Food Imports Of Tree and Ground Nuts

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Problem Statement

The problem statement is finding out the development of U.S. imports for Tree and Ground Nuts and the effects that variables such as import values, country contributions, and yearly fluctuations have on it over a period of time.

Using statistical analysis methods like linear regression and ANOVA.

- **The relationship this project hopes to explore is to understand fluctuations while also identify patterns and insights to what caused those fluctuations in recent years.**

- **Graphs will be used to help visualize this**

Introduction to Dataset

Dataset Source: U.S. imports of tree and ground nuts

Timeline: 1999-2023

Key Variables Looked at:
- Import values (measured in millions dollars).
- Import year (spanning 1999 to 2023).
- Categories: Prepared tree nuts, ground nuts, and cashew nuts.
- Exporting countries contributing to these imports."

The dataset provides a comprehensive view of import trends, showing long-term growth, fluctuations, and country-specific contributions. This data forms the foundation for identifying key drivers of changes and potential influencing factors

Linear Regression
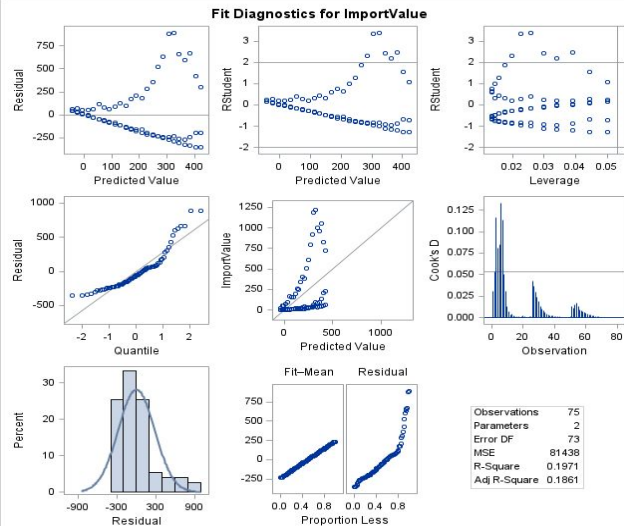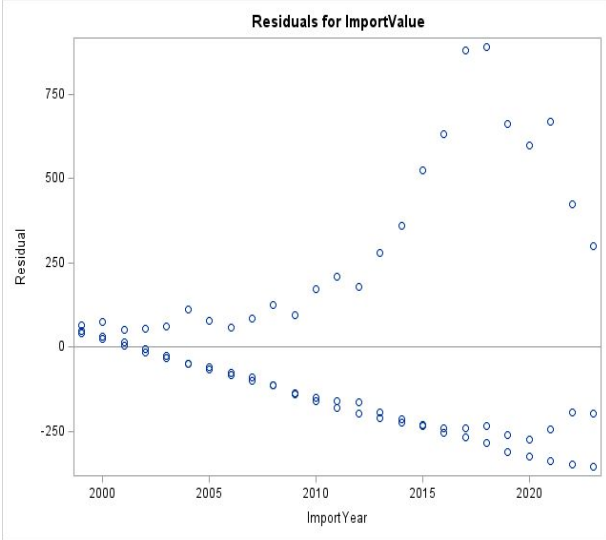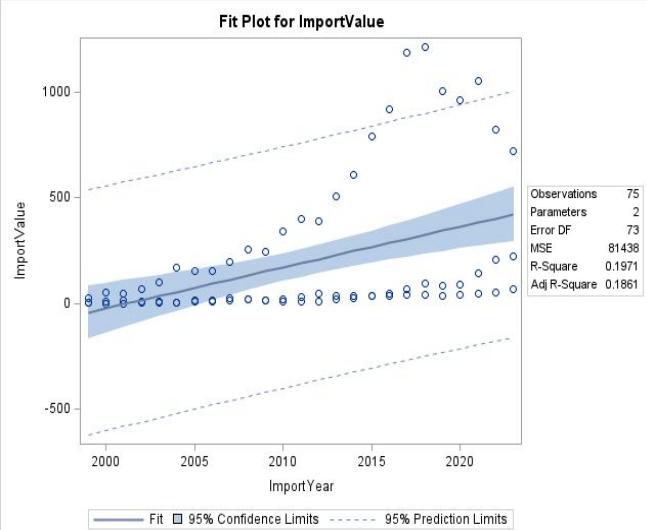
The three graphs show the development of U.S. imports for tree and ground nuts from 1999 to 2023, highlighting trends, yearly fluctuations, and influencing factors. The fit plot reveals a steady upward trend with significant variability in recent years.

The residual plot shows increasing deviations, suggesting other factors like economic or geopolitical events may impact imports.

The diagnostics panel identifies potential outliers and non-linear patterns, emphasizing the need to explore factors like country contributions and trade disruptions. Together, these graphs visualize import trends and the complex variables driving changes over time.

T–Test for Cashews and Ground Nuts (2020–2023)

Metric	Treatment 1 (Cashew Nuts)	Treatment 2 (Ground Nuts)
Sample Size (NNN)	3	3
Degrees of Freedom (dfdfdf)	2	2
Mean (MMM)	946.97	45.37
Sum of Squares (SSSSSS)	25,928.43	117.25
Variance (s2s^2s2)	12,964.21	58.62

Additional Metrics	Value
Pooled Variance (sp2s_p^2sp2)	6,511.42
Variance of Means (sM12,sM22s_{M1}^2, s_{M2}^2sM12,sM22)	2,170.47
T-Statistic	13.68
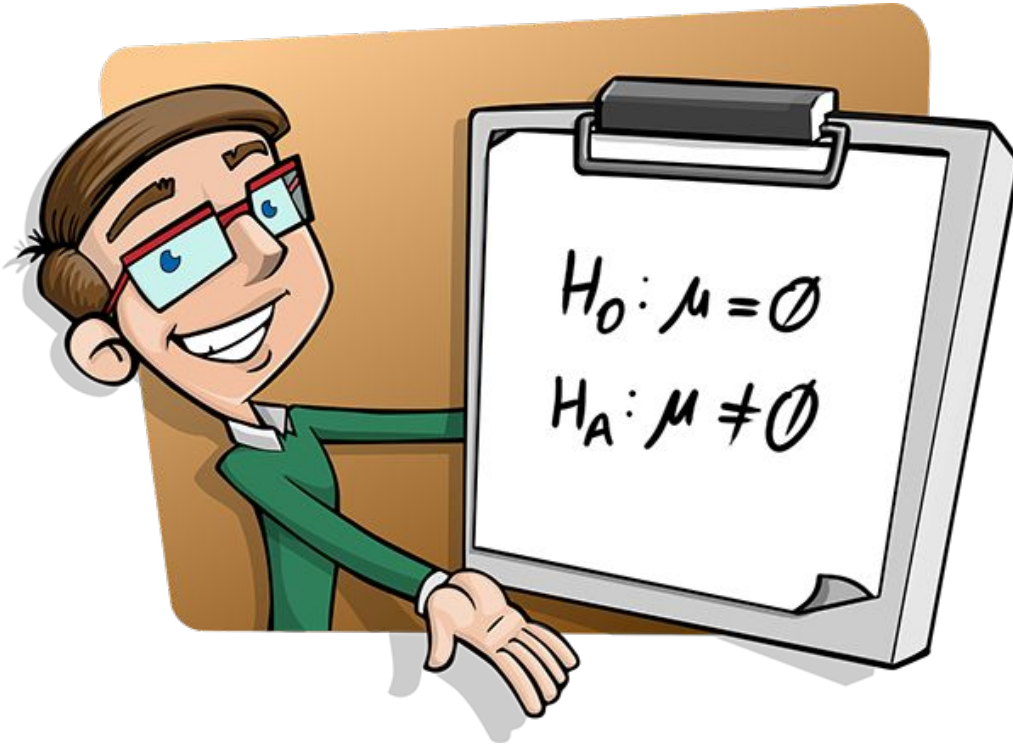
Summary and Analysis

Null Hypothesis:

$H0: \beta1 = 0$

There is no significant relationship between the year and U.S. import values for tree and ground nuts

Alternative Hypothesis:

$Ha: \beta1 = 0$

There is a significant relationship between the year and U.S. import values for tree and ground nuts

Meaning: (p-value for the slope is 0.0001 lower than 0.05 significance level)

We **reject the null hypothesis** and conclude that there is a significant relationship between the year and U.S. import values for tree and ground nuts. This continues to highlight the influence of other external factors such as trade policies, global disruptions, and country-specific contributions.

Reasons for the Potential Changes

- The changes in U.S. imports of tree and ground nuts can largely be attributed to a couple of reasons. One is the rise of Vietnam as a dominant exporter, the second is the impacts of the COVID-19 pandemic, and lastly the economic instability since 2022.

- Vietnam's advancements in cashew processing and strong trade ties with the U.S. have made it the primary supplier of cashews, significantly driving up import volumes in recent years.

- However, the COVID-19 pandemic disrupted global supply chains, causing shipping delays, labor shortages, and temporary price surges. Post-pandemic recovery has faced further challenges from inflation and rising transportation costs.

Conclusion

In summary, U.S. imports for tree and ground nuts have shown steady growth, but this trend is punctuated by notable fluctuations tied to key events. Vietnam's emergence as a leading cashew exporter has driven import increases, while the COVID-19 pandemic and post-pandemic economic instability have created variability in recent years

A limitation of our analysis is that we focused primarily on time as an independent variable, without including additional influencing factors like tariffs or global production trends. Future analyses could incorporate these variables or explore other categories of nuts to provide a more comprehensive understanding of import dynamics.

Ultimately, these findings highlight the importance of external variables in shaping trade and provide a foundation for future strategies in managing U.S. nut imports.

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