The financial markets have put a huge strain on the United State’s economy in every way possible. The housing market has plummeted drastically, unemployment rates are higher than anytime in the recent years, and consumer spending is viewed as a snail race. In the housing market, problems arise for both sellers and buyers alike. Even with the economy in a downward spiral, people have become more interested in buying homes in this buyer’s market, especially because homes are readily available and at fantastic prices due to foreclosures and unemployment. However, the banking industry has made it a challenge for buyers to borrow money, especially if the borrower’s credit is not perfect.

 With the market being abundantly equipped with housing, buyers can broaden their search and add on additional features (e.g. square footage, pools, bedroom, and bathrooms) that might not have been an option prior to the recession. These amenities are still considered when concerning the selling prices in the slow economy. In this paper, the Real Estate Data sets will be used to determine if there is a difference in the mean price per square foot among homes with different number of bedrooms. The samples used have been collected and published in *Statistical Techniques in Business and Economics*. In the samples Team C will use the following:

* 24 homes with two bedrooms
* 26 homes with three bedrooms
* 26 homes with four bedrooms
* 29 homes with five or more bedrooms

 By performing this research, two hypotheses will be examined and either rejected or accepted. The question being researched, the *verbal hypothesis*, is stated as: Is there a difference in the mean price per square foot among the homes with different number of rooms.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of Bed-rooms |   |   |
|  | *Two* | *Three* |  *Four* | *Five or more* |
|  |  |  |  |  |
| Mean | 200.35 | 214.4538 | 215.172 | 250.9897 |
| Standard Error | 8.90 | 6.81 | 7.63 | 10.02 |
| Median | 193.30 | 212.15 | 216.00 | 247.70 |
| Standard Deviation | 43.61 | 34.72 | 38.14 | 53.94 |
| Sample Variance | 1902.00 | 1205.18 | 1454.38 | 2909.35 |
| Kurtosis | -0.22 | 0.87 | -1.07 | -1.17 |
| Skewness | 0.21 | 0.80 | 0.22 | -0.04 |
| Range | 169 | 141.6 | 137 | 197.9 |
| Minimum | 125 | 166.2 | 155.4 | 147.4 |
| Maximum | 294 | 307.8 | 292.4 | 345.3 |
| Sum | 4808.4 | 5575.8 | 5379.3 | 7278.7 |
| Count | 24 | 26 | 25 | 29 |

 The null hypothesis will conclude if the square foot price is equal to or not equal to homes with a different number of bedrooms.

 The two hypotheses that will be examined will be:

$$H\_{0}:μ\_{1}=μ\_{2}=μ\_{3}=μ\_{4}(The Mean square foot price is equal in each sample)$$

$$H\_{1}:μ\_{1}\ne μ\_{2}\ne μ\_{3}\ne μ\_{4}\left(The Mean square foot price is not equal in each sample\right)$$

Step One – State the null hypothesis

 When looking at the data presented, Team C Decided to focus on the mean price per square foot for homes with Two, Three, Four, and Five or more bedrooms. This analysis was decided upon due to the current housing situation that many American’s find themselves in currently with the downturned economy. The null and alternate hypotheses are:

$$H\_{0}:μ\_{1}=μ\_{2}=μ\_{3}=μ\_{4}(The Mean square foot price is equal in each sample)$$

$$H\_{1}:μ\_{1}\ne μ\_{2}\ne μ\_{3}\ne μ\_{4}\left(The Mean square foot price is not equal in each sample\right)$$

Step Two – Select a level of significance

 In this step, Team C looks at the graph presented and analyzed the data by comparing the population samples. To test the right samples, Team C looks at the differences in mean cost per square foot for homes with two, three, four, and five or more bedrooms. This allows Team C to determine whether to reject the null hypothesis or accept it. The significant level used for this is α = 0.05.

Step Three – Identify the test statistic

 In this step, testing is being done to determine whether to reject or accept the null hypothesis. Below is The ANOVA single factor test that Team C constructed to compare the differences between the mean cost per square foot for the various homes. A significance level has been identified as 0.05 for the purposes of this study.

 Hypothesis Test: ANOVA Single Factor

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SUMMARY |  |  |  |  |  |  |
| *Groups* | *Count* | *Sum* | *Average* | *Variance* |  |  |
| Two bed-rooms | 24 | 4808.4 | 200.35 | 1902.001739 |  |  |
| Three bed-rooms | 26 | 5575.8 | 214.4538462 | 1205.177785 |  |  |
| Four bed-rooms | 25 | 5379.3 | 215.172 | 1454.3796 |  |  |
|  Five or more | 29 | 7278.7 | 250.9896552 | 2909.353818 |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |
| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
| Between Groups | 38246.86847 | 3 | 12748.95616 | 6.701423725 | 0.000362194 | 2.695534261 |
| Within Groups | 190242.5019 | 100 | 1902.425019 |  |  |  |
|  |  |  |  |  |  |  |
| Total | 228489.3704 | 103 |   |   |   |   |

Step Four and Five – State the decision and arrive at a decision

Once the data had been input, Team C analyzed the data of ANOVA to help state the decision rule. The ANOVA was constructed by analyzing a sample of 104 homes. Within the 104 homes, 24 homes had two bed-rooms, 26 homes had three bed-rooms, 25 homes had four bed-rooms, and 29 had five or more bed-rooms. The average cost per square foot for two bed-rooms was 200.35 with a variance of 1902.002. The average cost per square foot for three bed-rooms was 214.45 with a variance of 1205.177. The average cost per square foot for four bed-rooms was 215.17 with a variance of 1454.38. The average cost per square foot for five or more bed-rooms was 250.99 with a variance of 2909.354. Team C determines that there is a difference in cost per square foot when looking at homes with various bed room count.

In this statistical analysis, Megastat is sued to enter the raw data, in which a single factor ANOVA was performed to determine if the null hypothesis should be rejected or accepted. In the study, 104 homes were considered with two, three, four, or five or more bed-rooms. The average cost per square foot was 200.35, 214.45, 215.17, and 250.99 respectively. Team C assumed that the homes tested were equally distributed; therefore, there should be enough evidence to conclude that there is a difference with 0.05 level of significance.

 We see that the one-tailed p-value is 0.000362, which is less than the 5% level of significance. Due to the p-value being less than the 0.05 we have no reason to accept the null hypothesis. One should accept (at a 0.05 level of significance) that the cost per square foot varies when compared with the number of bed-rooms in each home.

*Results and Findings*

After performing the calculation for the ANOVA test, many of our assumptions were confirmed. With the ANOVA test, the F value is 6.7, which exceeds the critical value of F(0.05). F(0.05) is about 2.7, which tells us that we can reject the null hypothesis. We can then receive more confirmation from the results that the p-value is less than the level of significance.

*Conclusion*

To conclude, the calculations prove that one should accept the alternate hypothesis. The mean price per square foot differs depending on the number of bed-rooms in the house. During this past week Team C learned through the course materials and were able to put in practice our knowledge on Two or More Sample Hypothesis Testing. The research question developed by our team was based on the given Real Estate Data Set that contained data gathered by assessing 106 participants and inquired by if the number of rooms affects the mean price per square foot. Team C was interested in researching and finding answers to the question of whether a home’s value per square foot is affected by the number of rooms. Through the five-step hypothesis test we studied the null and the alternative hypothesis and could to conclude that our theory was confirmed and that the results from the null hypothesis were rejected, once that the result s from the alternative hypothesis showed that not all the means are equal.

References

Lind., Marchal., & Wathen. (2008). *Statistical Techniques in Business And Economics 13th edition* (13th ed.). New York: McGraw-Hill/Irwin.