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THE ANALYTICS CURRENCY DECODER
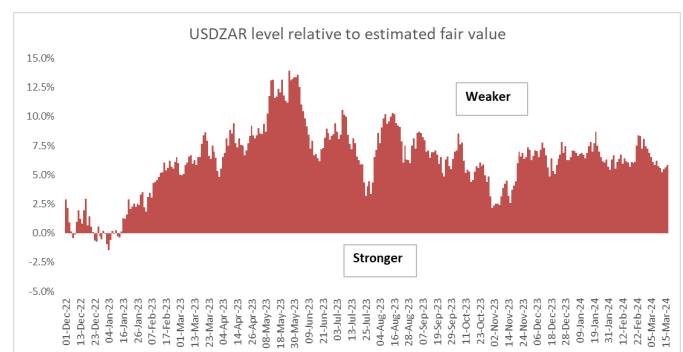
MACHINE LEARNING UNCOVERS FAIR VALUE

Exchange rate modelling techniques have been the subject of significant academic research and practical implementation since the demise of the Bretton Woods system for creating fixed international exchange rates. Models such as Purchasing Power Parity (PPP), Behavioural Equilibrium Exchange Rate (BEER) and Macroeconomic Balance (MB) are all reputable methods of estimating "fair value" or "equilibrium" rates of exchange between currencies.

The Economist journal even has its own Big Mac Index with which to estimate these equilibrium levels. However, these models are all extremely data-intensive and rely, at regular intervals, on the accurate and timely collection of thousands of variables in many economies across the globe followed by the subsequent collation and processing of this data to determine the equilibrium exchange rates. In addition, these models focus on long-term equilibrium estimation and are thus not able to capture short-term shifts in fundamentals which can affect exchange rate valuations and suggest that currencies are out of sync with current financial and economic fundamentals. Recent academic research has proposed improvements to these models to enhance short-term estimation accuracy.
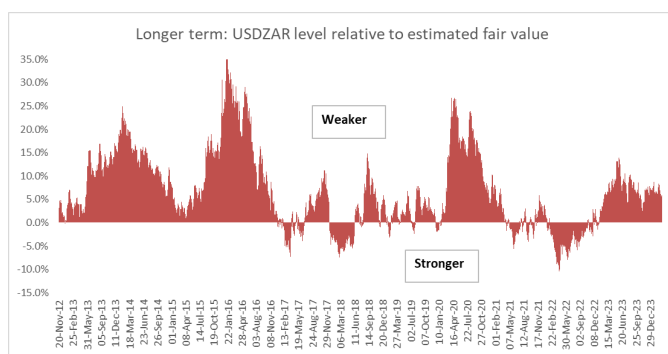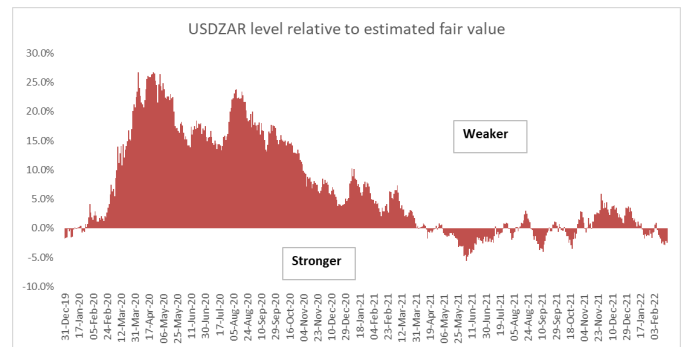
The Analytics Currency Decoder is our method for estimating the fair value for any currency pair on a dynamic short- and long-term basis. The Decoder is our proprietary analysis tool for forex analysis and for determining whether to buy, sell or wait on trading a currency pair.

We do not model a currency pair. On the assumption that currencies are "all knowing" and discount positive or negative information on a highly efficient and dynamic basis, we utilise a basic form of artificial intelligence (AI) through machine learning, together with some unconventional thinking, to decode (or mine) the information-rich exchange rate. The fundamental outcome of running the Decoder is the estimated equilibrium exchange rate (or fair value) at any point in time. The Decoder is not data intensive and only requires a historical time series of the exchange rate levels on which the AI-based (decoding) algorithm can feed. The Decoder currently runs (very quickly) in a simple EXCEL spreadsheet.

Armed with an estimate of the fair value for a currency pair, the strength or weakness in the exchange rate can be computed at that point in time. This strength or weakness is called the fair value residual. The chart below shows this residual (expressed as a percentage) for the USDZAR exchange rate since the end of 2022. The Decoder suggests that since the end of 2022, the USDZAR exchange rate has been persistently weak relative to the US dollar.

USDZAR level relative to estimated fair value

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Intuitive expectation is that over long periods of time, this residual chart should display the characteristics of mean reversion, demonstrating that the USDZAR exchange rate has periods of strength and periods of weakness against the US dollar. The next chart extends the measurement time period to incorporate the last 12 years and indeed, the mean reversion nature of the residual is clearly evident. It is also clear that the USDZAR exchange rate is more often weak against the US dollar as opposed to being strong and that every instance of peak strength or peak weakness is followed by a return to our estimate of fair value at some stage in the future.

USDZAR level relative to estimated fair value

Longer term: USDZAR level relative to estimated fair value

It is instructive to look at a case study of the signals provided by the Decoder, particularly in times of deep economic or political stress. In March 2020, South Africa lost its last investment grade rating when Fitch downgraded the country to sub-investment grade status, following the S&P and Moody's downgrades that happened in April 2017. By 23 April 2020, the USDZAR exchange rate had weakened to R19.08 to the US dollar. Earlier in the year, on 24 January 2020 the exchange rate had been at a level of R14.39. The chart below shows the progression of the fair value residual over that period of time.

When the USDZAR was at R14.39 on 24 January 2020, the estimate for fair value was R14.49. When the USDZAR was at R19.08 on 23 April 2020, the estimate for fair value had only moved up to R15.06. While the exchange rate had weakened by 469c, the fair value estimate had only moved up by 57c, giving a clear measure in monetary terms of the extent of the huge negative shock to the exchange rate. At that point it seemed highly improbable that the exchange rate could strengthen all the way back to around the R15/USD level. By 5 April 2021, the USDZAR exchange rate had indeed strengthened all the way back to R14.56 (passing through R15.06 early in December 2020). On 5 April 2021, the fair value estimate had been revised down to R14.59, very close to where it was on 24 January 2020. This is just one of a number of case studies that have been completed for the USDZAR exchange rate.

The Analytics Currency Decoder has demonstrated a remarkable ability to provide very useful signals for determining whether to buy, sell or wait on trading a currency pair, and not only for the USDZAR exchange rate. The Decoder can be used to analyse any currency pair, without the need for any modifications or alterations to the internal algorithms as the currency pair changes.

In this series of articles, we will explore the versatility of the Decoder and highlight a number of its important characteristics that all provide confidence in a data-light, very efficient way of getting a better understanding of exchange rate behaviour and the drivers of this behaviour.

Source: Dr Lance Vogel, Analytics. Bloomberg data.