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Data 400: Senior Capstone

3/30 model logic:

How does model actually work **mathematically**?

Finds the new raw price. So if the mean of milk is normally \$4, and the shock is = 20% shock, this means that the price of milk has now gone up by an additional \$0.80 cents, so now milk is \$4.80.

New_milk = mean_milk * (1 + shock)

new_milk = 4.00 * 1.20 = 4.80

Scale into Z-score:

Then we have to scale into z-score(standard deviation)

Milk sd is = .40

Code runs:

- Scaled_milk = (new_milk - mean_milk / sd_milk
- Scaled_milk = (4.80-4) / 0.40
- Scaled_milk = 2.0

Computer says milk is currently 2 full standard deviation more expensive than normal milk

Takes coefficients ([0.19246 = milk, 0.73905= sugar, 0.19483= coco])

So the coefficient for sugar just means that if sugar prices go up by one standard deviation, the price of our cup of coffee gets pushed up by 0.73905 standard deviations (assuming milk and cocoa remain constant).

Prediction = Intercept + (Milk_Coef x Scaled_Milk) + (Sugar_Coef x Scaled_Sugar) + (Cocoa_Coef x Scaled_Cocoa)

2 goes into scaled milk, then unscales into real dollars.

If it remains the same then that means

Here is how the different slider choices change that math:

- **Positive Shock (+20%):** The ingredient gets more expensive, so its weight pushes the final price of the coffee up.
- **Negative Shock (-20%):** The ingredient gets cheaper, so it just works in reverse and pulls the final coffee price down by that same weight.
- **"Same" (Average):** If we leave a slider on "same", it means that ingredient is sitting exactly at its average. Statistically, it is 0 standard deviations away from the norm, so it adds absolutely zero to the final coffee price.

Once the model adds all those weighted impacts together, my script just runs the scaling math in reverse to spit out a normal, real-dollar price tag on the dashboard

Now my next step is to have the user be able to adjust any number up or down that they want to get a more interactive model. For now the model successfully predicts the price of coffee based of 3 different unique non-coffee prices which is pretty cool.