Math 23C Final Project Write-Up:
Can the Price Behavior of Certain Goods Predict Recessions:
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1 Introduction

Can the price changes in certain commodities reveal the kind of recession the U.S. is in? How do qualitatively different recessions affect commodities' prices? We are specifically interested in the dotcom crash of the early 2000s, the Great Recession, and the COVID-19 pandemic.

"The stock market is not the economy." This refrain frequently sounds. We decide to assess whether commodity prices that could signal the health of the general public are correlated with unemployment rates across two decades. We test to see if these goods' prices are independent of recessionary indicators. We also assess the goods' prices' distributions to establish a baseline for recessionary vs. non-recessionary price behavior across different types of recessions.

2 Commodities, Recessions, and Unemployment

This section investigated correlations between commodity prices, recessions, and the national unemployment rate. Though it was hypothesized that commodity prices would increase faster during periods of growth than during recessions, this was not borne out by the data. It was also not true that commodity prices experienced growth during the coronavirus pandemic but slumped during the other recessions; rather, they increased during all periods except the dot-com slump. Unemployment rates were indeed higher during recessions, as expected.

Several modeling techniques, such as stepwise regression and vector autoregression, were applied to create models to estimate the likelihood of a recession in current or future months from present or recent commodity price data. However, these turned out to have minimal predictive power, as there was little to no correlation between commodity price trends and recessions. Models for the unemployment rate fared slightly better, though most of the variables were not significantly predictive and thus eliminated based on the Akaike information criterion.

3 Price Behaviors

In order to asses whether a good behaves differently given the circumstances of a recession, we collected daily data and analyzed prices, first order price changes, and second order price changes for four goods: gold, oil (WTI prices), sugar, and wheat. We selected gold and oil as points of comparison against the classic commodities, represented by sugar and wheat. Our price data for gold and oil came from the St. Louis Fed, as did our recessionary dates. To represent prices of the two classic commodities, we collected daily data for ETFs focused on sugar and wheat; the ETFs were from the same firm. We then ran Chi-square tests and used QQ plots to assess whether the prices followed a normal distribution. We compared variances among recessions for the prices and first and second order price changes. We concluded prices are stable, with rare big movements in either the first or second order changes. These types of price shifts stay tightly clustered around zero. Finally, we created quantiles to represent a Pareto distribution and assessed whether any of the goods' prices follow a Pareto distribution instead.