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Macro Note

Singapore: Recalibrating The UOB S$NEER

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- As part of our regular review process, this note outlines the process of how we recalibrate the UOB Singapore Dollar Nominal Effective Exchange Rate (S$NEER) and estimate the midpoint and width of the S$NEER policy band.
- Our revised S$NEER model includes 13 currencies, selected via the use of statistical relevancy. Currencies that are found to be statistically insignificant, or are pegged to the USD, are excluded.
- With the use of restricted least square estimation, we identified the currencies' weights that make up the S$NEER. Our in-house S$NEER model tracks the MAS actual very well, with weekly levels correlation since 2016 at 0.9738.

A Primer On Singapore's Monetary Policy

Singapore's monetary policy, unlike most other Asian economies where benchmark interest rates are used as the main policy tool, is managed through the use of a floating exchange rate tool. The use of the exchange rate as a policy tool has been in force since the early 1980s, "with the primary objective of promoting medium term price stability as a sound basis for sustainable economic growth".

According to the Monetary Authority of Singapore (MAS), the three main features of the exchange rate system are:

1. The Singapore dollar is managed against a basket of currencies of our major trading partners.
2. The MAS operates a managed float regime for the Singapore dollar with the trade-weighted exchange rate allowed to fluctuate within a (crawling) policy band.
3. The exchange rate policy band is periodically reviewed to ensure that it remains consistent with the underlying fundamentals of the economy.

Given Singapore's small and open economy, the use of the exchange rate as a policy tool can be regarded as a sound policy approach. This is because Singapore is highly trade dependent where gross exports and imports of goods and services are over 300% of Gross Domestic Product (GDP), while almost 40% of domestic expenditure is on imports. Further, the exchange rate can directly and indirectly affect a wide range of prices, such as import and export prices, wages and rentals, output prices, and eventually, general consumer prices (or widely known as inflation). As such, the impetus to guide Singapore's exchange rate as a policy tool is critical to fulfilling the central bank's mandate in promoting medium term price stability and sustainable economic growth.

To that end, the MAS has three policy parameters at its disposal in managing the trade-weighted S$:

1. the target band within which allows the S$NEER to fluctuate,
2. the target appreciation tangent which guides the S$NEER's target band slope, and
3. the 'centre' which the empirical S$NEER trends within the stipulated target band.

The MAS may or may not intervene in the FX market (via spots or forwards) when the S$NEER approaches the policy band, and in certain cases, allowing the S$NEER to breach the band limit before intervening.

Constructing The S$NEER

The MAS publishes the official S$NEER index on a weekly average basis, at the beginning of each month. However, MAS does not publicly release the policy parameters, which include these key unknowns:

1. Currencies in the S$NEER basket
2. Weights of each currency
3. Policy Band width in which the S$NEER trends
4. Appreciation gradient which the policy band trends
5. Mid-point of the policy band
6. Base period of the estimation
7. Periodic adjustments (e.g. change in base year) made to the S$NEER

An effective estimation of the S$NEER would then be based on answering the above-mentioned six unknowns and the resulting proxy model has to be re-estimated and recalibrated periodically to minimize drift from the "true" model.

Currencies In The UOB S$NEER Basket

Our approach in selecting the currencies in the S$NEER basket is based on statistical relevancy via the Ordinary Least Square (OLS) simple regression analysis.

An approach would be to rely on Singapore's total trade data to determine the top trading partners. According to 2018 total trade data, we selected Singapore's top 18 trading partners, which accounts for 86.4% of total trade. These currencies include the CNY, EUR, USD, MYR, HKD, JPY, IDR, KRW, INR, THB, PHP, AUD, SAR, CHF, AED, GBP, VND and the QAR, sorted according to trade weights.

Using the base period between the start of January 2016 and the end of February 2019, we select the currencies based on a 95% confidence level (or p-value < 0.05). Currencies which are pegged to the USD, which includes the HKD, AED, SAR and QAR, are excluded from the UOB S$NEER model, as the inclusion of these currencies introduces significant multi-collinearity problems. Through this approach, our final UOB S$NEER model includes a total of 13 currencies.

Table 1: Singapore's Top Trading Partners In 2018

Trading Partner	Total Trade (US$M)	(%)
World	656,125.0	100.0
China	85,324.7	13.0
European Union	76,667.8	11.7
United States	70,663.3	10.8
Malaysia	67,901.7	10.4
Hong Kong	44,609.6	6.8
Japan	33,351.5	5.1
Indonesia	31,916.2	4.9
South Korea	23,419.7	3.6
India	21,844.5	3.3
Thailand	17,207.6	2.6
Philippines	14,633.8	2.2
Australia	14,530.5	2.2
Saudi Arabia	14,050.5	2.1
Switzerland	13,544.5	2.1
United Arab Emirates	11,775.8	1.8
United Kingdom	10,078.4	1.5
Vietnam	8,258.5	1.3
Qatar	7,224.9	1.1

Source: Bloomberg, UOB Global Economics & Markets Research

Weights For Each Currency To Determine The Estimated S$NEER

Our approach in determining the weights for each currency is based on the use of the Restricted Least Square (RLS) estimation method. Put simply, the RLS regression model is a method to solve for two conditions: (1) $\sum\beta 1\text{-}n = 100$ while assuring that (2) $\beta 1\text{-}n > 0$. I.e. All the weights are summed to 100%, and each weight is non-negative.

Comparing the obtained results from this method, we found that our derived weights are closely matched to Singapore's trade weights calculated based on total trade values over 24 months (Feb 2017 – Jan 2019)[1]. Specifically, our S$NEER model assigns a slightly lower weighting to the USD, CNY, TWD and KRW versus what the trade weights would suggest, while a vice-versa higher weighting is assigned to the EUR, JPY, AUD and GBP. In a nutshell, our S$NEER tracks the actual MAS S$NEER well. The level correlation of our S$NEER since 2016 is 0.9738.

Kindly see Figure 1 for our S$NEER weights as compared to the respective trade weights.

Figure 1: UOB Revised S$NEER Weights Vs Trade Weighted Weights

Source: Macrobond, UOB Global Economics & Markets Research

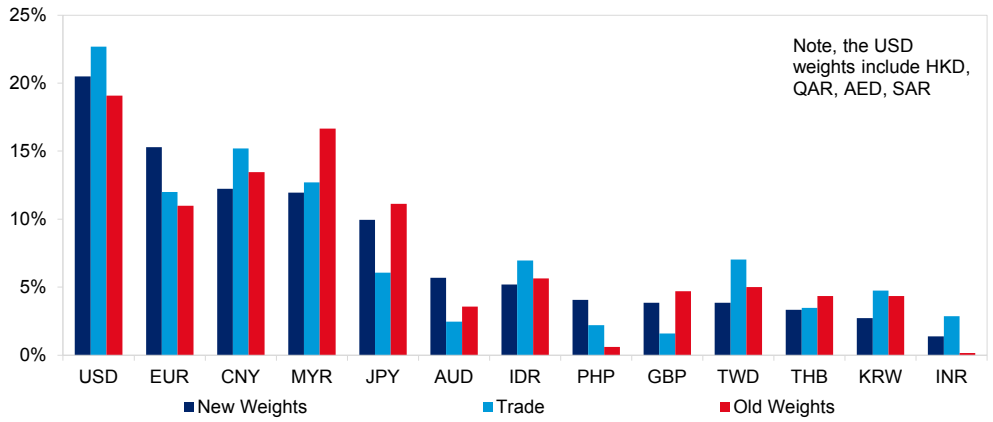
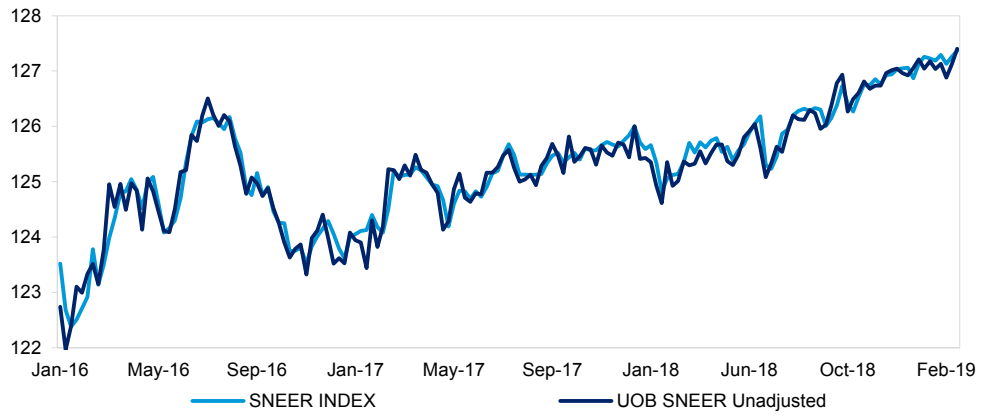


Figure 2: UOB S$NEER Versus MAS Actual (Weekly)

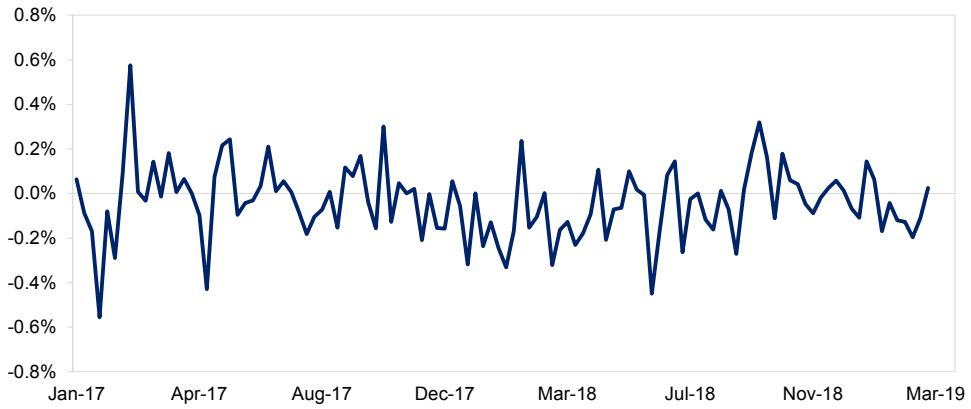
Source: Macrobond, UOB Global Economics & Markets Research



1 We have included the trade weights of Hong Kong, Qatar, UAE and Saudi Arabia together with the US, as these economies' currencies are pegged to the USD.

Figure 3: % Deviation From MAS S$NEER

Source: Macrobond, UOB Global Economics & Markets Research



Band, Appreciation And Mid-Point Estimations

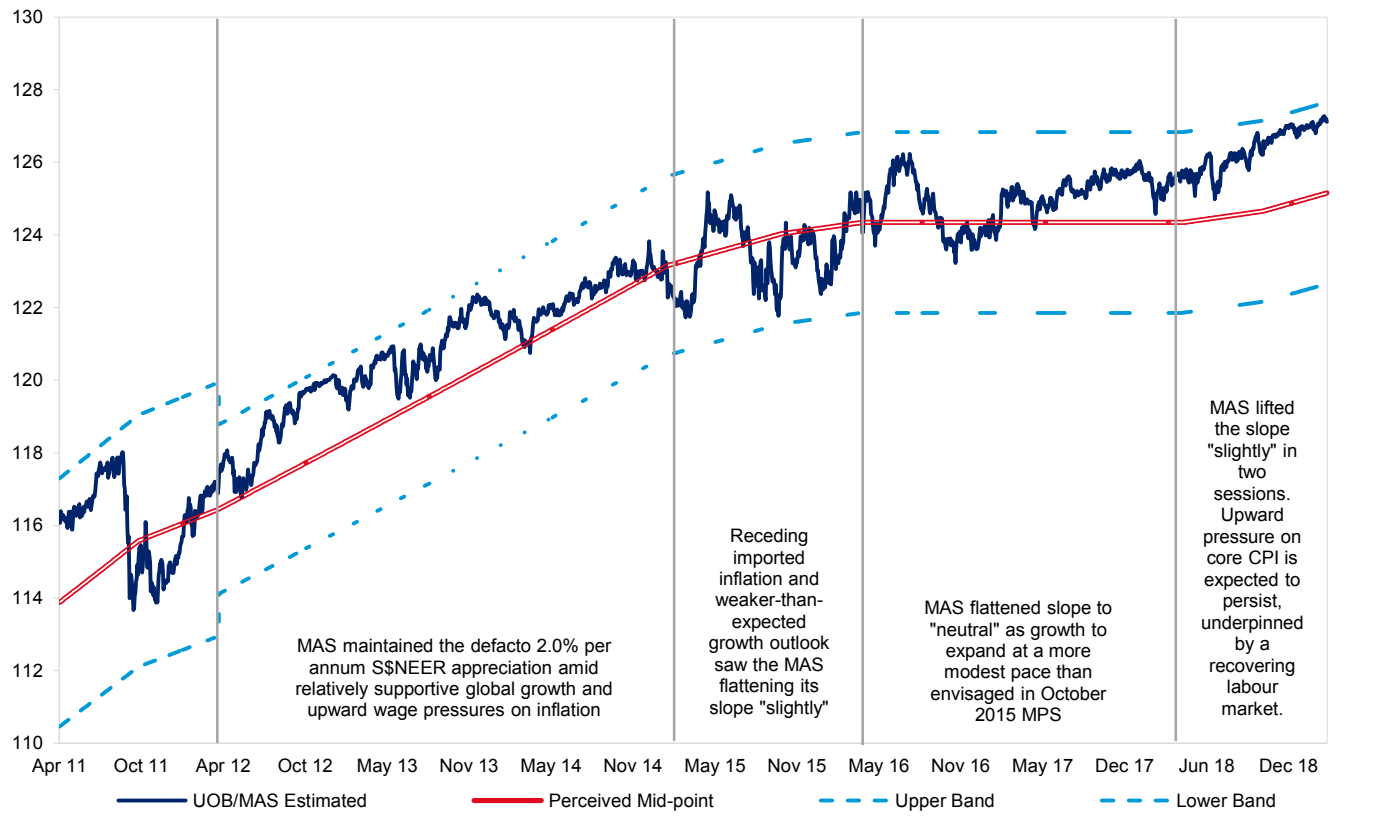
So far our discussion has been on the methodologies pertaining to identifying the relevant currencies in the S$NEER basket, as well as formulating the necessary weights to determine the eventual UOB S$NEER index. However, constructing the S$NEER via the statistical approach has proven to be relatively methodical, while figuring the policy parameters including the band, appreciation and mid-point requires many assumptions.

The inability to statistically derive these policy parameters stem from the intended ambiguity in the MAS' approach in managing the exchange rate policy. For that matter, the central bank does not disclose the slope or the width of the policy band in their decisions, nor do they publicly release the magnitude of the adjustments. Strictly, the only time when we are certain about the slope of the policy band is when the MAS shifts to a neutral policy stance (or better known as a zero percent appreciation slope). We also only have partial clarity about where the mid-point of the S$NEER band is when MAS re-centers it to the prevailing S$NEER level. The last re-centring that the MAS did was in April 2011, where they introduced a re-centring below the prevailing level of the S$NEER, which added further uncertainty as to where the new mid-point is.

To address the assumptions needed to decipher the current policy parameters, one would then need to identify those periods where we are certain about the slope and the mid-point, and thus reverse engineer the process from there. We then use the MAS commentaries in assuming the slope, width, and mid-point of the band, and referencing them with the empirical movements in the S$NEER. The MAS statements could also reference the movement relative to the mid-point, for eg, indicate if the S$NEER has traded above the mid-point in over the past months, which in turn gives us a reliable gauge of the accuracy of our in-house UOB S$NEER parameters.

UOB S$NEER

Source: Macrobond, UOB Global Economics & Markets Research



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