A hypothetical study on the logistics of imported fruits

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## Introduction

[Intro text goes here]

## Methodology

We gathered economic and logistical data for imports of three fruits (apples, mangoes, and blueberries) into the United States over the twenty-year period of 1990 to 2009. Data for each fruit is split into three varieties/cultivars. Import volume is measured in metric tons, and expenditures are measured in millions of dollars (USD). We derive the variable “cost by weight” by dividing the expenditure by the total weight of imported produce of that variety for that year.

For each of the three fruits, we use an R script to perform multilinear regressions on each variety. We also use ggplot to generate scatterplots and display separate regression fits. We use a separate R script to perform ANOVA on the cost by weight variable across the varieties for each fruit.

## Results

### Apples

|  |  |
| --- | --- |
| **Apple Regressions** | |
|  | |
|  | Cost\_millions\_USD |
|  | |
| Import\_weight\_metric\_tons | 0.06\*\*\* |
|  | (0.003) |
|  |  |
| VarietyGranny Smith | 4.18\*\*\* |
|  | (1.55) |
|  |  |
| VarietyPink Lady | -1.49 |
|  | (1.55) |
|  |  |
| Constant | 32.59\*\*\* |
|  | (1.70) |
|  |  |
| *N* | 60 |
| R2 | 0.85 |
| Adjusted R2 | 0.84 |
| Residual Std. Error | 4.86 (df = 56) |
| F Statistic | 104.90\*\*\* (df = 3; 56) |
|  | |
| *Notes:* | \*\*\*Significant at the 1 percent level. |
|  | \*\*Significant at the 5 percent level. |
|  | \*Significant at the 10 percent level. |

A graph of different colored lines

Description automatically generated

### Mangoes

|  |  |
| --- | --- |
| **Mango Regressions** | |
|  | |
|  | Cost\_millions\_USD |
|  | |
| Import\_weight\_metric\_tons | 0.06\*\*\* |
|  | (0.003) |
|  |  |
| VarietyHaden | 27.39\*\*\* |
|  | (1.85) |
|  |  |
| VarietyHoney | 14.66\*\*\* |
|  | (1.96) |
|  |  |
| Constant | 25.70\*\*\* |
|  | (1.70) |
|  |  |
| *N* | 60 |
| R2 | 0.92 |
| Adjusted R2 | 0.91 |
| Residual Std. Error | 5.83 (df = 56) |
| F Statistic | 208.14\*\*\* (df = 3; 56) |
|  | |
| *Notes:* | \*\*\*Significant at the 1 percent level. |
|  | \*\*Significant at the 5 percent level. |
|  | \*Significant at the 10 percent level. |

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### Blueberries

|  |  |
| --- | --- |
| **Blueberry Regressions** | |
|  | |
|  | Cost\_millions\_USD |
|  | |
| Import\_weight\_metric\_tons | 0.09\*\*\* |
|  | (0.01) |
|  |  |
| VarietyHighbush (Southern) | -11.12\*\*\* |
|  | (1.60) |
|  |  |
| VarietyRabbiteye | 30.60\*\*\* |
|  | (1.63) |
|  |  |
| Constant | 36.80\*\*\* |
|  | (1.78) |
|  |  |
| *N* | 60 |
| R2 | 0.93 |
| Adjusted R2 | 0.93 |
| Residual Std. Error | 5.05 (df = 56) |
| F Statistic | 245.96\*\*\* (df = 3; 56) |
|  | |
| *Notes:* | \*\*\*Significant at the 1 percent level. |
|  | \*\*Significant at the 5 percent level. |
|  | \*Significant at the 10 percent level. |

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### ANOVA for Cost by Weight vs. Variety

Apples:

Df Sum Sq Mean Sq F value Pr(>F)

Variety 2 0.01949 0.009743 1.875 0.163

Residuals 57 0.29623 0.005197

Mangoes:

Df Sum Sq Mean Sq F value Pr(>F)

Variety 2 0.029 0.01473 0.254 0.777

Residuals 57 3.305 0.05798

Blueberries:

Df Sum Sq Mean Sq F value Pr(>F)

Variety 2 2.355 1.1775 8.528 0.000575 \*\*\*

Residuals 57 7.870 0.1381

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

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