The loco-modities

Turnleaf Analytics economic forecasts to trade commodities

It seems intuitive that there is a relationship between commodities, inflation and growth. However, the key question is whether such a link can be monetised. In this paper, we explore how Turnleaf Analytics economic forecasts, both for inflation and growth (ISM), can be used to generate historically profitable signals for trading commodities. Historically, our portfolio of Turnleaf Analytics economic forecast trading rules with a trend following component has risk adjusted returns of 0.94 and annualised returns of 3.3% since 2018, outperforming a basket which purely uses trend following signals on commodities futures.

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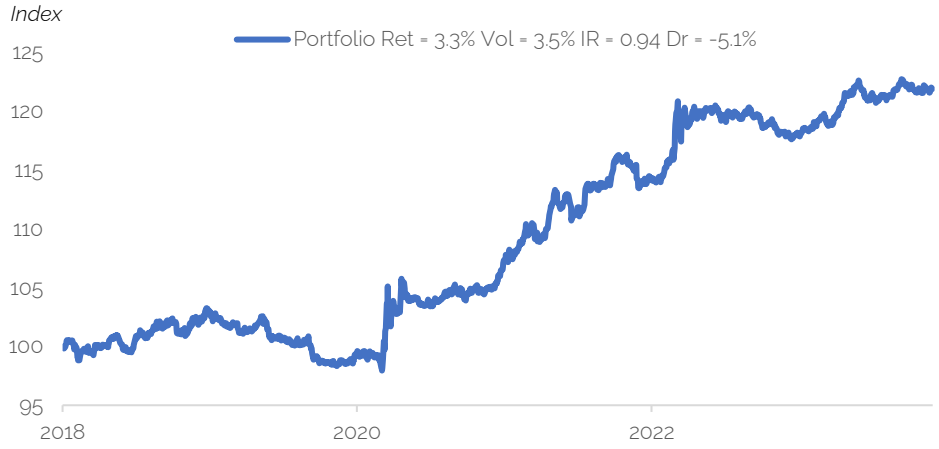
If you are interested in learning more about Turnleaf Analytics inflation forecasts and would be interested in a trial, please contact us

Introduction

Commodities are often considered to be a hedge for inflation. Hence, we might conjecture that if we can forecast inflation accurately, it should also be beneficial for understanding the future price action in commodities. One way to test this is by creating trading rules for commodities, based on these economic forecasts. In Figure 1, we present the historical returns for a trading strategy trading a portfolio of commodities futures based on signals related to Turnleaf Analytics US CPI & ISM manufacturing forecasts and trend.

Figure 1: Historical returns of a commodities portfolio based on forecasts and trend



Source: Turnleaf Analytics, Bloomberg

Later in the paper, we shall go into detail into how this trading rules behind this portfolio are constructed.

The relationship between inflation, growth and commodities

As mentioned in the introduction, commodities are often considered as an inflation hedge, although we should note that commodities tend to exhibit different characteristics depending upon their uses. If we think of the inflation basket in many countries, and focus purely on the energy component, it is impacted by the price action in commodity futures such as gasoline, natural gas etc. Sometimes the pass through might be obvious and relatively quick, such as the higher gasoline futures translating to quicker retail prices at the pumps.

The food components of inflation are also going to be impacted by commodities such as grains, with varying lengths of pass through into consumer prices.

Furthermore, many of the core inflation metrics are indirectly impacted, as changes in headline filters down into core at varying paces. Obviously, there can be a lagging effect between price changes in commodities and subsequent changes in underlying inflation components. Hence, if we can forecast inflation, it seems intuitive that this can potentially be beneficial for trading commodities.

If we consider measures of economic growth, we might expect them to have a positive correlation with commodities, given that growth is associated with more demand for commodities. Conversely, poor economic growth should see shrinking demand for commodities.

Later, we shall discuss how we can translate these ideas into trading rules for commodities based on inflation and growth (ISM) forecasts.

Background on Turnleaf Analytics inflation and growth (ISM) forecasts

In this section, we give some background on how Turnleaf Analytics inflation and growth (ISM) forecasts are constructed. Turnleaf Analytics uses several types of data to construct our forecasts. This data is drawn from many sources, including central banks, official statistical organisations, data vendors etc. which we list below:

- Macroeconomic data
    - This includes what we would traditionally expect to be used for inflation, such as unemployment data and growth data
- Market data
    - This includes FX, rates and commodities data
- Benchmark data
    - Benchmark/consensus inflation forecasts are used as an input
- Alternative data
    - This includes, for example, time series on pollution, which can be used as a proxy for industrial activity, and is available on a high frequency basis

This data is collected and then pre-processed. This pre-processing includes steps like checking for outliers, cleaning the data etc. As with other data science problems, the steps involving the collection and preparation of the data is the most time consuming.

The pre-processed data is then fed into a machine learning model. We have opted for a machine learning model, which:

- captures the non-linearities in the data (which for example an OLS cannot do effectively)
- is sufficiently simple, so it isn't very data greedy like deep neural net

Our inflation model generates forecasts from 1 month out to 12 months, and is updated for each country once a month, a short time after the inflation release for that country. We also update our forecasts closer to the CPI release for a large number of countries, i.e., we publish short term forecasts/nowcasts.

There are many potential use cases for inflation and growth forecasts. In this paper, we shall explore a specific use case, looking at trading commodities, using Turnleaf Analytics' US CPI YoY NSA forecasts for inflation and Turnleaf Analytics' ISM manufacturing forecasts as a proxy for economic growth.

Creating metrics for forecasts around inflation and growth

We have already noted the rationale of why there is likely to be a relationship between commodities with inflation and growth. Here, we create metrics based upon the forecast curve, as well as back-end forecasts.

Some pick up in commodities should be reflected relatively quickly (i.e., gasoline prices), and we should observe this in the short-term curve of forecasts. Some pass through from commodities can also be observed on a longer-term basis, as changes in headline begin to impact core components of inflation. Hence there is rationale behind looking at longer term forecasts.

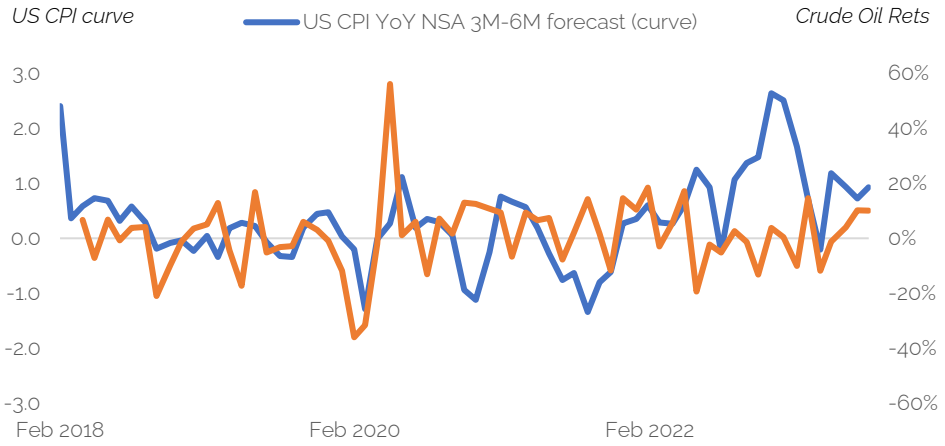
For our growth-based metric, we might argue that commodities need to be bought relatively early in the economic cycle to be used in manufacturing etc. Hence, a short-term pick-up in growth should be bullish for commodities.

We create several metrics based upon Turnleaf Analytics inflation and growth forecasts below. In all cases, an increase in our forecast metrics, are indicative of higher inflation and of growth.

- Inflation forecast curve metric = Turnleaf Analytics US CPI YoY NSA 3M forecast – Turnleaf Analytics US CPI YoY NSA 6M forecast
- Inflation back-end forecasts metric = Turnleaf Analytics US CPI YoY NSA 12M forecast – last US CPI YoY NSA realised
- ISM manufacturing forecast curve metric = Turnleaf Analytics US ISM manufacturing SA 3M forecast – Turnleaf Analytics US ISM manufacturing SA 6M

In Figure 2, we illustrate the relationship between the inflation curve and commodities. We plot the WTI crude oil returns one month in the future, versus the inflation forecast curve. At least in this stylized example, it does appear that expected shorter term upward pressure in inflation against more medium-term inflation, is beneficial for the subsequent price action WTI crude.

Figure 2: Inflation forecast curve against WTI returns 1 month into the future



Source: Turnleaf Analytics, Bloomberg

Trading rules for commodities using economic forecasts

We earlier discussed the construction of our various inflation and growth metrics and illustrated the relationship between the inflation curve with commodities with a stylized example. To understand whether this relationship is more robust across a wide range of commodities, we backtest several trading rules for commodities using as inputs our inflation and growth forecast based metrics.

Our trading rule for all commodities based on these metrics is straightforward:

- if the inflation metric is positive => go long commodities, otherwise go short
- if the growth metric is positive => go long commodities, otherwise go short

Our trading rule is triggered when the monthly Turnleaf Analytics forecast is updated (within 3 working days of the US CPI or ISM manufacturing release). We shall be using 1st dated commodity futures and we'll be applying a volatility target of 10% with max leverage of 5 in our trading rules.

The reweighting of each commodity based on the volatility target will be applied at month end. It is important to apply volatility targeting for each commodity given their associated levels of volatility can be vastly different. All the commodity futures have been back-adjusted by the relative ratio of each contract at the rolls.

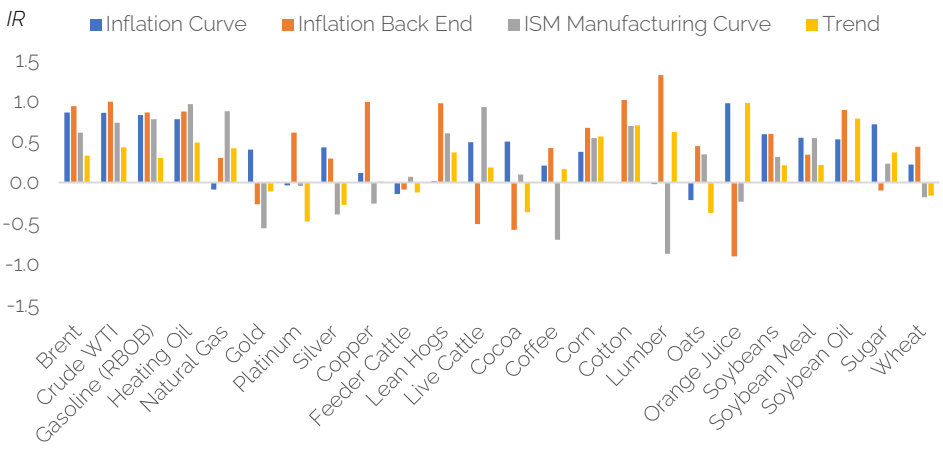
Historical results for the inflation and growth forecast trading rules

In Figure 3, we present the historical results for our various inflation and trading based trading rule for a historical sample from 2018 for a wide array of commodity futures. We also add a generic trend following rule for comparison.

We find that in the vast majority of cases, all the trading rules are profitable, in particular for the energy commodities. Perhaps this shouldn't be surprising that energy tends to be quite macro driven. By contrast commodities which are more fundamentally driven such as feeder cattle generally have poor results across all the trading rules.

Precious metals also tend to a bit more mixed. Perhaps this shouldn't be so surprising given that that precious metals do not have significant weights in CPI baskets, and furthermore precious metals tend to have a stronger relationship with real yields (i.e., inflation adjusted yields), as opposed to inflation alone.

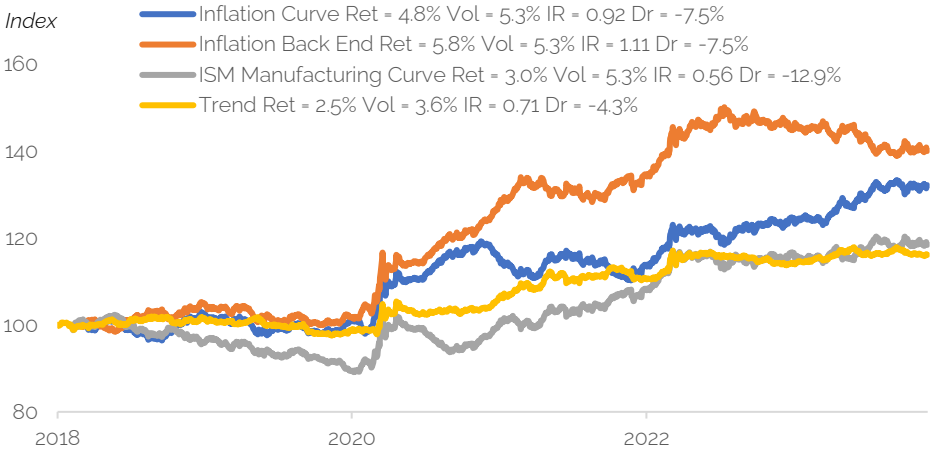
Figure 3: Historical returns for the nowcast trading rules over US CPI by asset



Source: Turnleaf Analytics, Bloomberg

In Figure 4, we create a trading basket based on each trading rule. We see that the inflation-based trading rules have the highest risk adjusted returns. The ISM manufacturing rule has the lowest risk adjusted returns.

Figure 4: Baskets for each trading rule

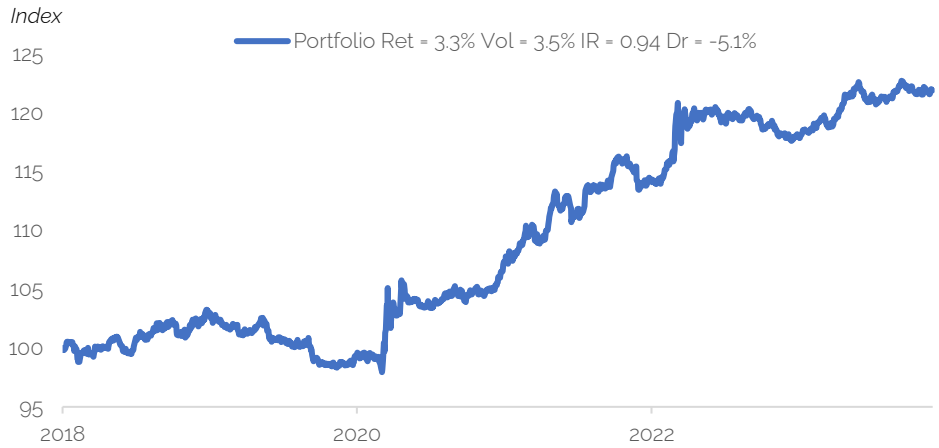


Source: Turnleaf Analytics, Bloomberg

If we combine all the trading rules into an equally weighted portfolio, it has risk adjusted returns of 0.94 and returns of 3.3%. We also note that our portfolio has higher risk adjusted returns compared to every individual basket (other than inflation back end). In particular, we see that the portfolio outperforms the trend basket.

This suggests that historically by looking at the dynamics of Turnleaf Analytics economics forecasts we are capturing some additional information for the subsequent price action that cannot purely be perceived from assessing the trend of a commodity.

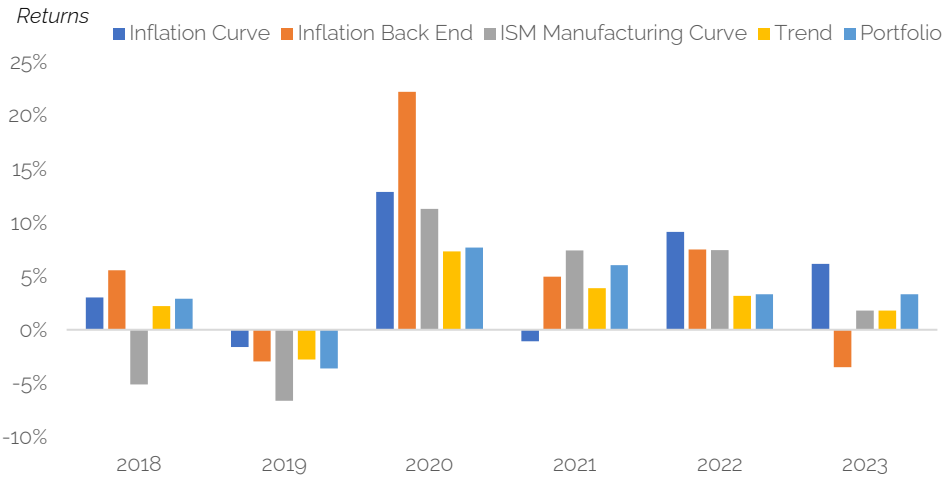
Figure 5: Combining all trading rule baskets into a portfolio



Source: Turnleaf Analytics, Bloomberg

If we decompose the returns for all the individual baskets, as well the portfolio, into annualised year-on-year returns (see Figure 6), we note that 2020 was a particularly profitable year. This was driven in part by the trading rules largely being on the right side of the unusual move of crude oil into negative territory. However, even ignoring 2020, we see that that portfolios were broadly profitable, with the one exception being 2019.

Figure 6: Year on year returns of the commodities trading rules



Source: Turnleaf Analytics

Conclusion

In this paper, we talked about why price action in commodities should be related to inflation and growth. We used as a proxy for inflation and growth expectations, Turnleaf Analytics forecasts for CPI and ISM manufacturing.

Later we created some commodities trading rules based upon the curve in the Turnleaf Analytics inflation and growth forecasts, as well as longer term inflation forecasts. The rationale behind these trading rules is that higher expected inflation and growth should be beneficial for commodities whereas lower inflation and poor growth should be a headwind for commodities.

Our commodities-based portfolio which uses signals from economic forecasts and trend had risk adjusted returns of 0.94 and returns of 3.3% since 2018, outperforming a basket which used trend following alone to trade commodities.

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