |  |  |  |
| 12. Medicare discharge |  |  |  |  |  |  |  |
| 13. Medicaid discharge |  |  |  |  |  |  |  |

(Note: Master RStudio script is available for this exercise, but you may need to modify that for this analysis)

**Exercise #3:**

The dataset provides Herfindahl–Hirschman Index, and herfindahel index categories, please use the herf\_cat variable and answer the following questions:

Note: “The Herfindahl–Hirschman Index is a commonly accepted measure of market concentration used by antitrust enforcement agencies and scholars in the field. The HHI is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers” (NASI, 2015; pp: 14-16). read more from here:

<https://www.urban.org/sites/default/files/publication/50116/2000212-Addressing-Pricing-Power-in-Health-Care-Markets.pdf>

For this exercise you do not need to compute the HHI, but if you have any questions, please do not hesitate to ask me, but try to learn more about this you will need that to report your findings.

Use the dataset from week1 exercise and then answer the following questions:

1. Compare the following information between hospitals located in high, moderate and low competitive markets? (table 1)
2. What are the main significant differences between hospitals in different markets? (use Anova test)
3. Use the density curves and compare hospitals cost and revenues between three markets.
4. What is the impact of being in high-competitive market on hospital revenues and cost? Do you think being in high-competitive market has positive impact on net hospital benefits? What about the number of Medicare and Medicaid discharge? Do you think hospitals in higher completive market more likely to accept more Medicare and Medicaid patients? What are the impact of other variables? Please discuss your findings in 1-2 paragraphs.

(Note: to answer to the last question, please compute the ratio-Medicare-discharge and ratio-Medicaid-discharge first and then run 2 ttest) high vs. moderate and high vs. low competitive market), please support your findings with box-plot).

Table 3. Comparing hospital characteristics and market, 2011 and 2012

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | High Competitive Market | | | Moderate Competitive Market | | | Low Competitive  Market | | | ANOVA/Chi-Sq (results) |
| **Hospital Characteristics** | N | Mean | STD | N | Mean | STD | N | Mean | STD |
| 1. Hospital beds |  |  |  |  |  |  |  |  |  |  |
| 1. Number of paid Employee |  |  |  |  |  |  |  |  |  |  |
| 1. Number of non-paid Employee |  |  |  |  |  |  |  |  |  |  |
| 1. Internes and Residents |  |  |  |  |  |  |  |  |  |  |
| 1. System Membership |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. Total hospital cost |  |  |  |  |  |  |  |  |  |  |
| 1. Total hospital revenues |  |  |  |  |  |  |  |  |  |  |
| 1. Hospital net benefit |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. Available Medicare days |  |  |  |  |  |  |  |  |  |  |
| 1. Available Medicaid days |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 1. Total Hospital Discharge |  |  |  |  |  |  |  |  |  |  |
| 1. Medicare discharge |  |  |  |  |  |  |  |  |  |  |
| 1. Medicaid discharge |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 14. Herfindahel index |  |  |  |  |  |  |  |  |  |  |

(Note: Master RStudio script is available for this exercise, but you may need to modify that for this analysis)

**Exercise #4**

**Linear Regression Model**

If you have chosen to work with RStudio, please run the following model and complete the following tables.

**1st Model:**

Run a linear model and predict the difference between hospital beds (use the bed-tot) and hospital’s ownership on hospital net-benefit? Discuss your finding, do you think having higher beds has positive impact on the hospital net benefit? What about the ownership?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Model 1a | |  |
| **Hospital Characteristics** | Coef. | St. Err |  |
| Hospital beds |  |  |  |
| **Ownership** |  |  |  |
| For Profit |  |  |  |
| Non-for profit |  |  |  |
| Other |  |  |  |
| N |  |  |  |
| R-Squared |  |  |  |

**2nd Model:**

Now, estimate the impact of being a member of a system on hospital net benefit? And discuss your finding (nor more than 2 lines)? Is it significant?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Model 2 | |  |
| **Hospital Characteristics** | Coef. | St. Err |  |
| Hospital beds |  |  |  |
| **Ownership** |  |  |  |
| For Profit |  |  |  |
| Non-for profit |  |  |  |
| Other |  |  |  |
| **Membership** |  |  |  |
| System Membership |  |  |  |
| N |  |  |  |
| R-Squared |  |  |  |

**3nd Model:**

Now, include the ratio of ratio-Medicare-discharge and ratio-Medicaid-discharge in your model? How do you evaluate the impact of having higher Medicare and Medicaid patients on hospital revenues?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Model 3 | |  |
| **Hospital Characteristics** | Coef. | St. Err |  |
| Hospital beds |  |  |  |
| **Ownership** |  |  |  |
| For Profit |  |  |  |
| Non-for profit |  |  |  |
| Other |  |  |  |
| **Membership** |  |  |  |
| System Membership |  |  |  |
| **Socio-Economic Characteristics** |  |  |  |
| Medicare discharge ratio |  |  |  |
| Medicaid discharge ratio |  |  |  |
| N |  |  |  |
| R-Squared |  |  |  |

Based on your finding please recommend 3 policies to improve hospital performance, please make sure to use the final model for your recommendation.

Discuss your findings.

If you have chosen to work with Excel, please run above three models and complete the following tables.

**Model 1:**

Run a linear model and predict the difference between hospital beds (use the bed-tot) and hospital net-benefit in teaching hospitals?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-1 |  |  |  |  |  |  |
| Hospital beds |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

**Model 2:**

Run a linear model and predict the difference between hospital beds (use the bed-tot) and hospital net-benefit in non-teaching hospitals?

Use the results from model 1 and model 2 and compare the results between teaching and non-teaching hospitals.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-2 |  |  |  |  |  |  |
| Hospital beds |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

**Model 3:**

Now, include the ratio of ratio-Medicare-discharge and ratio-Medicaid-discharge in first model? How do you evaluate the impact of having higher Medicare and Medicaid patients on hospital net-benefit in teaching hospitals?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-3 |  |  |  |  |  |  |
| Hospital beds |  |  |  |  |  |  |
| ratio-Medicare-discharge |  |  |  |  |  |  |
| ratio-Medicaid-discharge |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

**Model 4:**

Now, include the ratio of ratio-Medicare-discharge and ratio-Medicaid-discharge in first model? How do you evaluate the impact of having higher Medicare and Medicaid patients on hospital net-benefit in non-teaching hospitals?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-4 |  |  |  |  |  |  |
| Hospital beds |  |  |  |  |  |  |
| ratio-Medicare-discharge |  |  |  |  |  |  |
| ratio-Medicaid-discharge |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

Based on your finding please recommend 3 policies to improve hospital performance, please make sure to use the final model for your recommendation.

**Exercise #5**

For this week exercise, we need to try a few logit models (see this link for more information: <https://stats.idre.ucla.edu/r/dae/logit-regression/>)

**Model 1**

Run a logit model and use being a member of network and find out its impact on hospital ownership and hospital beds? (Model 1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | St. Err | p-value |
| Hospital beds |  |  |  |
| **Ownership** |  |  |  |
| For Profit |  |  |  |
| Non-for profit |  |  |  |
| Other |  |  |  |
| N |  |  |  |
| AIC |  |  |  |

**Model 2**

Now, include hospital income and report the Coeff.? (Model 2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | St. Err | p-value |
| Hospital beds |  |  |  |
| **Ownership** |  |  |  |
| For Profit |  |  |  |
| Non-for profit |  |  |  |
| Other |  |  |  |
| **Hospital Income** |  |  |  |
| N |  |  |  |
| AIC |  |  |  |

**Model 3**

Now, include the ratio of ratio-Medicare-discharge and ratio-Medicaid-discharge in your model? And keep all variables you used for models 1, 2 & 3 and discuss your findings? Do you recommend keeping membership for a hospital? Why or why not? (Model 3)

|  |  |  |  |
| --- | --- | --- | --- |
| **Hospital Characteristics** | Coef. | St. Err | p-value |
| Hospital beds |  |  |  |
| **Ownership** |  |  |  |
| For Profit |  |  |  |
| Non-for profit |  |  |  |
| Other |  |  |  |
| **Hospital Income** |  |  |  |
| **Medicare discharge ratio** |  |  |  |
| **Medicaid discharge ratio** |  |  |  |
| N |  |  |  |
| AIC |  |  |  |

Based on your finding please recommend 3 policies to improve hospital performance in FP, NFP hospitals, please make sure to use the final model for your recommendation.

If you have chosen to work with Excel, please run above three models and complete the following tables.

**Model 1**: Run a regression model and use being a member of network and find out its impact on hospital cost? (Model 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-1 |  |  |  |  |  |  |
| Hospital cost |  |  |  |  |  |  |
| N |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

**Model 2**: For the 2nd model run a regression model and use being a member of network and find out its impact on hospital cost and hospital revenue? (Model 2)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-2 |  |  |  |  |  |  |
| Hospital cost |  |  |  |  |  |  |
| Hospital Revenue |  |  |  |  |  |  |
| N |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

**Model 3**: For the 3rd model run a regression model and use being a member of network and find out its impact on ratio-Medicare-discharge and ratio-Medicaid-discharge.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Coef. | ST. ERR | T Stat | P-values | Lower 95% | Upper 95% |
| Model-3 |  |  |  |  |  |  |
| Hospital cost |  |  |  |  |  |  |
| Hospital Revenue |  |  |  |  |  |  |
| Medicare discharge ratio |  |  |  |  |  |  |
| Medicaid discharge ratio |  |  |  |  |  |  |
| N |  |  |  |  |  |  |
| R Square |  |  |  |  |  |  |

Based on your finding please recommend 3 policies and discuss the impact of being on a network on hospital cost, hospital revenue and out its impact on ratio-Medicare-discharge and ratio-Medicaid-discharge. Do you recommend keeping membership for a hospital? Why or why not?