MEMORANDUM

From: Andrew Chu
To: Dr. Thomas Craig
Date: May 8, 2021
Subj: Strategic Analysis of the Cost in Damages from Climate Change

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Climate Change: Its Negative Effects

Climate change causes many changes to our environment such as, rising sea levels, change in temperature, and unusual weather patterns. I care about this topic because the environment should be preserved in a healthy state for as long as possible. The dataset shows that there is even an economical effect from climate change aside from the other struggles that come from a worsening environment. We should care about this topic because the air quality will be compromised if we continue along our current path. Additionally, it is costing the government millions of dollars in damages because of climate change. **Table 1** indicates costal properties in the Southeast are projected to be the most expensive cost due to climate change.

Table 1: Cost in Damages with Projected Year and Region
(Damage in Millions of USD)

region	year	sector	damage
Southeast	2070	CoastalProperties	142835.7256
Southeast	2070	CoastalProperties	125597.6262
Southeast	2090	CoastalProperties	125500.862
Southeast	2090	CoastalProperties	124963.8315
Southeast	2070	CoastalProperties	124915.7274

Details on the Dataset

The dataset contains many variables discussing climate change and regions that are affected. The variables that will be focused on in this data analysis project are the year, region, sector, and damage. The year variable is the 20-year eras centered on specific years of interest. The region variable is regional aggregations of states from the Fourth National Climate Assessment. The sector variable is the Economic Sectors of the U.S. The damage variable is the cost of damages in millions of USD in 2015.

Hypothesis: Are Costs an Issue?

I hypothesize that the cost of damages due to climate change will increase over time. This would mean rows with projected years of 2090 or 2070 should have higher values in the damage variable to support my hypothesis.

Data Analysis & Methodology

To test the hypothesis, I used a few key variables such as year, region, sector, and damage. The data was harvested by EPA ScienceHub but the excel file was found on data.gov. However, I used both Excel and

Minitab for this analysis. For this data analysis I used a One-Way ANOVA test to see if the cost in damages were the same across all years or if there was a higher cost in damages in certain years. This tool was appropriate because I needed to see if all the samples were the same or if at least one was different.

Results

After running a few tests on the data, the results show that my original hypothesis was correct and the later years have a higher cost in damages than the earlier years. By using the One-Way ANOVA and the P-Value associated, I was able to determine this. If the P-Value is less than 0.05, then the NULL hypothesis is rejected. The NULL hypothesis states that all samples (year) have the same mean (average cost in damages). Since the P-Value is less than 0.05, this means at least one of the 20-year eras is different from the rest. In this case, The years 2090 and 2070 are statistically different from the years 2050 and 2030.
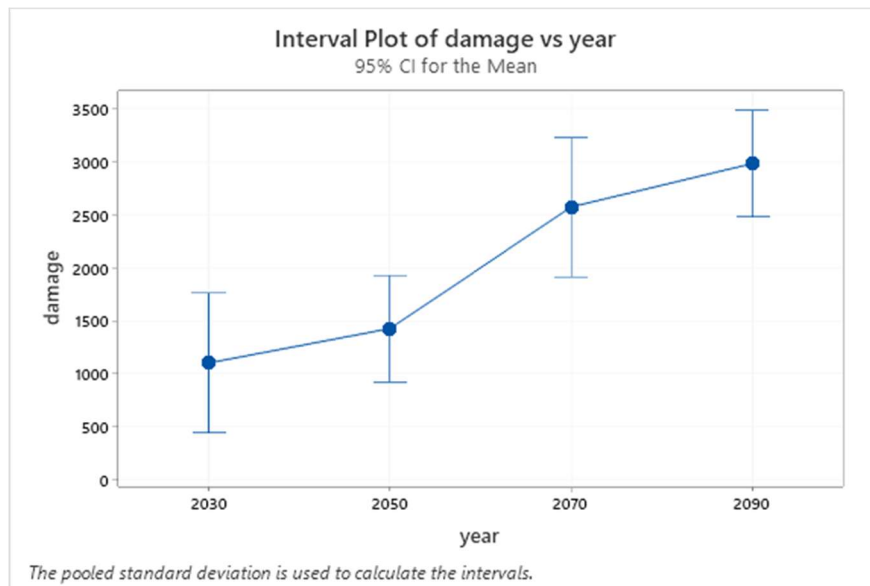
Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
year	3	2189225081	729741694	9.87	0.000
Error	3581	2.64890E+11	73970863		
Total	3584	2.67079E+11			

Figures 1 and 2: Figure 1 shows the average cost in damages in 2090 and 2070 are significantly higher than the earlier years. **Figure 2** shows the P-Value of the analysis. If the P-Value is less than 0.05, then the NULL hypothesis is rejected. The NULL hypothesis states that all samples (year) have the same mean (average cost in damages). Since the P-Value is less than 0.05, this means at least one of the 20-year eras is

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Final Thoughts

To recap, the problem was the negative effects of climate change and I was testing for the change in costs due to damages caused by climate change. I tested my hypothesis with a One-Way ANOVA test and it revealed that the later years, 2090 and 2070, have a significantly higher cost due to damages than earlier years. I feel that some of the limitations of this analysis were that the data was based on findings in 2015 and that 20-year eras were used for the projections. For future analyses, I would suggest finding a more thorough dataset or splitting the data into smaller eras.

CONCLUSION

Thank you for considering this analysis of the negative effects of climate change, and more specifically, the costs due to damages cause by climate change. I was able to prove my hypothesis that later years are projected to have more costs due to damages by using a One-Way ANOVA test. I would suggest for you to investigate ways to help reduce climate change to lessen the damage done economically. I look forward to discussing this with you more in depth as I have identified specific regions and sectors that are particularly high in costs due to damages.

REFERENCES

"Climate Change Indicators in the United States." EPA, Environmental Protection Agency, 3 May 2021, www.epa.gov/climate-indicators.

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