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Macro Note

Singapore: Recalibrating the UOB S$NEER; An Improvement From The Previous Model

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Highlights

- 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$NEER model includes 14 currencies, selected via the use of statistical relevancy. This is compared to our previous S$NEER model of 13 currencies, where the CHF was excluded. Currencies that are found to be statistically insignificant, or are pegged to the USD, are omitted from the model.
- With the use of restricted least square estimation, we identified the currencies' weights that make up the S$NEER. Our recalibrated model has shown an observable improvement in terms of tracking the MAS S$NEER. The weekly level correlation has increased to 0.998 (from 0.974), while the percentage deviation from MAS S$NEER has narrowed from +/- 0.6% to +/- 0.5%.
- As a result, our recalibrated S$NEER index is shifted above the midpoint to around +0.85% at the time of writing, rectifying the 0.3% underestimation of the previous model.

Constructing The S$NEER

This paper serves to provide the process of how we recalibrate the UOB Singapore Dollar Nominal Effective Exchange Rate (S$NEER). Through the use of statistical methods, we identified 14 currencies which should be in the S$NEER currency basket and its respective weights to eventually determine the S$NEER index. We have previously recalibrated the UOB S$NEER index in March 2019, and provided a primer on Singapore's monetary policy process. For more details, please read our report.

The Monetary Authority of Singapore (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 six 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. Periodic adjustments made to the S$NEER

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

Selecting Currencies For The UOB S$NEER basket

An approach would be to rely on Singapore's total trade data to determine the top trading partners. According to total trade data in 2020, we selected Singapore's top 20 trading partners, which accounts for 92.1% of Singapore's total trade. These currencies include the CNY, MYR, USD, EUR, TWD, HKD, JPY, IDR, KRW, THB, VND, INR, PHP, AUD, GBP, AED, CHF, SAR, QAR, and CAD, sorted according to its respective trade weights. The trade weights are calculated as the economies' percentage of total trade to Singapore's.

Table 1: Singapore's top trading partners in 2018 - 2020[1]

Source: Department of Statistics Singapore, UOB Global Economics & Markets Research

Trading Partner	Total Trade (S$M)	(%)
World	3,047,197.6	100.0
China	408,537.7	13.4
Malaysia	334,796.0	11.0
United States	305,362.0	10.0
European Union	281,556.5	9.2
Taiwan	207,029.8	6.8
Hong Kong	204,862.3	6.7
Indonesia	172,440.8	5.7
Japan	156,998.3	5.2
South Korea	124,296.2	4.1
Thailand	96,537.3	3.2
India	70,534.1	2.3
Australia	66,721.2	2.2
Vietnam	66,250.9	2.2
Philippines	62,354.9	2.0
United Arab Emirates	52,169.4	1.7
United Kingdom	51,059.7	1.7
Switzerland	41,489.0	1.4
Saudi Arabia	39,574.7	1.3
Qatar	24,651.7	0.8
New Zealand	11,985.8	0.0

While referencing the trade weights in Table 1 could give some guidance on what the S$NEER currency weights could be, we found this approach to be overly simplistic. This is because (1) it does not offer statistical clarity on which currencies should be in the basket, while (2) neither do the trade weights in the above 20 economies sum to 100%.

As such, our approach in selecting the currencies in the S$NEER basket is based on statistical relevancy via the Ordinary Least Square (OLS) regression approach.

Using the base period between the start of January 2018 and the end of December 2020, 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

[1] We excluded Cambodia, Brazil, Bangladesh, Myanmar and Mexico from Table 1.

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 14 currencies.

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) $\sum \beta_{1\text{-}n} = 1$ while ensuring that (2) $\beta_{1\text{-}n} > 0$. These two conditions by definition, mean that the sum of the weights must equal to 100%, and each weight carries a non-negative value.

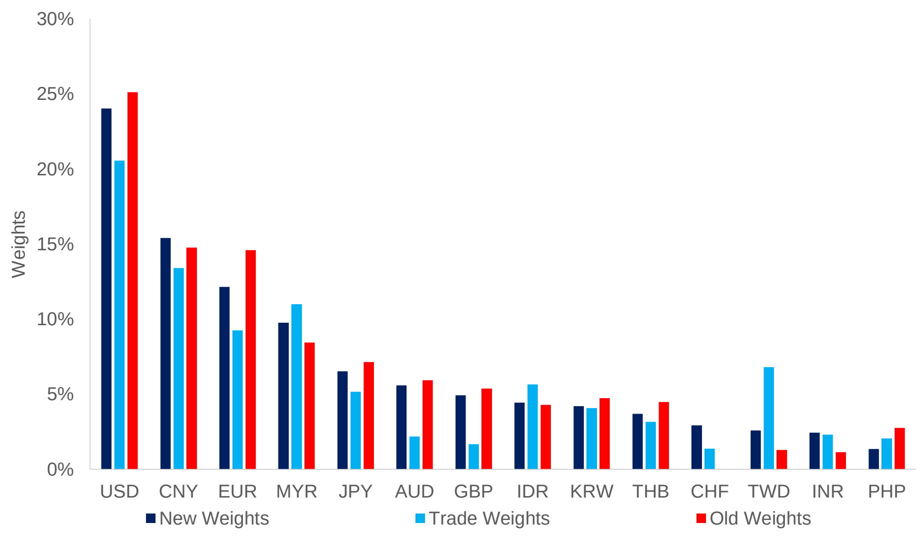
Comparing the obtained results from this method, we found that our derived weights are closely matched to Singapore's trade weights calculated based on total trade values over 36 months (Jan 2018 – Dec 2020). Our S$NEER model assigns a higher weighting to the USD, CNY, EUR and JPY versus what the trade weights would suggest, while a vice-versa lower weighting are assigned to the MYR, IDR, TWD and PHP.

The UOB S$NEER tracks the MAS S$NEER well with a R-square level of 0.998, from a lower R-square of 0.974 observed in the previous model. Similarly, the deviation from MAS S$NEER has narrowed to +/-0.5%, an improvement from the previous model at +/-0.6%.

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

Exhibit 1: UOB Revised S$NEER Weights Vs Trade Weights[2]

Source: UOB Global Economics & Markets Research



[2] USD weights include HKD, QAR, AED, SAR; CHF was not included in the previous model

Exhibit 2: UOB S$NEER Versus MAS S$NEER

Source: UOB Global Economics & Markets Research

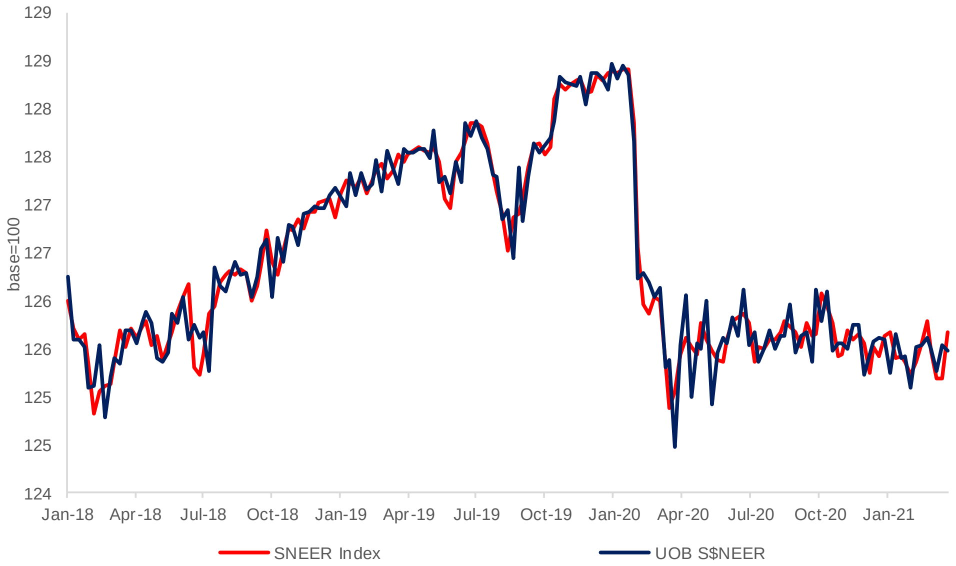
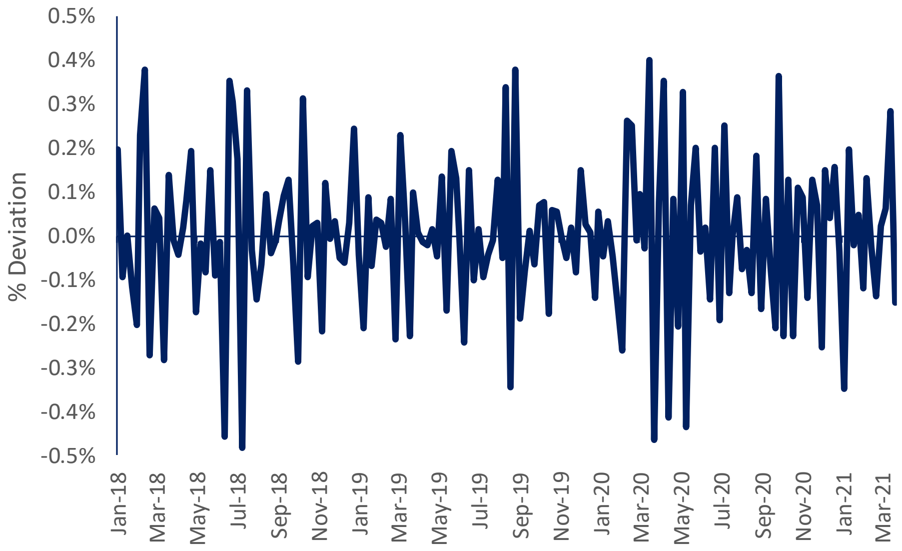


Exhibit 3: UOB S$NEER Percentage Deviation From MAS S$NEER

Source: UOB Global Economics & Markets Research



Band, Appreciation And Mid-Point Estimations

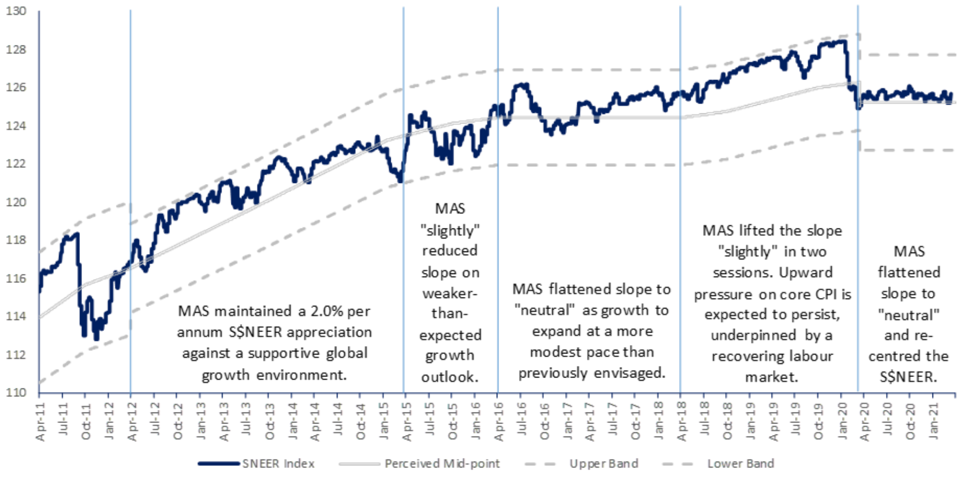
So far our discussion has been on the methodologies pertaining to identifying the relevant currencies in the S$NEER basket, as well as formulating the necessary weights to determine the eventual UOB S$NEER index. However, constructing the S$NEER via the statistical approach has proven to be relatively 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. Partial clarity may however be obtained when the MAS shifts to a neutral policy stance (or better known as a zero percent appreciation slope), or when the MAS re-centres the S$NEER band. The last shift to a neutral policy stance and re-centring to the prevailing level of the S$NEER was made in March 2020, thus offering immense clarity to the slope and mid-point of the current S$NEER band.

As a consequence, our recalibrated S$NEER index is shifted above the midpoint to around +0.85% at the time of writing, rectifying the 0.3% underestimation of the previous model. This resulted in an upward adjustment in the eventual calculation of the S$NEER index from midpoint.

Exhibit 3: Recalibrated UOB S$NEER Model

Source: UOB Global Economics & Markets Research



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