Building on Inflating FX

Using Turnleaf Analytics inflation forecasts to trade FX

In this paper, we show how using the differential in Turnleaf Analytics inflation forecasts compared to consensus can be used to trade FX systematically. The idea is that the differential in inflation forecasts can be a proxy for relative monetary policy expectations, which impact FX. We extend our previous work by looking at a wider universe of currency pairs and applying more dynamic portfolio allocation rules. In a historical sample from 2018 onwards, our Turnleaf Analytics inflation strategy for trading FX has risk adjusted returns of 1.06 and annualised returns of 4.26%. By comparison, trend and rates based strategies for trading FX, which can be considered as a benchmark, have risk adjusted returns of 0.53 and 0.02 respectively, underperforming the Turnleaf Analytics strategy.

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Saeed Amen
CTO
+44 20 3290 9624
saeed@turnleafanalytics.com
@saeedamenfx

Alexander Denev
CEO
+44 20 3290 9624
alexander@turnleafanalytics.com

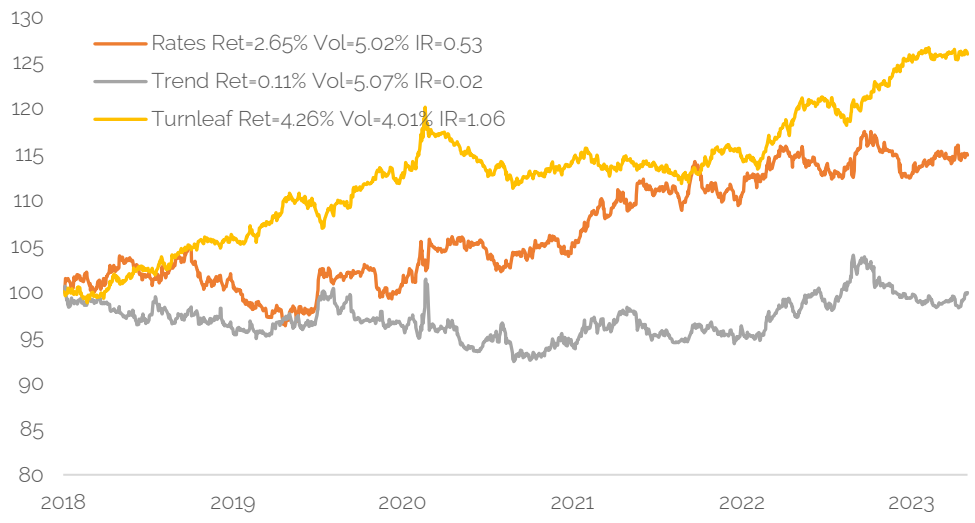
info@turnleafanalytics.com

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

Introduction

We would expect that central bank policy impacts FX. As inflation rises in a certain country, relative to other nations, monetary policy expectations are likely to become more hawkish- reflected in rising yields accompanied by an expected strengthening of the currency. Conversely, declining inflation relative to other countries, will likely see monetary policy expectations reprice a more dovish outlook and weakening currency.

Figure 1: Historical returns of FX baskets using rates, trend & Turnleaf forecasts



Source: Turnleaf Analytics

In Figure 1, we show the historical returns for trading FX pairs using three types of trading rules (and we shall explain these rules later):

- In orange, using relative yields which can be a proxy for monetary policy expectations.
- In grey, using the underlying trends in spot.
- In yellow, using relative Turnleaf Analytics inflation forecasts compared to consensus.

Relationship between yields and FX in EM

For the transmission mechanism discussed above to occur the central bank needs to be seen as credible by the market. Indeed, you can sometimes see an inverse relationship between yields and FX in EM, particularly during times of risk aversion, where investors can dump both the local currency and bonds at the same.

When there is hyperinflation, we also see significant weakening of a currency, given the central bank is no longer seen as being credible in terms of fighting inflation. Hence, the dynamics of inflation and FX can be quite different in developed markets compared to those in certain emerging markets.

We could argue however that on a relative value basis, where the EM beta is removed, monetary policy divergence still applies in EM in certain cases. We shall test this approach in the looking at relative value pairs in CEE which is a more developed part of EM,.

Background on Turnleaf Analytics inflation forecasts

In this section, we give some background on how Turnleaf Analytics inflation forecasts are constructed. The data Turnleaf Analytics uses to forecast inflation consists of several types, These are drawn from many sources, including central banks, official statistics 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

All of this data is collected and then pre-processed. This pre-processing includes checking for outliers, cleaning the data, and many other steps. As with other data science problems this step of collecting and preparing the data is the most time consuming.

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

- captures the non-linearities in the data (which for example an OLS cannot do effectively)
- is sufficiently simple, so it is easier to understand than models such as deep neural nets, which are very data hungry

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. There are many potential use cases for inflation forecasts. Here we shall explore one particular use case, namely using our monthly updated inflation forecasts for trading FX. Note, that for the United States, Eurozone and United Kingdom, we have also recently started doing weekly updates for our model.

Explaining our inflation based trading rule for trading FX

Now that we have given some background on how Turnleaf Analytics forecasts are constructed, we can now explain our systematic trading rule for FX in more detail. As mentioned, there is some significant intuition for the use of inflation forecasts for trading FX, given the impact of inflation on central bank policy. In our case, we calculate an inflation forecast metric, which compares our expectation for the inflation differential between two countries versus the benchmark (usually based on an official source such as a central bank forecast or survey).

Let's say we are trading EUR/USD using inflation forecasts. First, calculate the inflation differential forecast metric:

- EUR/USD inflation differential metric = (Eurozone Turnleaf Analytics 1M forecast – United States Turnleaf Analytics 1M forecast) - (Eurozone Benchmark 1M forecast – United States Benchmark 1M forecast)

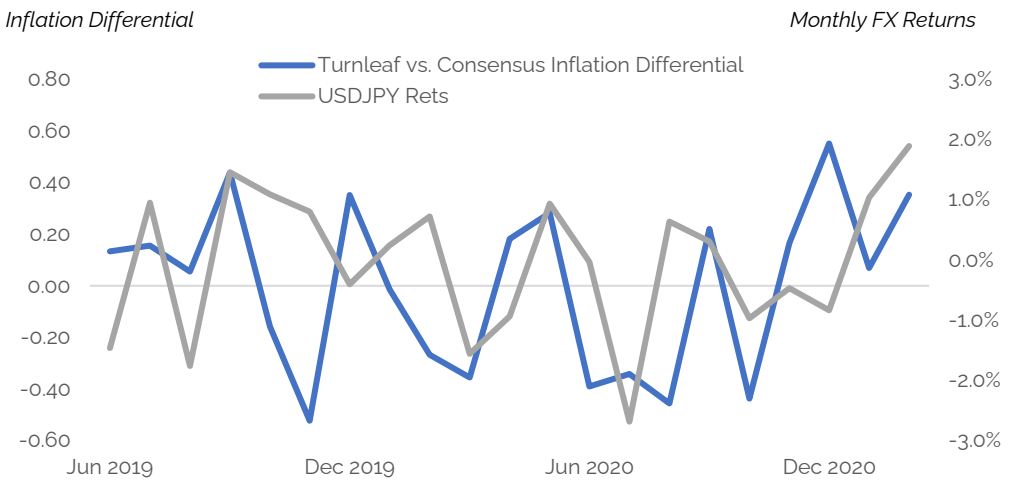
The rationale is if we are forecasting a higher inflation differential than general market expectations, it is likely that the monetary policy expectations should be more hawkish on a relative basis for the base currency (in the example above EUR), compared to the terms currency (USD above). Hence, we would expect spot to rise.

If we see the reverse, and the inflation forecast is negative (i.e. Turnleaf Analytics forecasts are below that of the market consensus), then it suggests that monetary policy expectations should be more dovish for the base currency's central bank compared to the central bank of the terms currencies. In other words, spot is likely to decline.

In Figure 2, we show a stylized example of the Turnleaf inflation differential forecast metric for USD/JPY against the USD/JPY returns, both in monthly data. We see that the forecasts do seem to lead the returns to some extent, at least in this example.

In our previous work, we focused purely on the most liquid pairs in G10 FX. In this instance, we shall expand our universe across more pairs in G10 Fx. We shall also test the trading rule for the more developed parts of EM, notably CEE.

Figure 2: FX returns vs. inflation forecast differentials



Source: Turnleaf Analytics

Our Turnleaf Analytics inflation trading rule, would trigger:

- A long position in EUR/USD if the inflation forecast differential metric is positive
- A short position in EUR/USD if the inflation forecast differential metric is negative

If our reference date is February 2023, then our Eurozone forecast will be updated after the inflation release date for Eurozone (usually close to the beginning of the next reference month, in this case March 2023) and our United States forecast will be updated after the inflation release date for the United States (usually in the middle of the next reference month March 2023).

For trading purposes, we would need to take into account the delay in releasing the data, so we would lag any forecasts with a reference date till the end of March 2023, and trigger the trades then.

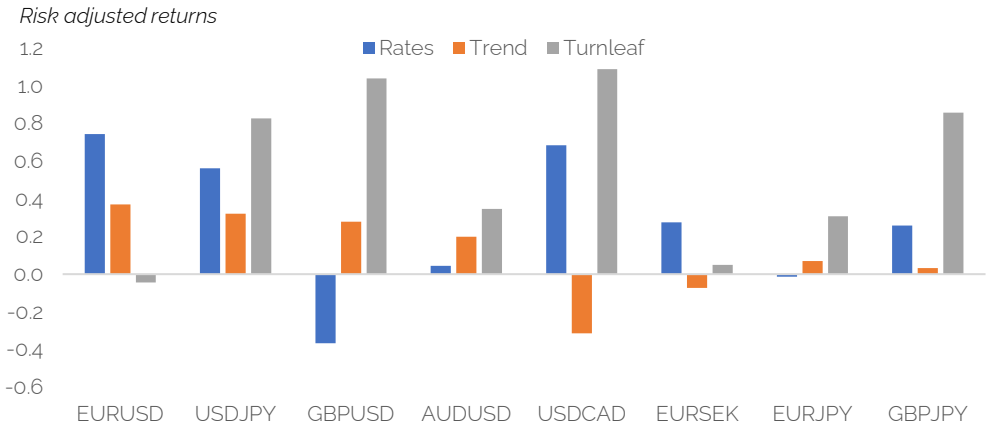
In our historical analysis, we shall be trading a wide array of FX pairs in G10 FX and also relative value FX pairs in CEE. We shall also compare our active trading rules for the G10 FX pairs which use relative rates as an input and trend, which we shall consider as our benchmarks. Transaction costs and carry are included in our analytics.

In past work, we had a constant notional for each currency pair. In this case, we have adjusted our trading rule. We use volatility targeting for each currency, so we adjust the leverage of each signal using a volatility target of 10% and a max leverage constraint of 5. We apply the same approach of volatility targeting for our trend following and rates based strategies.

Historical results for our trading strategies

In Figure 3, we present the historical results for our rates, trend and Turnleaf inflation trading rules for a historical sample from 2018 for the G10 FX currency pairs. For PLNHUF, PLNCZK and CZKHUF, their risk adjusted returns are 0.45, -0.47 and 0.21 respectively for their Turnleaf inflation trading rules.

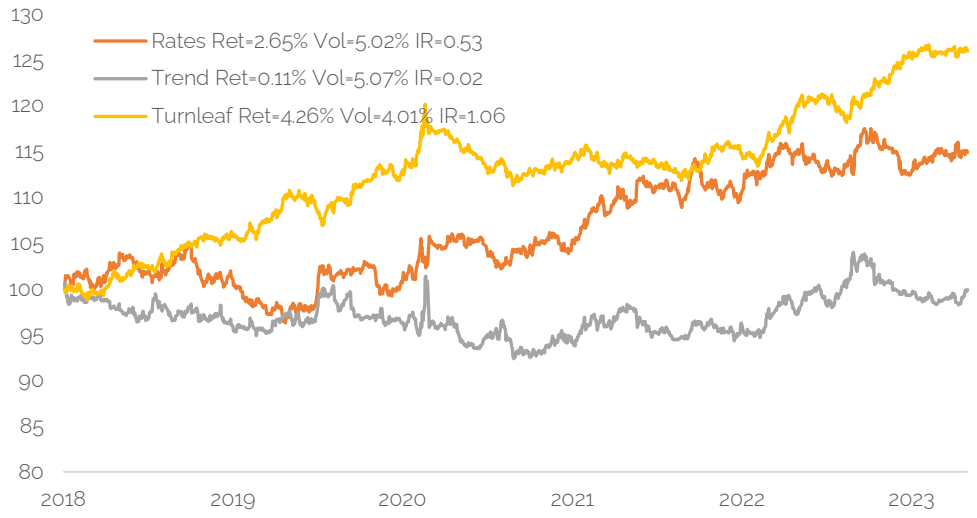
Figure 3: Risk adjusted returns for our strategies



Source: Turnleaf Analytics

In Figure 4, we create an equally weighted basket for all our currency pairs for all these strategies. Our Turnleaf Analytics inflation forecast strategy for trading FX has risk adjusted returns of 1.06 and annualised returns of 4.26% in our historical sample since 2018. The Turnleaf Analytics inflation forecast FX strategy outperforms both the rates and trend FX baskets which have risk adjusted returns of 0.53 and 0.02 historically.

Figure 4: Our Turnleaf Analytics FX basket outperforms benchmark strategies



Source: Turnleaf Analytics

Conclusion

In this paper, we talked about the differential in inflation forecasts between Turnleaf Analytics and consensus on a relative basis can be used for trading FX. The rationale is that the knock on effect of inflation differentials on relative monetary policy can impact FX.

If inflation rises quicker compared to market expectations, we expect a currency to strengthen, if that central bank is perceived as credible by market participants. Falling inflation tends to be accompanied by dovish policy. This transmission mechanism is more of a characteristic of developed markets, rather than emerging markets.

In emerging markets, we can have the dynamic where local bonds can sell off, and yields rise, whilst the local currency is being sold by market participants. That being said, we have also added a small number of relative value pairs from CEE. By looking at relative value pairs, we are stripping out any overall EM beta. CEE is also relatively developed compared to other emerging markets.

Building on previous work, we create a currency basket across a number of G10 FX pairs and also relative value pairs in CEE which used a Turnleaf Analytics inflation forecast differential, has risk adjusted returns of 1.06 historically since 2018. This compares to risk adjusted returns of 0.53 for an FX trading strategy which uses relative rates as an input, and a trend based FX strategy which has risk adjusted returns of 0.02 during the same sample.

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Turnleaf Analytics Ltd., 60 Cannon Street, London EC4N 6NP, UK
Tel +44 20 3290 9624, e-mail info@turnleafanalytics.com
web https://www.turnleafanalytics.com

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