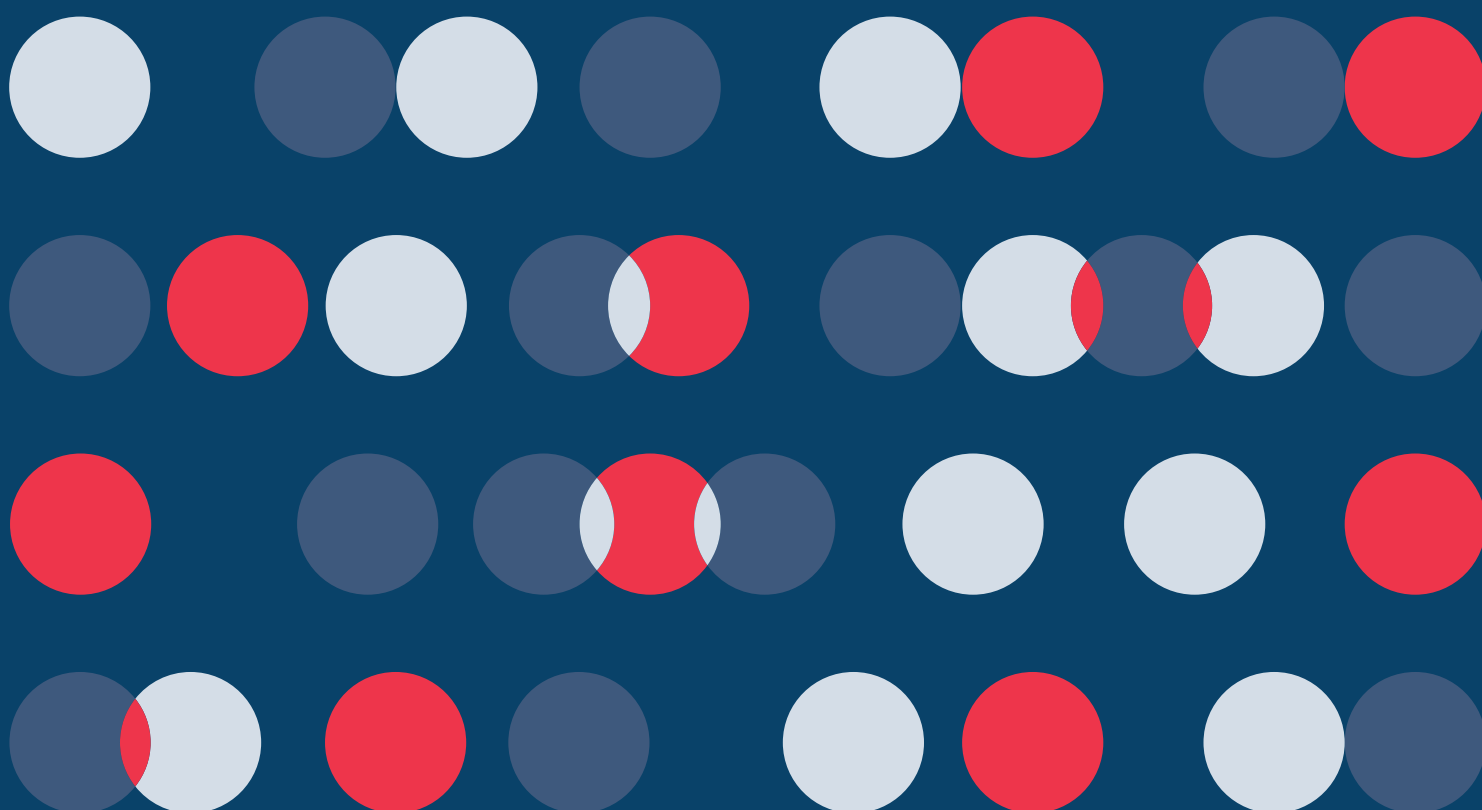


July 2018

RESEARCH REPORT

THE RMB REFERENCE CURRENCY BASKET AND
THE IMPLICATIONS OF A MARKET-BASED
RMB CURRENCY INDEX



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SUMMARY

After the Renminbi (RMB) exchange rate reform in 2005 which introduced a basket of currencies as reference for RMB central parity rates against foreign currencies, the currency basket has become a major reference in determining RMB exchange rate in the following decade. During 2005 to 2015, the RMB/USD bilateral rate became more flexible and moved closer with other Asian currencies. At the same time, the Euro, the British Pound, the Canadian Dollar and the Australian Dollar showed increasing influence on the RMB value. In December 2015, the People's Bank of China announced for the first time the composition of the RMB's reference basket of currencies, further increasing the transparency of the currency basket. A mechanism based on the "previous closing rate" and the "exchange rate movements of a basket of currencies" is gradually established to determine the RMB/USD central parity rate. This clarifies how the currency basket would influence the RMB central parity rate. The currency basket expanded further in 2016, and in 2017 a counter-cyclical factor was introduced which enhanced the anchoring role of the currency basket for determining the RMB central parity rate.

The actual movements of the RMB exchange rate showed that, in nearly two years from the end of 2015 to November 2017, the RMB exchange rate and the CFETS RMB currency basket index experienced several stages of interaction. During the period, the currency basket had experienced a trend from devaluation to slight appreciation. With increased reference to the currency basket in the pricing of the RMB, the flexibility of the RMB/USD exchange rate has also increased. This fosters a healthy shift of the RMB exchange rate from a one-way movement to two-way fluctuations and promotes exchange rate equilibrium in the medium- to long-term.

The historical development of the US Dollar indices exemplifies that currency indices have much reference value for currency pricing. They are also important tools that improve the tradability and usability of currencies. In designing the composition and the weightings of reference currencies for a currency index to enable its extensive market use, the home country's trade relations with other countries, as well as the liquidity of the reference currencies in the foreign exchange and capital markets, are factors to be taken into consideration. With this perspective, HKEX and Thomson Reuters, in compiling their jointly developed RMB Currency (RXY) Indices, have taken into account the liquidity of trading in RMB against other major currencies, and exercise dynamic adjustment of currencies and their weightings in the reference basket on a periodic basis based on a highly transparent set of formulae. Thereby, the indices can duly reflect the direction and the degree of movement in the RMB exchange rate against other currencies, making available useful instruments for facilitating market-based RMB exchange rate reforms.

1. RMB EXCHANGE RATE REFORM IN 2005 AND 2010: CURRENCY BASKET BECAME A REFERENCE BENCHMARK

1.1 2005: Towards a managed floating exchange rate regime with the introduction of a currency basket

Reforms in the Renminbi (RMB) exchange rate can be traced back to 1994 when the RMB's official exchange rate and the foreign exchange (forex) swap market rate¹ were unified, which brought the currency's value from RMB 5.8 per US Dollar (USD) down to RMB 8.7 per USD. This signified the beginning of a unified managed floating exchange rate regime based on market supply and demand. During the 1997-98 Asian financial crisis, Thai Baht and other Asian currencies plunged but the value of the RMB against the USD remained stable at about RMB 8.28 per USD.

On 21 July 2005, the People's Bank of China (PBOC) announced the adoption of a managed floating exchange rate system based on market supply and demand, with reference to a basket of currencies. This officially marked the beginning of market-based reforms for the fixings of RMB central parity rates. This was also the first time that the PBOC made it clear that the RMB exchange rates will be determined with reference to a basket of currencies, dropping its peg to the USD. The reform started off a process of adjustment that saw the RMB exchange rate moving from its value being under-estimated to a more balanced and adjusted value.

In June 2010, the PBOC, in another round of exchange rate reform, stressed that the RMB exchange rates were to shift from bilateral to multilateral references, with greater emphasis placed on a basket of currencies. The exchange rate fixing mechanism that makes reference to a basket of currencies is one that operates between a currency peg and a floating rate regime — it offers greater flexibility than a currency peg and brings not as big a volatility as to easily set off financial turbulence than it might under a floating rate regime. It helps realise the implementation of stable macroeconomic policies and prevent speculative cross-border capital flows. Along with the continuous opening up of the Chinese economy, China's major trade partners have become increasingly diversified and its external investments have extended to multiple regions. Therefore, pegging to a basket of multiple currencies will more accurately reflect the RMB exchange rates and will also increase its flexibility.

1.2 2005-2015 currency basket: The projected composition and its impact on the RMB exchange rate

After the 2005 exchange rate system reform, despite repeated pronouncement of the important role of the currency basket in RMB pricing, the PBOC did not directly disclose the basket's composition, currency weightings and pricing mechanism. Hence, outside observers and researchers, based on RMB/USD movements, came up with various projections of their own regarding the relationships between the RMB and the USD and other currencies in the reference basket.

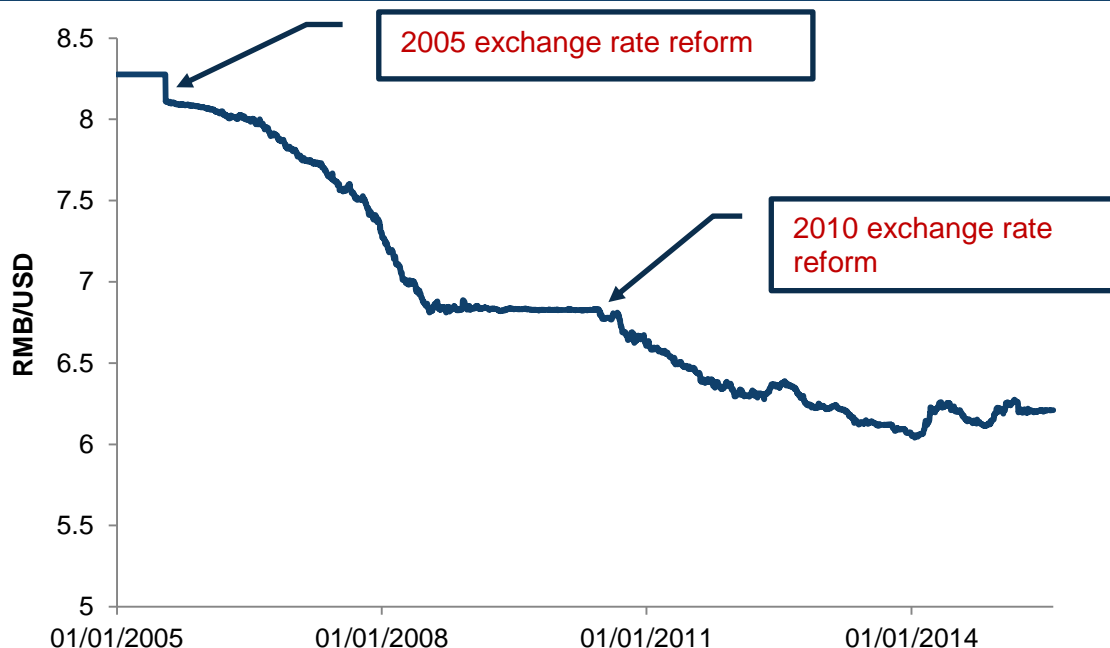
The movement of the RMB/USD central parity rate demonstrated that for most of the time after 2005, the rate was basically fixed with reference to a basket of currencies, except during the time of the 2008 global financial turmoil when the RMB was re-pegged to the USD². Between 2005 and the financial crisis in 2008, the RMB/USD exchange rate was on an accelerating trend of appreciation. The RMB/USD exchange rate appreciated 5.5% and 10.9% respectively by the second year and the third year since the exchange rate reform on 21 July 2005. By

¹ Starting from 1980, a forex swap regime was implemented resulting in the co-existence of official and forex swap exchange rates.

² See Zhang Ming, *Renminbi exchange rate: Mechanism changes and future directions* (張明·《人民幣匯率：機制嬗變與未來走向》), September 2017.

November 2008, the RMB/USD exchange rate had appreciated by about 19%. On the outbreak of the 2008 global financial crisis, the RMB/USD exchange rate regained stability; the RMB was once again pegged to the USD. Until the subsequent exchange rate reform in June 2010, the fluctuation in the RMB/USD exchange rate continued to widen. On the one hand, this was due to the gradual expansion of the official band of the RMB exchange rate from 0.3% to 2%. On the other hand, it reflected the increasing influence of the currency basket on the RMB central parity rate.

Figure 1. Daily movement of the RMB exchange rate (1 Jan 2005 — 10 Aug 2015)



Source: Wind

Using simulation analysis, academics projected the currency composition and weightings in the currency basket and the impact of the currency basket on the RMB central parity rates. A study³ found that, other than the period during the 2008 financial crisis, the USD had an absolute dominant position in the RMB's reference basket of currencies; some reference currencies were pegged to the USD and so their impact on the RMB was also fully manifested through the USD. According to the study, the USD's weighting in the currency basket at that time was probably around 80%, a percentage notably more substantial than that theoretically required for any stable balance of payment. Secondly, weightings in the currency basket probably changed dynamically. The weightings of emerging market currencies, such as the Russian ruble and the Singaporean Dollar had probably increased. Thirdly, the monetary authority's usage of the currency basket for exchange rate reference was at a low level at that time, hence, its effect on the RMB exchange rate was limited. According to another study⁴, such characteristics continued after 2010 with the supremacy of the USD in the currency basket continued; but the weighting of the USD had somewhat declined along with the increase in the weightings of the Asian currencies which included the Japanese Yen, the Korean Won, the Singaporean Dollar, the Malaysian ringgit, the Philippines peso, the New Taiwan Dollar and the Thai baht. The increase in weightings of the Asian currencies reflected the increasing influence of China's trade relations with East Asia.

³ Zhou Jizhong, *Renminbi's reference currency basket: Composition, stability and level of commitment* (周繼忠·〈人民幣參照貨幣籃子：構成方式、穩定程度及承諾水平〉), 《國際金融研究》, March 2009.

⁴ Xie Hongyan, *Estimation of weightings in the RMB currency basket since the latest exchange rate reform and comparison with the optimal weightings* (〈新匯改以來人民幣匯率中貨幣籃子權重的測算及其與最優權重的比較〉), 《世界經濟研究》, Issue 3, 2015.

By and large, in a decade after its introduction in 2005 as the reference for the RMB central parity rates, the currency basket has gradually become the major reference in RMB pricing. Albeit it was not clear about the composition of the currency basket or its effect on the RMB central parity rates during this period, both the actual exchange rate movements and academic studies showed that the flexibility of the RMB/USD exchange rate had been growing and the relationship between RMB and the Asian currencies was deepening during the period. The Euro, the British Pound, the Canadian Dollar and the Australian Dollar were also found to have an increasing influence on the RMB exchange rate. The gradual and dynamic change of the RMB exchange rate against the currency basket during that period demonstrated the increasing diversification of China's external trade relations and its economic structural adjustments.

2. 11 AUGUST 2015 REFORM: CURRENCY BASKET BECOMING ONE OF THE TWO ANCHORS FOR RMB CENTRAL PARITY RATES

2.1 A transparent RMB reference currency basket

On 11 August 2015, the PBOC announced the adjustment of the quotation mechanism for the RMB/USD central parity rate, setting off a new round of exchange rate reform under which the RMB central parity rates become more market-driven. In December 2015, the RMB exchange rate fixing mechanism became more transparent as the PBOC officially published for the first time the composition of the reference currency basket. China Foreign Exchange Trade System (CFETS) publicly released for the first time the CFETS RMB Index which reflects the RMB exchange rates against 13 currencies traded at CFETS. The USD, the Euro and the Japanese Yen had the highest weightings at 26.40%, 21.39% and 14.68% respectively, followed by the Hong Kong Dollar (6.55%) and the Australian Dollar (6.27%). The sample currency weightings are calculated based on international trade weightings with adjustments of re-export trade factors. Trade volumes represented by the currency basket index accounted for as much as 60.4% of China's external trade volume (see Table 1).

Location	Currency	Index weighting	Average annual trade volume with China (US\$ million) (Oct 2014 — Oct 2017)	Trade weighting
US	USD	26.40%	554,230	14.1%
Eurozone	EUR	21.39%	576,441	14.7%
Japan	JPY	14.68%	285,217	7.3%
HK	HKD	6.55%	323,030	8.2%
Australia	AUD	6.27%	118,960	3.0%
Malaysia	MYR	4.67%	94,282	2.4%
Russia	RUB	4.36%	74,799	1.9%
UK	GBP	3.86%	78,031	2.0%
Singapore	SGD	3.82%	78,202	2.0%
Thailand	THB	3.33%	77,443	2.0%
Canada	CAD	2.53%	51,647	1.3%
Switzerland	CHF	1.51%	44,131	1.1%
New Zealand	NZD	0.65%	12,425	0.3%
Total		100%	2,368,838	60.4%

Note: Due to rounding, weightings may not add up to 100%.

Sources: CFETS for index weightings; Wind for trade volumes based on which trade weightings are calculated.

To provide for observation of changes in the RMB exchange rate from different perspectives, CFETS publishes a RMB index that refers to the Bank for International Settlements (BIS) currency basket and another that refers to the International Monetary Fund (IMF) Special Drawing Rights (SDR) currency basket. Compared to the BIS effective exchange rate index for RMB, the CFETS RMB Index assigns higher weightings to the currencies of major developed countries, with also the inclusion of East Asian and Russian currencies but not a wider range of emerging market currencies.

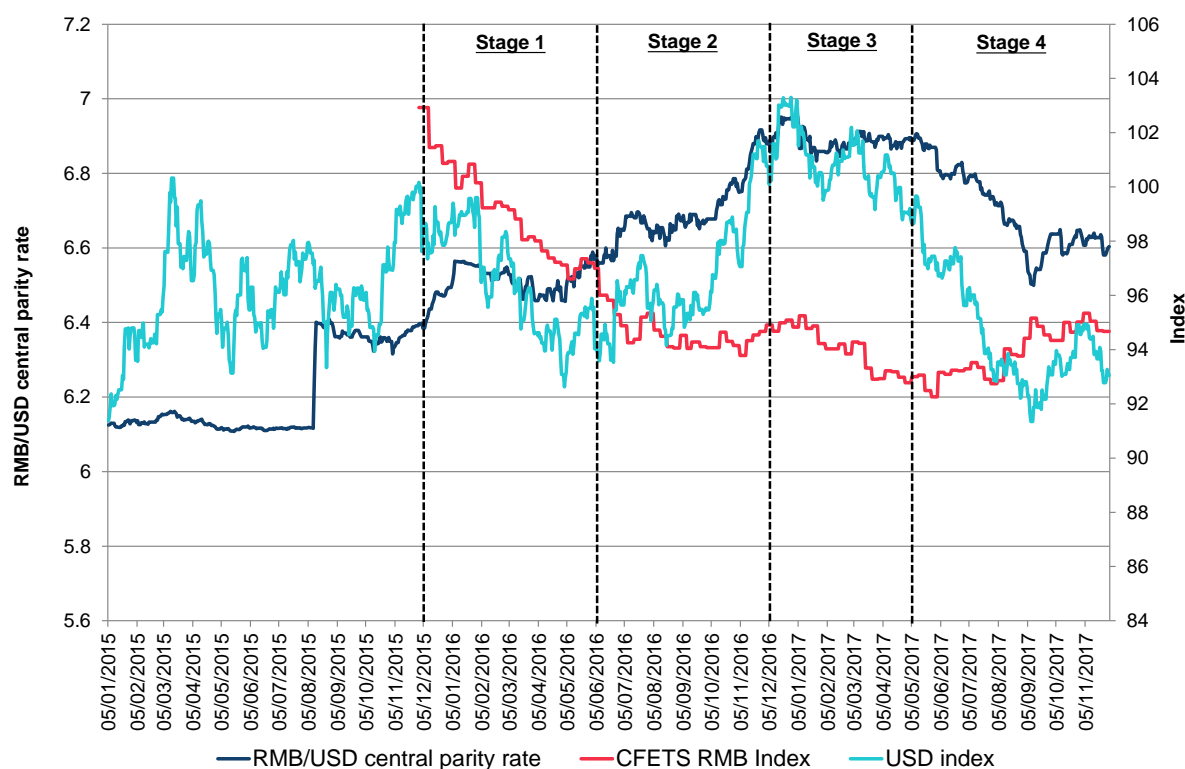
In the currency basket published by CFETS in 2015, the USD had a weighting far below its previously estimated percentage (see section 1.2). In this new currency basket, the USD together with the Hong Kong Dollar had a combined weighting of 33%. Obviously, the launch of the new currency basket marked the gradual transition of the RMB exchange rate policy from pegging to the USD to adopting a floating rate mechanism under which the exchange rate is increasingly determined by market forces and trade relations.

2.2 Interactions between RMB central parity rate and CFETS Index: Four stages of transitions

After CFETS' official release of its RMB Index, the currency basket has taken on a greater role in the RMB exchange rate. The RMB/USD central parity rate is being determined by a mechanism that is based on the "closing rate" and the "exchange rate movements of a basket of currencies". This clarifies the principles based on which the currency basket would influence the RMB central parity rate.

Specifically, under the new central parity rate formation mechanism, the RMB/USD central parity rate is based on both the "closing rate on the previous trading day" and the "exchange rate movements of a basket of currencies". The "closing rate" refers to the RMB/USD closing exchange rate in the interbank forex market at 16:30 on the previous day. This factor mainly reflects supply and demand in China's forex market. The "exchange rate movements of a basket of currencies" refers to the adjustment that is required in the RMB/USD exchange rate in order to maintain the stability of the RMB against a basket of currencies. Under this mechanism, the RMB central parity rate is increasingly bound by the currency basket, which has gradually become one of the two anchors that determine the RMB central parity rate.

Figure 2. Daily movements of RMB central parity rate, USD index and CFETS RMB Index (Jan 2015 — end-Nov 2017)



Note: The US Dollar index used is the DXY US Dollar Index provided by the US Intercontinental Exchange.

Sources: Wind for US Dollar index data; CFETS for RMB central parity rates and CFETS RMB Index data

As indicated by actual exchange rate movements, from the end of 2015 to November 2017, the RMB central parity rate and the CFETS RMB Index experienced different development stages (see Figure 2):

- (1) **Stage One** — from the announcement of the RMB central parity rate mechanism at the end of 2015 to mid-2016

This stage is characterised by *depreciation of the USD a fall in the CFETS RMB index and a stable central parity rate.*

The USD index fell from its peak after the first interest rate hike in 2015 and started to weaken. Under the new RMB central parity rate mechanism, the central parity rate should rise correspondingly. However, during that period, the RMB was weak against non-US currencies such that the CFETS RMB Index showed depreciation (from 100.94 points to around 95 points). This resulted in basically a flat central parity rate that hovered in the range between 6.5 and 6.65.

- (2) **Stage Two** — from mid-2016 to end of 2016

This stage is characterised by *a rising USD, a stable CFETS RMB Index and a devaluation of the central parity rate.*

The USD index was driven up by factors including changes in risk profiles as a result of the Brexit vote (voting on Britain's exit from the European Union) in June 2016 and Donald Trump's winning in the US presidential election in November the same year, and the expectations of interest rate hikes by the end of 2016. The USD index was on an overall upward trend, rising from 94 points to a peak of 103 points at the end of 2016,

while non-US currencies (including RMB) depreciated against the strong USD. As a result, the RMB exchange rate against the currency basket was largely stable during this period such that the CFETS RMB Index moved steadily and remained at the level of 94-95 points. The result was that the RMB central parity rate depreciated against the USD, reaching the lowest level of 6.94.

(3) **Stage Three** — from early 2017 to mid-May 2017

This stage is characterised by *depreciation of the USD, a slight fall in the CFETS RMB Index and a stable central parity rate.*

During this period, Trump policies were challenged and expectations for a strong USD began to recede. The Euro rose as European economic fundamentals strengthened and systemic risks in European politics subsided. The USD weakened correspondingly. As the USD continued to weaken, the RMB recorded a modest depreciation against a basket of currencies. The CFETS RMB Index fell from 95.25 points to 92.26 points. The RMB central parity rate remained largely in the range of 6.85-6.90 without rising in response to the weak USD. The RMB exchange rate and the CFETS RMB Index had basically the same movement trends as in stage one.

(4) **Stage Four** — from late May 2017 to end of November 2017

In this stage, the PBOC introduced a counter-cyclical factor to the quotation formula for the RMB/USD central parity rate to offset any unilateral expectation driven by market sentiments. This stage is characterised by *depreciation of the USD, a modest rise in the CFETS RMB Index, the USD depreciation effect being offset by the counter-cyclical factor and a substantial rise in the central parity rate.*

After the introduction of the counter-cyclical factor, the RMB/USD central parity rate is determined based on three factors: the closing rate on the previous trading day, exchange rate movements of a basket of currencies and the counter-cyclical factor. According to the PBOC's Monetary Policy Report (2017Q2), the counter-cyclical factor was calculated in the following way: firstly, the quoting banks broke down the change in the closing price into two parts — the part due to changes in exchange rates of the currencies in the reference basket and the part due to RMB demand and supply conditions; then, counter-cyclical adjustment was applied to the factor of demand and supply conditions, in order to weaken the herding effect in the forex market. In calculating the counter-cyclical factor, the first step was to remove the impact of the currency basket from the difference between the previous closing rate and the central parity rate, thereby obtaining the change in the RMB exchange rate that mainly reflects market supply and demand. The counter-cyclical factor can then be determined by adjusting the counter-cyclical coefficient, which is set by quoting banks based on factors like changes in the economic fundamentals and the extent of procyclicality in the forex market.

As the impact of supply and demand was largely offset by the counter-cyclical factor in the actual quotations, the anchoring effect of the currency basket on the RMB central parity rate was further strengthened. After the second quarter of 2017, the USD index continued its downtrend while the CFETS RMB Index rose steadily to around 95 points. Due to the filtering effect of the counter-cyclical coefficient, the RMB saw considerable appreciation against the USD.

2.3 Composition and impact of the new currency basket

2.3.1 The increased impact of Euro and Japanese Yen on RMB

At the end of 2016, the PBOC once again modified the composition of the currency basket. The number of currencies in the basket was increased from 13 to 24. The trade volume represented by the new currency basket accounted for 74% of China's total external trade, which is much higher than that represented by the old index. The new CFETS RMB Index is therefore more representative.

In the new currency basket, the weighting of the USD fell from 26.4% to 22.4%. Including the Hong Kong Dollar which is pegged to the USD, the USD had effectively a weighting of 26.7% in the basket. Euro and the Japanese Yen had a combined weighting of 27.8%, surpassing that of the USD (see Table 2).

In 2016, the RMB depreciated by around 6.5% against the USD, and by 3.9% and 9.4% against the Euro and the Japanese Yen respectively. The RMB devaluation was relatively substantial, driving the CFETS RMB Index down. In the first 11 months of 2017, the RMB appreciated 5.08% against the USD, but remained stable against the Japanese Yen and depreciated by 6.8% against the Euro. This resulted in a relatively steady but weakening CFETS RMB Index. The increasing influence of the Euro and the Japanese Yen on the RMB showed that the RMB is no longer linked unilaterally to the USD but is having bigger interactions with other major currencies in the international market. In this way, the RMB exchange rate could achieve a level that better serves China's need to improve its trade conditions as well as the needs of Mainland enterprises to adapt to structural adjustments.

Table 2. Comparison of CFETS RMB Index composition in 2015 and 2016

Location	Currency	Index weighting (2015)	Index weighting (2016)	Weighting adjustment
US	USD	26.40%	22.40%	-4.0%
Eurozone	EUR	21.39%	16.34%	-5.1%
Japan	JPY	14.68%	11.53%	-3.2%
Korea	KRW	—	10.77%	+10.8%
Australia	AUD	6.27%	4.40%	-1.9%
Hong Kong	HKD	6.55%	4.28%	-2.3%
Malaysia	MYR	4.67%	3.75%	-0.9%
UK	GBP	3.86%	3.21%	-0.7%
Singapore	SGD	3.82%	3.16%	-0.6%
Thailand	THB	3.33%	2.91%	-0.4%
Russia	RUB	4.36%	2.63%	-1.7%
Canada	CAD	2.53%	2.15%	-0.4%
Saudi Arabia	SAR	—	1.99%	+2.0%
United Arab Emirates	AED	—	1.87%	+1.9%
South Africa	ZAR	—	1.78%	+1.8%
Switzerland	CHF	1.51%	1.71%	+0.2%
Mexico	MXN	—	1.69%	+1.7%
Turkey	TRY	—	0.83%	+0.8%
Poland	PLN	—	0.66%	+0.7%

Location	Currency	Index weighting (2015)	Index weighting (2016)	Weighting adjustment
Sweden	SEK	—	0.52%	+0.5%
New Zealand	NZD	0.65%	0.44%	-0.2%
Denmark	DKK	—	0.40%	+0.4%
Hungary	HUF	—	0.31%	+0.3%
Norway	NOK	—	0.27%	+0.3%

Sources: CFETS.

2.3.2 The increased weightings of managed floating currencies in the basket

Since the change in composition at the end of 2016, the CFETS RMB Index currency basket newly admitted a number of emerging market currencies to reflect China's trade relations with these countries. These include the South African Rand, the Mexican Peso, the Emirati Dirham, the Saudi Riyal, the South Korean Won, the Turkish Lira and others. (See Table 2.)

On the other hand, the inclusion of more currencies with a managed floating exchange rate system accordingly reduced the weightings of free-floating currencies like the USD, the Euro, the Japanese Yen and the Hong Kong Dollar. This would reduce the volatility of the currency basket and in turn the overall flexibility of the RMB exchange rate. In the new basket, the South African Rand, the Mexican Peso, the South Korean Won and the Turkish Lira are currencies of managed floating rates, while the Emirati Dirham and the Saudi Riyal are fixed-rate currencies. The aggregate weighting of these currencies in the new CFETS RMB Index was 18.9%.

A relatively stable basket of currencies is favourable to managing market expectations on the RMB exchange rate. It may also help improve trade competitiveness and maintain the stability of the currency's purchasing power. However, with a larger number of low-volatility currencies in the currency basket, the RMB exchange rate may not be able to react promptly to changes in supply and demand. As a result, the RMB's flexibility vis-à-vis other currencies in coping with market risks, and therefore its ability to mitigate risks, might be reduced.

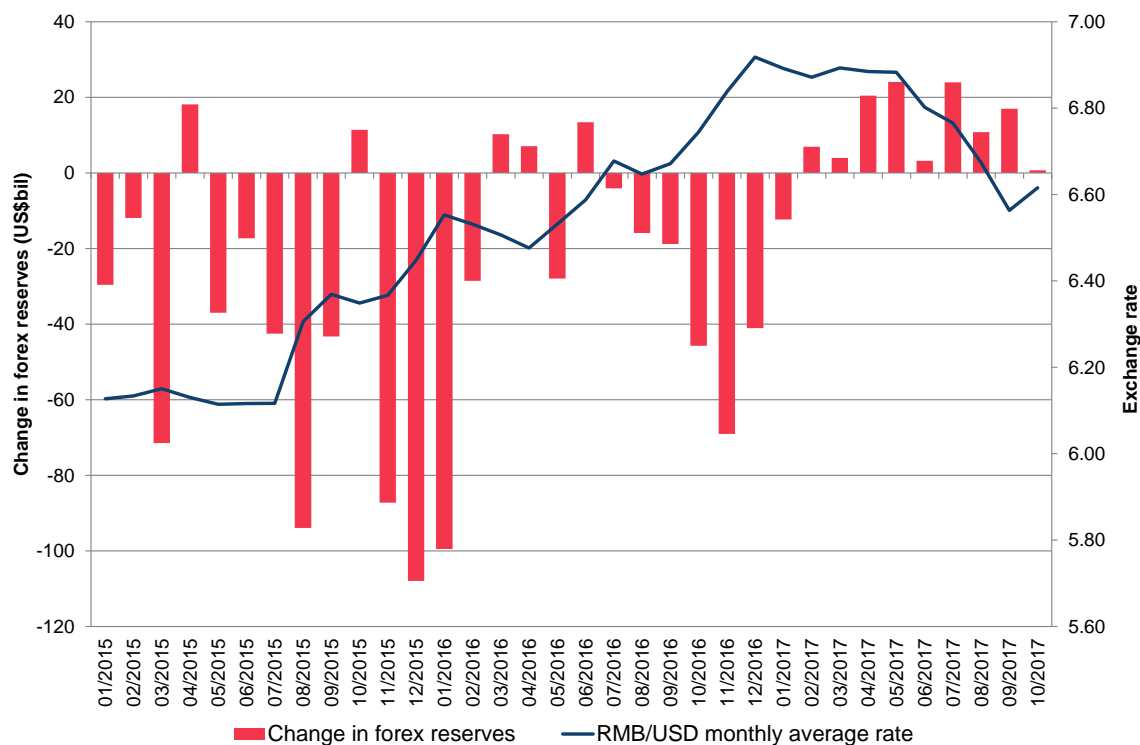
2.3.3 The stability of exchange rate against currency basket supports other macroeconomic targets

After the introduction of the counter-cyclical factor, the RMB/USD exchange rate became more volatile, changing the historical trend that had inclined towards a falling rather than a rising RMB against the USD. The RMB rapidly appreciated subsequent to the introduction of this measure on 26 May 2017. On 11 September, the PBOC scrapped reserve requirements for foreign exchange purchase and made use of the counter-cyclical factor to prevent over-adjustment. As a result, the RMB/USD exchange rate fluctuated within a confined range.

With the counter-cyclical factor in place, the benchmarking effect of the currency basket on the RMB exchange rate was enhanced. As exchange rate movements of the basket currencies are highly random, reference to the currency basket in determining the RMB's value means that the RMB would have less tendency to move in a single direction, achieving more or less an equilibrium in the medium to long term. On the one hand, it fosters the healthy development of two-way movements in the RMB exchange rate. On the other hand, the relative stability of the exchange rate against a basket of currencies would

lessen the burden on the foreign exchange reserves, allowing a continuous rebound of the foreign exchange reserves. By October 2017, the foreign exchange reserves increased for nine consecutive months to US\$3.1 trillion (see Figure 3).

Figure 3. Monthly changes in the Mainland's foreign exchange reserves (Jan 2015 — end-Oct 2017)



Source: Wind.

3. OUTLOOK ON MARKET USAGE OF RMB INDICES

3.1 Experience from USD indices: major indices and composition

USD indices are currently the world's most important currency indices and are critical measures of global financial market conditions and trends. In their 40 years of history, USD indices have evolved to have assumed different functions. The USD index family now consists of indices of different currency composition and weightings, being used to gauge and assess the value of the USD.

According to the different functions, the existing USD index family may be categorised into (1) USD indices compiled by the US Federal Reserve (FED) and international entities, and (2) USD indices compiled by exchanges or business entities.

3.1.1 USD indices launched by the US FED

The earliest USD index in use was the **Trade Weighted U.S. Dollar Index: Major Currencies** (or DTWEXM) developed by the FED in the 1970s. This USD index has been used for tracking the value of the USD after the disintegration of the Bretton Woods system⁵. The reference basket of currencies for this index comprises 7 currencies — the Euro, the

⁵ The Bretton Woods system was established in 1944 at the time of World War II, which was an international monetary system based on both gold and the US dollar, with the US dollar value fixed at US\$35 per ounce of gold. However, in 1971, the US unilaterally terminated convertibility of the US dollar to gold, bringing the Bretton Woods system to an end.

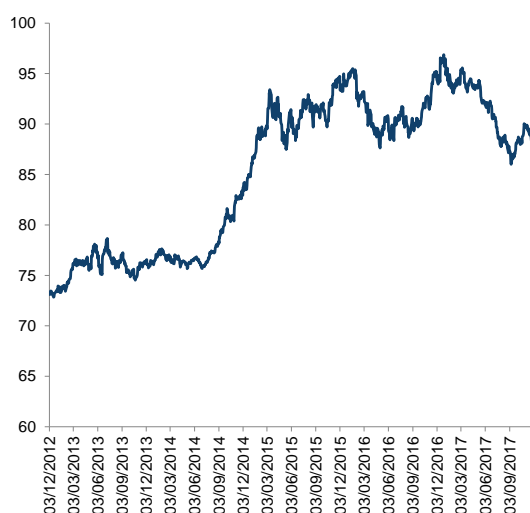
Canadian Dollar, the Japanese Yen, the British Pound, the Swiss Franc, the Australian Dollar and the Swedish Krona. The weighting of each currency in the basket is based on trade conditions between the home countries of the respective currencies and the US.

After the 1990s, emerging markets have entered into the world's industry production chain and have growing bilateral trades with the US. A USD index that make reference to the currencies of only a few developed countries would not be able to reflect the trade dynamics between the US and the world. Consequently, based on DTWEXM, the US FED developed the **Trade Weighted U.S. Dollar Index: Broad** (or TWEXB), and **Trade Weighted U.S. Dollar Index: Other Important Trading Partners** (or TWEXO).

TWEXB included an additional 19 currencies on top of the seven tracked by DTWEXM. The majority of the 19 currencies are those of emerging markets which are important trade partners of the US. The US FED also compiled TWEXO based on these 19 currencies. As TWEXB covered the major US trading partners, its adjustment in weightings constantly reflect the changing trade relationships between the US and these countries. It has therefore become the most significant benchmark of the US' competitiveness in international trade.

From a functional perspective, TWEXB and TWEXO were developed mainly as a reference for research on the forex market and for forex policy making. Currencies and their weightings in these indices were selected and determined mainly on the basis of the trade relations of the US with its major trade partners, especially with the emerging markets. The extent to which these currencies are used in the financial market, especially in the forex market are, however, not taken into account. In addition, these indices are not timely updated and the US FED has not licensed their use for commercial purposes. Market participants would have to go for alternative instruments if they want to assess the impact of bilateral exchange rate movements on the currency basket indices so as to conduct timely financial activities accordingly..

**Figure 4. Daily movement of DTWEXM
(Dec 2012 — Nov 2017)**



Source: US FED.

**Figure 5. Weekly movement of TWEXB and
TWEXO (Jan 1995 — Nov 2017)**



3.1.2 USD indices developed by market entities

This kind of indices is well represented by the U.S. Dollar Index (DXY) developed by the Intercontinental Exchange (ICE). It is the earliest and the most widely used USD index in the market. Initially, its reference currency basket and the weightings were mainly based on

the trade volumes between the US and its major trade partners, reflecting the competitive dynamics of US exports. The Euro replaced 12 of the currencies in the basket upon its birth in 1999. The DXY basket consists of six currencies, namely the Euro, the Japanese Yen, the British Pound, the Canadian Dollar, the Swedish Krona and the Swiss Franc. The composition and currency weightings of DXY remain unchanged up to now.

Currency	Weighting
EUR	57.6%
JPY	13.6%
GBP	11.9%
CAD	9.1%
SEK	4.2%
CHF	3.6%

Source: ICE website.

Since the USD is the world's major reserve currency, many commodities are denominated in the US Dollar. Both traders and investors require a USD trading instrument with high liquidity in order to manage the forex risks of commodities and investment portfolios. The DXY, being highly dynamic, can promptly reflect the impact of forex volatility on the USD. The index is recognised as the most significant USD benchmark by global traders, analysts and economists. Currency futures based on the DXY are widely used in the international forex market for investment and hedging purposes.

It is noteworthy that European currencies weigh as much as 77% in the DXY. The Euro alone has a weighting of nearly 58%. Such a characteristic results in that the DXY is highly sensitive to economic changes in the European Union. Any movement in the value of the Euro would affect the index to a large extent. To avoid the drawback of the currency concentration in Europe, other USD indices of different compositions were developed by market entities. In 2011, Dow Jones released the **Dow Jones FXCM Dollar Index**, which have the Euro, the British Pound, the Japanese Yen and the Australian Dollar as its reference currencies on consideration of their high liquidity and high correlation with the USD in global forex transactions as well as their low cost of trading. Weightings were equally assigned to each currency (25%).

Other indices of a similar nature included the FTSE Cürex's **USDG8** and the **Bloomberg Dollar Spot Index (BBDXY)**. When selecting reference currencies, the two indices not only take into account the importance of a currency and its tradability in the global financial market and in commodity trading, offshore RMB is also included in the currency basket. It is hoped that, the problem of over-weighting the Euro in the reference currency basket could be addressed by including in the basket an emerging market currency with a growing importance. These indices have given greater consideration to trade volumes in the forex market in determining the reference currencies and their weightings, and have adopted relatively scientific calculation methods. Nevertheless, they have a relatively short history and therefore have not been able to challenge the market standing of DXY and its related futures products.

3.2 Market-based RMB exchange rate indices

From a functional perspective, China's most important RMB index, the CFETS RMB Index, largely serves as an aid to macroeconomic policy making. With functions and composition similar to the US FED's TWEXB, it provides an all-round indicator for

macroeconomic usage. However, in respect of market trading, it is clear that new instruments and related derivatives need to be developed to serve market participants as RMB benchmarks for investment and hedging purposes.

Studies have been carried out in the Mainland on the development of a market-based RMB index. **The Shenzhen Securities Information Co., Ltd. and CCTV Finance jointly developed and released a RMB index** in 2013, before the announcement of the CFETS RMB Index. This index uses the USD, the Euro, the Japanese Yen, the Hong Kong Dollar, the Australian Dollar, the Canadian Dollar, the British Pound, the Russian Ruble, the Malaysian Ringgit, and the Korean Won as the reference currencies to reflect the overall movement of the RMB exchange rate. The currency weightings in the index were determined based on the weighting of each currency in China's bilateral trade volume and gross domestic product (GDP) respectively on a ratio of 1:1. The currency selection process and the determination of currency weightings for this RMB index represented a certain degree of innovative exploration. Before the currency reform in August 2015, the correlations of this RMB index with USD indices were relatively high, but the degree of correlation diminished after the reform⁶.

3.3 TR/HKEX RMB Currency (RXY) Indices

3.3.1 RXY Indices — a RMB index series developed with reference to the principles of the CFETS RMB Index and the DXY

In 2016, HKEX and Thomson Reuters (TR) launched the family of RXY Indices with reference to the CFETS currency basket, using 13 currencies as the reference currencies. The index series is highly dynamic and transparent, with hourly updates. Currency weightings are based on China's annual trade volumes with the respective home countries of the basket currencies, provided by UN Comtrade⁷.

Indices	Currencies	References
TR/HKEX RXY Reference CNH (RXYRH)	AED, AUD, CAD, CHF, DKK, EUR, GBP, HKD, HUF, JPY, KRW, MXN, MYR, NOK, NZD, PLN, RUB, SAR, SEK, SGD, THB, TRY, USD, ZAR	<ul style="list-style-type: none"> • Similar to the currency basket of the CFETS RMB Index • CNH as benchmark currency
TR/HKEX RXY Reference CNY (RXYRY)	AED, AUD, CAD, CHF, DKK, EUR, GBP, HKD, HUF, JPY, KRW, MXN, MYR, NOK, NZD, PLN, RUB, SAR, SEK, SGD, THB, TRY, USD, ZAR	<ul style="list-style-type: none"> • Similar to the currency basket of the CFETS RMB Index • CNY as benchmark currency
TR/HKEX RXY Global CNH (RXYH)	AUD, CAD, CHF, EUR, GBP, HKD, JPY, KRW, MYR, NZD, RUB, SGD, THB, USD	<ul style="list-style-type: none"> • Similar to the currency basket of the CFETS RMB Index in 2015 • CNH as benchmark currency
TR/HKEX RXY Global CNY (RXY Y)	AUD, CAD, CHF, EUR, GBP, HKD, JPY, KRW, MYR, NZD, RUB, SGD, THB, USD	<ul style="list-style-type: none"> • Similar to the currency basket of the CFETS RMB Index in 2015 • CNY as benchmark currency

Note: See abbreviations of the currencies at the end of this report. CNH = Offshore Renminbi exchange rate; CNY = Onshore Renminbi exchange rate.

Source: HKEX.

⁶ See *2016 RMB Index Review* (《2016年人民幣指數回顧》), CNI website (<http://www.cnindex.com.cn>), 28 February 2017.

⁷ The annual bilateral export data between Mainland China and Hong Kong reported by UN Comtrade will be adjusted in accordance with trade data released by the Census and Statistics Department of the Hong Kong Government to determine the actual Chinese export volumes absorbed by Hong Kong, since a considerably large proportion of Mainland exports to Hong Kong is not taken up by the city.

Unlike the USD index DXY where currency weightings are based on the US trade volumes with the respective countries or regions in 1999 and are unchanged over time, currency weightings in the RXY Indices are adjusted annually in accordance with the latest trade data. As China's external trade structure is still changing, such adjustments in currency weightings will better reflect the evolution of China's external trade structure.

3.3.2 Correlation and tradability of exchange rate indices

TR/HKEX RXY Reference CNY Index is found to be highly correlated with the onshore RMB against the USD (CNY/USD) exchange rate and the CFETS RMB Index (correlation coefficients are above 0.86, see Table 5). Therefore, the index can reflect relatively well the changes in the RMB exchange rate and can serve as a benchmark simulating the CFETS RMB Index.

In terms of volatility, CNY/USD had an average volatility⁸ of 1.58% in the six months before the exchange rate reform on 11 August 2015⁹. It rose to and 2.29% in the following two years or so after the reform. This shows that, along with the RMB exchange rate regime becoming increasingly market-driven, the volatility in the RMB exchange rate has increased. After the aforesaid reform, RXY Reference CNH Index had an average volatility of 4.00%, compared to 2.69% for the CFETS RMB Index, reflecting the impact of external market volatility on the offshore RMB exchange rate (see table 5). It is believed that futures products developed based on RXY indices, would be able to provide a closer tracking of movements in the value of offshore RMB.

Table 5. Correlation and volatility of RMB RXY Indices	
Correlation coefficient (Jan 2015 — Sep 2017)	
RXY Reference CNY Index and CNY/USD exchange rate*	-0.86
RXY Reference CNY Index and CFETS RMB Index	0.87
Average volatility (Aug 2015 — Sep 2017)	
CNY/USD exchange rate	2.29%
CFETS RMB Index	2.69%
RXY Reference CNH Index	4.00%

* RMB/USD refers to a certain amount of RMB per US Dollar. A rise in the figure means RMB depreciates against the USD while a rise in the RMB Index stands for appreciation of the RMB. Therefore, a negative correlation coefficient between the two denotes that they have the same direction of movements in the RMB's value.

Source: Bloomberg for daily RMB exchange rates and HKEX for daily RXY closings, based on which the figures are calculated.

3.3.3 Market implications and outlook

With reference to the development history of the USD indices, the reference value of a currency basket index and the tradability of the index mainly depend on the currency composition and weightings in the index. Given the progressive development of the financial market and the growth in forex trading, major factors to be considered in determining the currency basket of a RMB index should include, apart from trade relations, the liquidity of the currencies in the global forex market and the impact of their exchange rate volatility on the RMB.

⁸ Volatility stated herein refers to the rolling 30-day volatility calculated on a daily basis, while average volatility refers to the average value of these daily figures during a given period.

⁹ For the period of 11 February 2015 to 11 August 2015.

To conclude, in developing a currency index of potentially an extensive market use, the home country's trade relations with other countries as well as the liquidity of the reference currencies in the forex and capital markets have to be taken into consideration. In this perspective, the **RXY Indices take into account the liquidity of trading in RMB against other major currencies and exercise dynamic adjustment of currency composition and weightings in the reference basket on a periodic basis based on a highly transparent set of formulae. Thereby, the indices can duly reflect the direction and the degree of movement in the RMB exchange rate against other currencies. This makes available useful instruments for facilitating market-based RMB exchange rate reforms and lays a sound foundation for the development of RMB risk-hedging tools and other related financial products.**

ABBREVIATIONS OF CURRENCIES

AED	United Arab Emirates Dirham
AUD	Australian Dollar
CAD	Canadian Dollar
CHF	Swiss Franc
CNH	Offshore Renminbi
CNY	Onshore Renminbi
DKK	Danish Krone
EUR	Euro
GBP	British Pound
HKD	Hong Kong Dollar
HUF	Hungarian Forint
JPY	Japanese Yen
KRW	South Korean won
MXN	Mexican Peso
MYR	Malaysian Ringgit
NOK	Norwegian Krone
NZD	New Zealand Dollar
PLN	Polish Złoty
RUB	Russian Ruble
SAR	Saudi Riyal
SEK	Swedish Krona
SGD	Singapore Dollar
THB	Thai Baht
TRY	Turkish Lira
USD	US Dollar
ZAR	South African Rand

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