

Use the following query to acquire the data. Export the 74,596 records to JMP.

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SELECT * from carbo_transactions WHERE upc in (3000005970, 3000005300, 9999967727) and geography = 1 ORDER BY upc;
```

1. Identify what products these three upc denote. Using Graph Builder, plot the weekly sales volume (number of units) for each of these three products over time. Fit a spline to each. Describe what you see.
2. Using median unit price each week has advantages over using mean unit price per week. Answer the following questions using simple regression models with  $X = \ln(\text{weekly median unit price})$ .
  - a. Does Aunt Jemima syrup weekly unit sales show price sensitivity? Give a 95% confidence interval for price elasticity of demand.
  - b. Estimate the price sensitivity for the Kroger store brand (Private Label) syrup and compare this result with that for Aunt Jemima syrup. Does the difference make sense?
3. Show residual plots for the regression models fit for 2a and 2b and try to validate whether these models do or do not satisfy the assumptions of constant price elasticity, constant variance, and independently distributed normal errors (residuals).
4. Fit a multiple regression model using Fit Model for  $Y = \ln(\text{weekly Private Label syrup units sold})$  with  $X_1 = \ln(\text{weekly median unit price})$  and include Week and  $\text{Week}^2$  in the models as well. Interpret the following output, explaining how the addition of the terms involving Week
  - a. Changes  $R^2$ .
  - b. Changes the RMSE.
  - c. Changes autocorrelation in the residuals.
  - d. Changes the estimated price elasticity.
5. The file *HW8 sales by household.jmp* lists the number of times each household bought these items. Use Analysis – Multivariate Methods – Multivariate to produce a matrix of scatterplots and correlations. Interpret these three coefficients, explaining why they have the sign and magnitude that they do. What would be the effect of adding (0 0 0) for households with no trips on the correlation coefficients?

Extra credit: Do you see evidence of cross-elasticity for any of these products.