



Forecasting Inflation with the ARC Commodity Model

Introduction:

In this article we demonstrate that the ARC Commodity factor model can model and predict changes in the Consumer Price Index (CPI). In particular ARC Commodity factors, such as Agriculture, Energy and some style factors, have statistically significant explanatory powers with respect to CPI one month ahead. Curiously, we find that Metals have no significant predictive powers versus CPI.

We believe that commodity prices and especially the Sector and Sub Sector indexes/factor returns which our model generates are an early view into the prices of raw inputs into the production process. The raw prices are incorporated into the production process via an unknown lag adjustment process. Our model is a reduced form model which relates the inputs to consumer prices.

With a print of 5.3% for June, inflation is on everyone's radar. The Federal Reserve's consensus seems to be that inflation will continue for a few more months. Pundits argue that as economies come out of the pandemic shutdowns, inflation will eventually come back to recent historical trends. There is some doubt. The FED asset balance sheet, which has been ballooned since the great financial crisis, has explosively grown during this pandemic period. The presence of quantitative easing coupled with a very high level of borrowing and spending makes many suspicious that a 1970's style of inflation is around the corner. ARC takes no position on this discussion.



Analysis:

The Asset Risk Company (ARC) Commodity model is a cross-sectional commodity factor model. The model contains 50 of the most traded commodity products, and over 1,200 futures in total over all maturities. All futures in the model have exposures to sectors, sub-sectors, and style factors. ARC sector returns come from a regression model and not from a manual weighing of commodities in each sector. Styles factors include Basis, Momentum (long term and short term), Open Interest, Trading Activity, Volatility (long term and short term). Detailed discussions of the ARC Commodity Model can be found on our website at <https://www.assetriskcompany.com>.

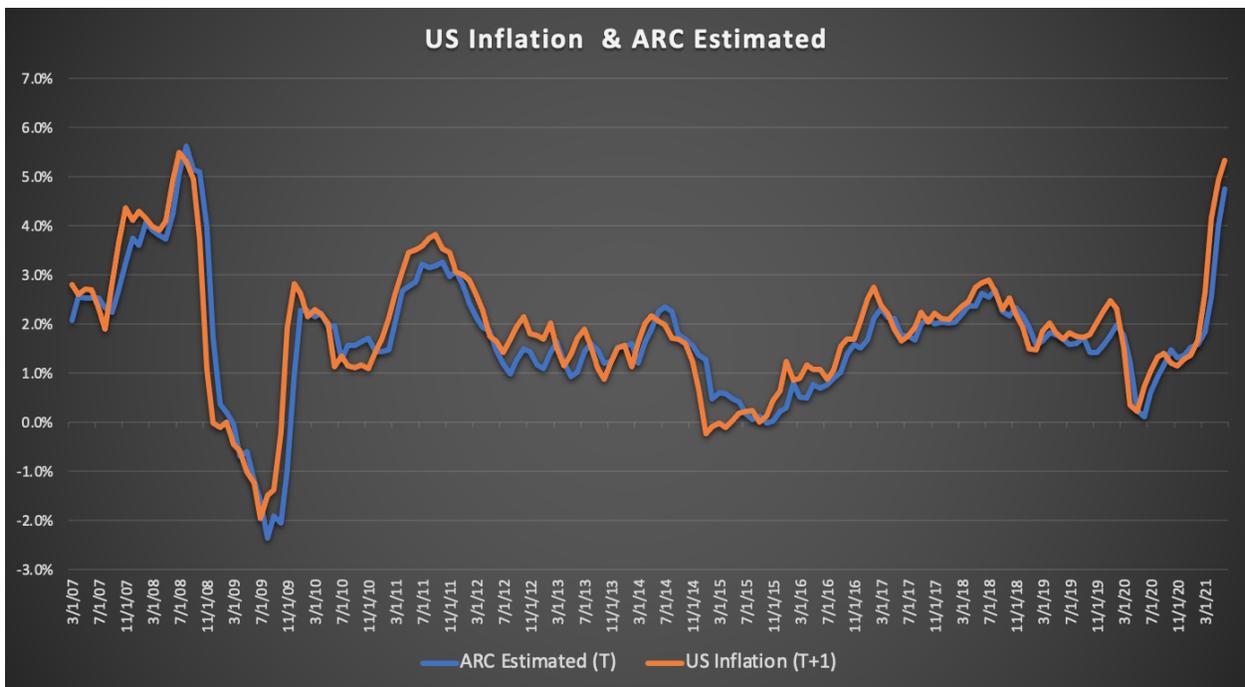
The recent move in commodity prices is often linked to the inflation discussion. Some have pointed to the movement in commodity prices as prima facie evidence of inflation. Having developed and commercialized the first daily cross-sectional commodity factor model, we thought it proper to look at our model and explore its link with inflation.

For our analysis we use the CPI data from the St. Louis Federal Reserve website (CPIAUCSL). The ARC model is estimated daily with a full history of 20 years. In a first analysis we regressed CPI monthly changes vs monthly returns of our factors and found limited significance. This suggests a tenuous contemporaneous link between commodities and inflation, as measured by the CPI. However when we look at CPI data one month ahead the regression becomes highly significant. Given our discussion of the theory of why there should be a link, we are confident the regression is not spurious. We take the CPI return at T+1 and, all our factors at T, we added T-1 and T-2 also for the sectors to test further lags. We find that Agriculture with lags of one and two months along with Energy, Open Interest, Trading Activity and ST Momentum with one month lag to be the most significant factors explaining CPI. The adjusted R² is above 55%.

It makes sense that activity in sectors such as Agriculture and Energy would impact consumer prices with a bit of a delay. We found no impact from Metals on the CPI. When we look further at the sub-sector level with Base and Precious Metals the broader Metals results stand.



With the regression coefficients in hand and using the previous month's ARC commodity factor returns we forecast the current CPI month¹. In Graph 1, we plot the realized inflation vs the ARC forecast. The plot was generated by a rolling backtest where the model conditions on information known at time T to forecast T+1 (month ahead).



Graph1: US Inflation at time at T+1 vs ARC estimated with Factors at T

It is clear that the ARC forecasted inflation tracks very well the realized US inflation and holds well during periods of rapid change in inflation, both upward and downward. The model captures the high water mark of 5.5% in July 2008 vs the 5% forecasted by ARC. The subsequent drop of -7.5% between July 2008 and July 2009 is also captured by the model's forecast of -6.7%. For the current period, inflation jumped from 0.2% in May of 2020 to 5.3% in June 2021. The ARC model had projected an increase from 0.2% to 4.8%.

¹ The regression coefficients are estimated using rolling regression with 40 months of data



Conclusion:

ARC commodity factors explain a significant part of the changes in CPI. We do not claim to guess the exact print of next month's Consumer Price Index, but the ARC Commodity Model can be a powerful tool for asset managers, insurers and any party which has exposure to inflation. It can decompose inflation into root causes (by ARC factors) and provide forecasts on a daily, weekly and monthly basis. Because the model is driven by market prices, we are drawing from the insights that very sophisticated participants make about inflationary expectations.