

Macro Insights

RMB exchange rate cycles: causes, implications & spillovers

China has a managed floating exchange rate regime with flexibility and management at the same time. Investor appetite, economic & policy divergence and geopolitical factor drive the movement of US\$/RMB rates. Changes of the PBOC's stance on renminbi are often important policy signals. US\$/RMB rates had two cycles in 2014-2021 and rose again in 2022 due to the Sino-US economic and policy asynchrony. Looking forward, US\$/RMB has moderate room to further rise in next 1-2 quarters. However, the trend may change in 2023 if the US sees a recession and China could reopen its economy. We expect US\$/RMB may reach 7.1 at end-2022 and 6.75 at end-2023. Changes of US\$/RMB rates have noticeable spillover effects on global markets especially on other assets with fundamental, liquidity or sentiment linkages.

- RMB exchange rate regime.** There is no signal of direct interventions using FX reserves. But the volatility of renminbi remains low with sign of careful management through central parity rate, verbal intervention, RRR adjustments for FX deposits and possible window guidance. The PBOC targets more flexibility of renminbi in the long run, but still pays attention to stability in the short run with some fears of floating.
- What factors influence US\$/RMB rates.** When China's economy grows stronger than the US, investor appetite for renminbi assets would increase and US\$/RMB rates tend to decline. When geopolitical risk related to China rises, US\$/RMB rates may rise. The BOP transactions have a direct impact on US\$/RMB rates by changing supply and demand. Domestic and global economic fundamentals influence the BOP transactions.
- US\$/RMB rate forecast.** US\$/RMB rates saw a new round of increase this year due to the Russia-Ukraine war, the Fed tightening and China's economic slowdown. US\$/RMB rates have moderate upside room as the US-Sino interest spreads may further rise in next 1-2 quarters. US\$/RMB rates may see some moderate decline in 2023.
- Spillover effects of US\$/RMB rates.** There are three cross-market linkages including fundamental, liquidity & sentiment linkages. US\$/RMB rate changes have significant correlations with Chinese stock returns especially in material, industrials, consumer discretionary, financials and air transportation, EM exchange rate and stock returns and commodities sensitive to "China" factor.

US\$/RMB Rate Forecast for 2023

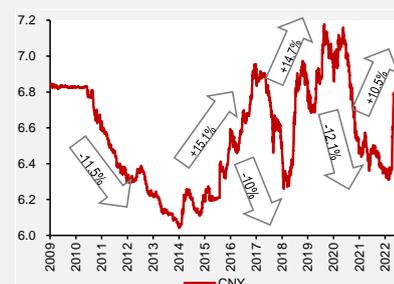
Scenario	US GDP growth	China GDP growth	3M Shibor-Libor spreads	US\$/RMB (average)
S1	1.5	6.0	-0.8	7.16
S2	1.5	5.0	-1.0	7.20
S3	1.5	4.0	-1.3	7.25
S4	0.5	6.0	0.3	6.99
S5	0.5	5.0	0.0	7.03
S6	0.5	4.0	-0.3	7.08
S7	-0.5	6.0	1.8	6.74
S8	-0.5	5.0	1.5	6.78
S9	-0.5	4.0	1.3	6.82

Source: Company data, CMBIGM estimates

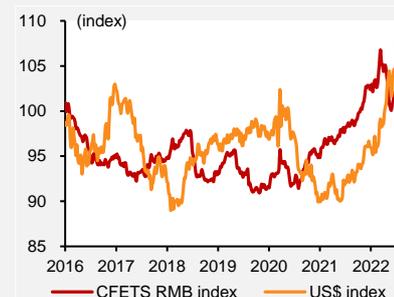
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Source: Wind, CMBIGM



Source: Wind, CMBIGM

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RMB Exchange Rate Regime

Increasing flexibility with two-way fluctuations

Renminbi exchange rate regime has undergone gradual reform since the move away from a fixed rate pegged to the US dollar in July 2005. Before the global financial crisis, renminbi continued to appreciate over 20% against US dollar from July 2005 to August 2008. After the global financial crisis, renminbi was pegged to dollar again from August 2008 to June 2010. The fixed rate was abandoned in June 2010 as China signaled exit of the four-trillion stimulus. From June 2010 to December 2013, Renminbi appreciated 13% against US dollar. According to BIS, renminbi appreciated over 30% in term of nominal effective exchange rate from July 2005 to December 2013.

Renminbi exchange rate has seen two-way fluctuations since 2014 amid a new normal for China economy with continuing slowdown of growth. In 2014-2016, renminbi depreciated about 13% against US dollar amid Fed's policy tightening and China's growth slowdown. In 2017, renminbi rebounded by 11% against US dollar as recovery accelerated in China and Europe. In 2018-2019, renminbi depreciated over 12% against US dollar amid Sino-US tensions in trade & technology. In 2020-2021, renminbi appreciated over 13% against US dollar as US Fed launched super loosening policy and China took the lead in economic resumption. But the trend changed again in 2022 due to the Fed's tightening and China's economic slowdown. Renminbi depreciated over 9% from March to early September in 2022.

A managed floating regime with careful management

The PBOC has defined the current exchange rate regime as a managed floating regime based on market supply and demand with reference to a basket of currencies¹. The current exchange rate regime has four major characteristics.

First, there is no sign of direct interventions using FX reserves. PBOC's forex position has remained stable since 2017. China has attached greater importance to FX reserve stability than exchange rate stability after its FX reserves dropped sharply in 2015-2016.

Second, RMB's volatility remains low with signs of careful management through central parity rate, verbal intervention, RRR adjustments for FX deposits and possible window guidance. Annualized volatility² of CNY rose from below 2% before 2014 to 3%-5% in 2016-2022, but it is still much lower than other major currencies. The PBOC still has some fears of floating as it is concerned about possible herding behavior and overshooting risk in China's FX market.

The PBOC used to send signals through a counter-cyclical factor in central parity rate fixing before temporarily phasing out its use in October 2020³. China's representative banks used to fix central parity rate according to three factors: closing price of CNY in the previous day,

¹ <http://www.pbc.gov.cn/en/3688229/3688338/3688344/index.html>

² Annual volatility is calculated in term of annualized standard deviation of the daily returns.

³ <https://news.cgtn.com/news/2020-10-28/Chinese-banks-phase-out-counter-cyclical-factor-in-yuan-pricing-UXhiOIH4Bi/index.html>

global FX market condition in the previous night and the counter-cyclical factor. The counter-cyclical factor has gradually faded out as we find the average level of its correlation coefficient with the CNY return changed from the negative to around zero from late 2020⁴.

Sometimes the central bank used verbal intervention to guide market expectations, but this became less common in recent years. For one thing, higher-level policymakers decide the exchange rate policy in China. The central bank may face the credibility issue in communications with the market. For another thing, the central bank may want to remain flexible enough, as it is reluctant to make commitments to the market or reveal too much policy information to the speculators.⁵

The PBOC started to use required reserve ratio (RRR) for FX deposits to send policy signals from last year. The central bank raised the RRR for FX deposits by 2ppts twice in 2021 to freeze the US dollar liquidity and slow renminbi appreciation. It cut the FX deposits' RRR twice in 2022 to support renminbi. There is a mantra in the FX market "don't fight the central bank". The RRR adjustments for FX deposits conveyed PBOC's attitude as the moves did have some effects in the short run. However, they seemed not to change the trend of US\$/RMB rate in the medium term as the central bank was reluctant to return to the fixed rate regime. The PBOC's target is to avoid possible disorderly overshooting or instability risk in the market instead of changing the trend of renminbi.

In rare cases, the central bank may have guided state-owned banks to slow renminbi depreciation or appreciation. Reuters reported a few cases in which some Chinese state-owned banks were suspected to use swap operations to support renminbi with the possible guidance from the central bank⁶. We are not sure if there were swap arrangement between the central bank and the state-owned banks in those cases.

Thirdly, renminbi exchange rates are not linked to a basket of currencies. "The reference to a basket of currencies" does not mean renminbi is pegged to a basket of currencies. It means the representative banks should consider exchange rates of a basket of major currencies in fixing the US\$/RMB central parity rate. In fact, renminbi appreciated even more against a basket of currencies than against US dollar in 2005-2014. The volatility of renminbi index against a basket of currencies was similar to that of US\$/RMB rate. The currencies in the basket do have some influence on the US\$/RMB central parity rate, but their impact is much smaller than that of the US\$/RMB rate. It seems banks mainly consider what happens in the US\$/RMB market when fixing the central parity rate.

Fourthly, the PBOC targets more flexibility of renminbi exchange rates in the long run, but still pays attention to renminbi stability with some fear of floating in the short run. The Mudell-Fleming trilemma indicates one country can only achieve one side of the trilemma triangle with two of the three options (autonomous monetary policy, free

⁴ We run the regression model "CPR(t)=a*CNY(t-1)+b*Rmb index(t)+e(t)" using sample data in 2018-2022. Rmb index is estimated by Wind database (calculated by using CNY in the previous day and global FX rates in the previous night). The estimated e(t) is defined as the counter-cyclical factor.

⁵ <https://www.caixinglobal.com/2016-02-15/transcript-zhou-xiaochuan-interview-101011865.html>

⁶ <https://www.reuters.com/article/us-china-yuan-intervention-idUSKBN0UM07N20160108;>
<https://www.reuters.com/article/us-china-markets-intervention-exclusive-idUSKBN2B81U9>

capital flow and a fixed exchange rate). Most countries favor autonomous monetary policy and free capital flow as they adopt the floating exchange rate regime. Some developing countries choose the fixed exchange rate regime and they have to maintain capital control or give up monetary policy autonomy. Other developing countries try to seek a balance between the three options as they adopt the managed floating exchange rate regime.

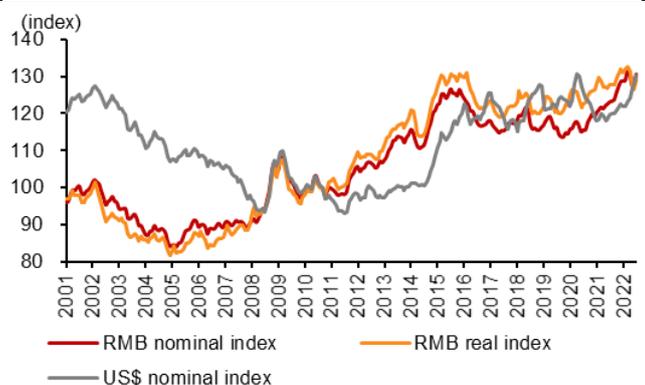
The PBOC admits flexible exchange rates can serve as an “automatic stabilizer” for China economy to absorb external shocks⁷. The central bank knows exchange rate flexibility is the key for its capacity to influence domestic economy via monetary policy. Therefore, the central bank targets more flexibility of renminbi exchange rates in the long run. However, the central bank also has some fears of floating. China has a large pool of renminbi savings seeking for diversification and a large number of immature individual investors with severe herding behavior. Chinese enterprises have foreign currency liability and exchange rate risk management products are not sufficiently developed. The policymaker is concerned about possible capital outflow risk triggered by renminbi depreciation. Therefore, the PBOC maintains careful management over both capital account and renminbi exchange rate.

Figure 1: Two-way Fluctuations of US\$/RMB Rates



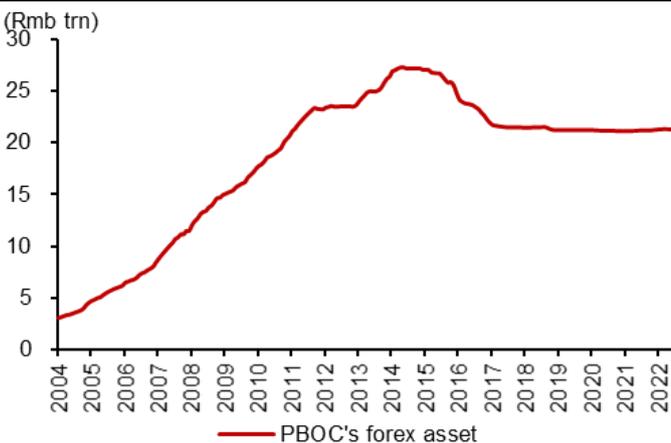
Source: Wind, CMBIGM

Figure 2: BIS Effective Exchange Rate Indexes



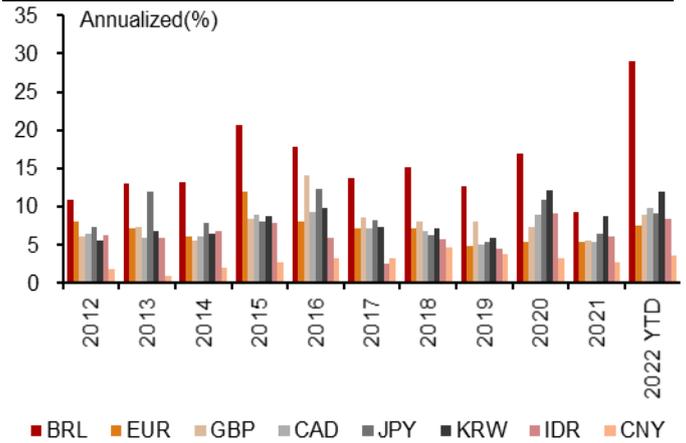
Source: Wind, CMBIGM

Figure 3: No Sign of Interventions Using FX Reserve



Source: Wind, CMBIGM

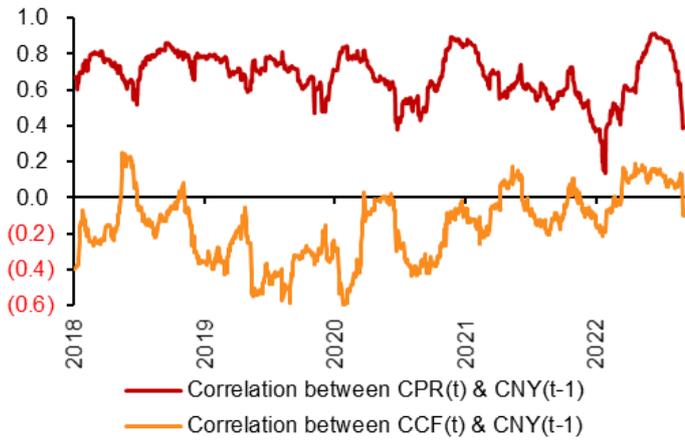
Figure 4: CNY Volatility Remains Low



Source: Wind, CMBIGM

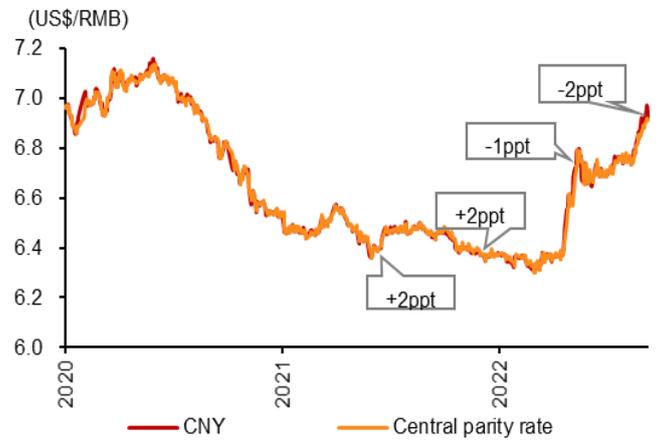
⁷ Yi Gang, 2018, “Monetary Policy Retrospective and Outlook”, China Finance, 2018, Issue 3.

Figure 5: Counter-cyclical Factor in Central Parity Rate



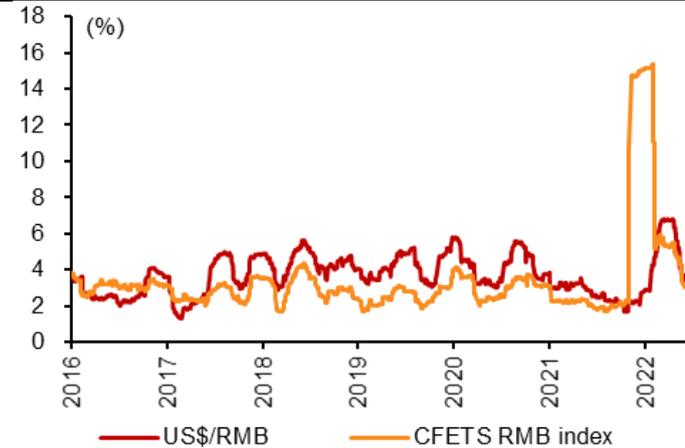
Source: Wind, CMBIGM
Note: CPR(t) means US\$/RMB central parity rate in day t; CNY(t-1) means onshore US\$/RMB spot rate in day t-1; CCF(t) means counter-cyclical factor in day t.

Figure 6: Impact of FX Deposit RRR Changes



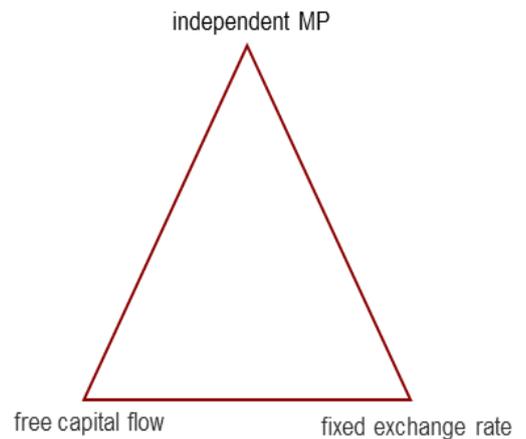
Source: Wind, CMBIGM

Figure 7: Annualized Moving Average Volatility



Source: Wind, CMBIGM

Figure 8: The Mundell-Fleming Trilemma



Source: CMBIGM

What factors influence US\$/RMB rates?

Investor appetite, economic & policy divergence and geopolitics

US\$/RMB rate moves along with the change of investor appetite for renminbi assets or dollar assets. Investors change appetite for different assets according to their risk-adjusted returns. The rise of US\$/RMB rates indicates a decline of investor appetite for renminbi assets or an increase of investor appetite for dollar assets. The decline of US\$/RMB rates shows an increase of investor appetite for renminbi assets or a drop of investor appetite for dollar assets. When their risk-adjusted returns rise relative to the dollar assets, investor appetite for renminbi assets will increase. Otherwise, the appetite for renminbi assets would decline.

Economic fundamentals and geopolitical factors determine risk-adjusted returns of assets. When China has a better economic prospect with stronger fundamentals than the US, renminbi assets tend to have higher risk-adjusted returns than the US dollar assets. Otherwise, US dollar assets will be more attractive in risk-adjusted returns. Geopolitical factors could also influence risk-adjusted returns of assets. Global investors generally consider renminbi as a risky asset and the US dollar as a safe haven. When geopolitical risk related to China rises, the risk-adjusted return of renminbi assets would decline. Global investors tend to sell renminbi for the greenback.

US\$/RMB rates and US-Sino interest spreads are highly correlated as their changes both reflect economic & policy divergence in the two countries. When China economy performs stronger than its US counterpart, the PBOC would adopt a tighter policy than the Fed. US-Sino interest spreads and US\$/RMB rates tend to decline. When China economy becomes weaker than the US economy, PBOC should adopt a more accommodative policy than the Fed. US-Sino interest spreads and US\$/RMB rates would rise.

Changes of PBOC's stance on RMB as policy signals have important implications. Figure 9 shows changes of US\$/RMB rates often lag behind changes of US-Sino interest spreads. There are two possible reasons. First, China has a dual-track interest rate system. Money market and bond market rates are market-oriented, but loan and deposit rates are not fully liberalized. The interest rate transmission from money and bond markets to loan and deposit markets is not smooth. Investors anchor their RMB expectations to all interest rates in the economy especially because loan and deposit markets still dominate in China's financial system. Second, renminbi exchange rates are not free floating. The central bank maintains some careful management and sometimes has to seek a balance between exchange rate flexibility and interest rate flexibility. The exchange rate cannot respond adequately to changes of interest rates in a timely manner. Due to the above two reasons, changes of the PBOC's stance on renminbi are often important signals for interest rate policy. For example, China restarted renminbi appreciation in June 2010 as a strong signal to withdraw from the four-trillion stimulus. In April 2022, China changed its cautious attitude on renminbi depreciation, which paved the way for LPR cuts in 2Q22.

US dollar index moves along with changes in the relative strength of the US economy and risk aversion sentiment. US dollar index is a measure of the dollar's value against six major currencies (the euro, Japanese yen, British pound, Canadian dollar, Swedish krona and Swiss franc). The euro is the largest component with its weight at 57.6% and the remaining five currencies respectively accounted for 13.6% (JPY), 11.9% (GBP), 9.1% (CAD), 4.2% (SEK) and 3.6% (CHF) in the index. Changes in the relative strength of the US economy compared to other economies determine the trend of the US dollar index. Due to the high weight of the EUR/US\$ rate in the US dollar index, economic & policy divergence in Eurozone and the US has the greatest impact on the US dollar index. When

the US economy grows stronger than the Eurozone economy, the Fed will adopt a tighter policy than the ECB. Then the US-Eurozone interest spreads and the US dollar index tend to increase. Changes of investors' risk aversion sentiment also have an impact on the US dollar index. The US dollar has a dominate role in the international monetary system as global investors view the US market as the safest place to invest. When risk aversion sentiment increases, investors tend to sell other currencies to buy US dollar assets and the US dollar would appreciate.

The balance of payments

The balance of payments (BOP) is a record of transactions between domestic residents and foreign residents during a given time period. It includes transactions in goods, services, income, transfers, assets and liabilities. From the perspective of economic analysis, the BOP statement mainly includes current account, financial account, official reserve account and net errors & omissions⁸. Current account reflects cross-border flows of goods, services, income and transfers, while financial account reflects cross-border capital flows. Official reserve account records transactions related to official reserve assets. Net errors & omissions are the residual to ensure the four accounts in the BOP statement always sum to zero.

Official reserve account could reflect exchange rate flexibility as large-scale FX interventions will cause significant changes in official reserve. If exchange rates are free floating, the balance of official reserve account should be close to zero. In this case, official reserve account balance only reflects exchange rate changes of major currencies in official reserve assets. Based on the data for major countries in 2017-2021 (figure 15), the US, Eurozone, Canada and UK have flexible exchange rates, while Switzerland, Vietnam, Saudi Arabia, Hong Kong and Thailand have signs of FX interventions.

Net errors & omissions reflect the imbalances resulting from imperfections in source data and compilation of the BOP. A survey report by IMF in 2019 shows net errors & omissions increased rapidly in the past years as authorities faced difficulties to single out accounts contributing to the increase⁹. We guess there might be two causes. First is the statistics quality issue due to lack of capacity in countries' statistical system. Second is the digital trade, global value chain activity and informal economy, which is not included in the statistics of current and financial accounts. If statistics quality is high and current & financial accounts are fully liberalized to cover all transactions, net errors & omissions should be close to zero. According to the data for major countries in 2017-2021 (figure 16), net errors & omissions for India, Spain and UK were close to zero. Vietnam, Saudi Arabia, Malaysia and China had substantial negative numbers, while Switzerland and Hong Kong had large positive values.

With free floating exchange rates, high statistics quality and liberalized cross-border transactions, total balance of current account and financial account should be zero. In this case, current account balance and financial account balance should be inverse of each other. It is not difficult to understand from the transaction perspective. We assume

⁸ For simplicity, we omit the capital account which records all international transfers. Its scale is usually very small.

⁹ <https://www.imf.org/external/pubs/ft/bop/2019/pdf/19-14.pdf>

country A as a net exporter has a current account surplus and country B as a net importer has a current account deficit. When A sells goods or services to B, B has to pay A using A's currency or other currencies. Therefore, B's holdings of currency A will decline or A's holdings of other currencies will increase. Either case is reflected in the BOP statement as capital outflows from country A. Therefore, country A with a current account surplus should have a financial account deficit. Figure 17 shows there is approximately inverse relationship between current account balance and financial account balance in most economies in 2017-2021.

Transactions in the BOP have a direct impact on exchange rates as they change the supply and demand in the FX market. Financial account transactions or capital flows seem to have a greater influence than current account transactions at least in the short run. Over 80% of daily trading in global FX market is related to financial account transactions while current account transactions account for less than 20%. With strong capital inflows, domestic currency tends to appreciate; and otherwise, domestic currency will depreciate.

However, it is difficult to observe the short-run impact of a specific type of transactions on renminbi exchange rates. We do not have high-frequency detailed data on related transactions. We only have the annual or quarterly BOP statement that aggregates all transactions at all points during a year or a quarter into several categories in a single simple table. The combination eliminates differences in the nature, timing and direction of different transactions and make it difficult to observe the short-term impact of a specific type of transactions on renminbi exchange rates.

Using Chinese banks' foreign receipts on behalf of clients, we find a significant correlation between BOP transactions and US\$/RMB rate. Chinese banks' monthly foreign receipts on behalf of clients are highly related to transactions in the BOP. Both US\$/RMB rate and its MoM & change have a significant negative correlation with banks' net foreign receipt in the BOP. US\$/RMB rate has a stronger correlation with the current account receipt, while its MoM% change has a stronger correlation with the financial account receipt. In other words, current account condition has a greater influence on renminbi exchange rate level while financial account condition has a greater influence on the marginal change of renminbi exchange rate.

The above analysis on the BOP also indicates economic fundamentals play an important role in exchange rate determination The BOP condition is usually considered by investors as an integral part of economic fundamentals. Moreover, transactions in the BOP are mainly influenced by economic fundamentals. For example, numerous papers and articles confirm that there are two kinds of important factors for capital flows. One is global economic fundamentals called "push" factors and the other is domestic economic fundamentals named "pull" factors. When domestic economy slows with global monetary policy tightening, China tends to face capital outflows and renminbi depreciation pressure.

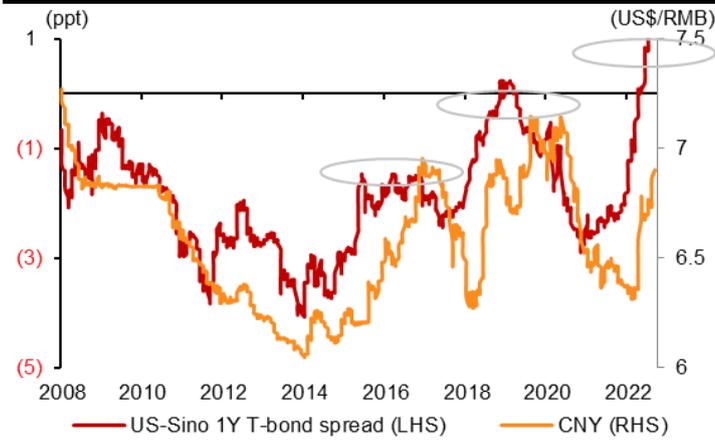
The two cycles for US\$/RMB rates in 2014-2021

The first cycle started from January 2014 and ended in February 2018. In the ascent from January 2014 to early 2017, US\$/RMB rate increased over 15% as China economy slowed with a hard-landing panic in 2H15 and the Fed tightened policy with QE tapering and policy rate hikes. In the descending stage from early 2017 to February 2018, US\$/RMB rate declined over 10% as the stronger recovery in China and Eurozone supported renminbi and weakened US dollar.

The second cycle was from March 2018 to 2021. US\$/RMB rate rose by nearly 15% between March 2018 to October 2019 as the US launched trade & technology war against

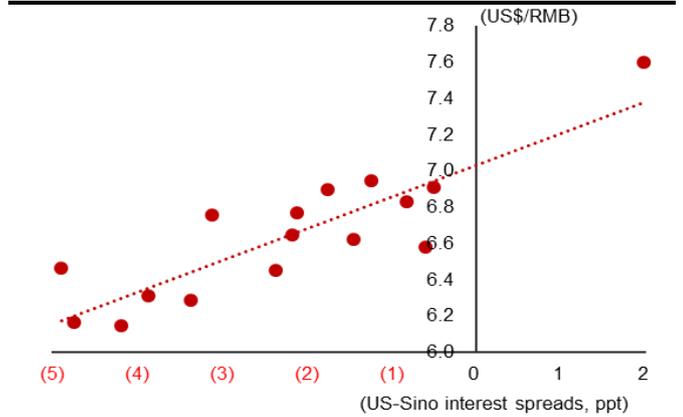
China and the Fed further hiked policy rates in 2018. In 4Q19 and January 2020, US\$/RMB rate declined as the Fed cut the rate and China took measures to boost business confidence. After the burst of the Covid-19 pandemic, US\$/RMB rate firstly rose and then sharply declined as the Fed injected huge amount of US dollar liquidity. From March 2020 to 2021, US\$/RMB rate decreased by over 12% due to the Fed's super-loosening policy and China's rapid economic resumption.

Figure 9: US-Sino Interest Spreads & US\$/RMB Rates



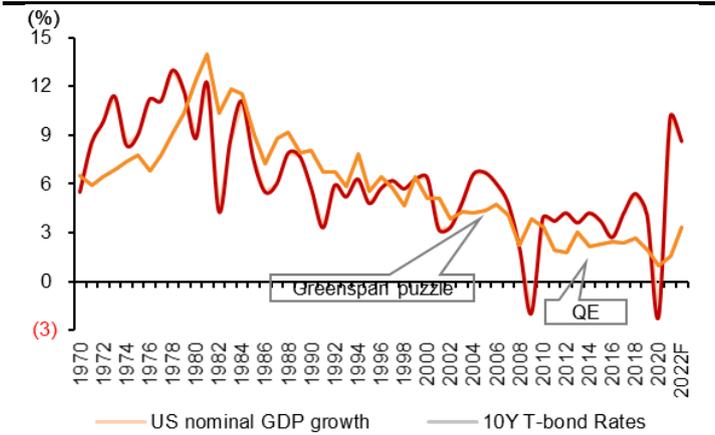
Source: Wind, CMBIGM

Figure 10: Average US\$/RMB & Interest Spreads Each Year



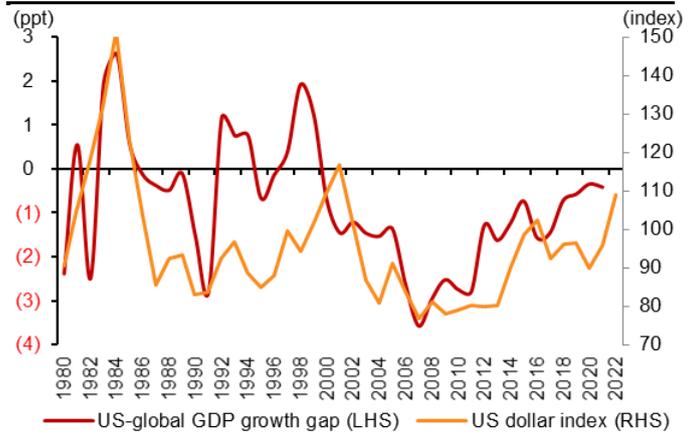
Source: Wind, CMBIGM

Figure 11: US Nominal Growth & 10Y T-bond Rates



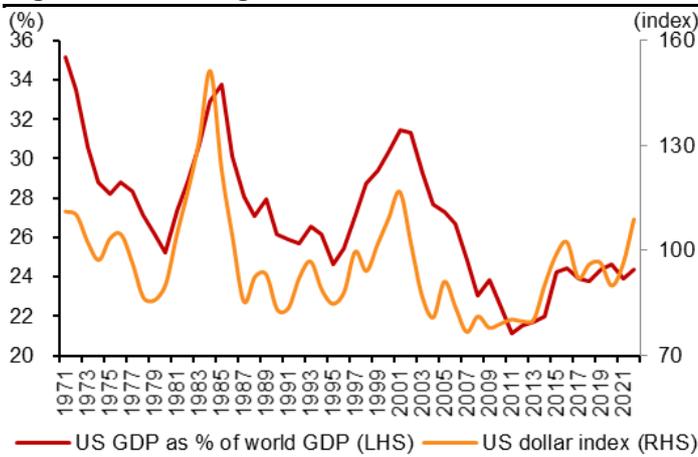
Source: Wind, CMBIGM

Figure 12: US-World Growth Gap & US Dollar Index



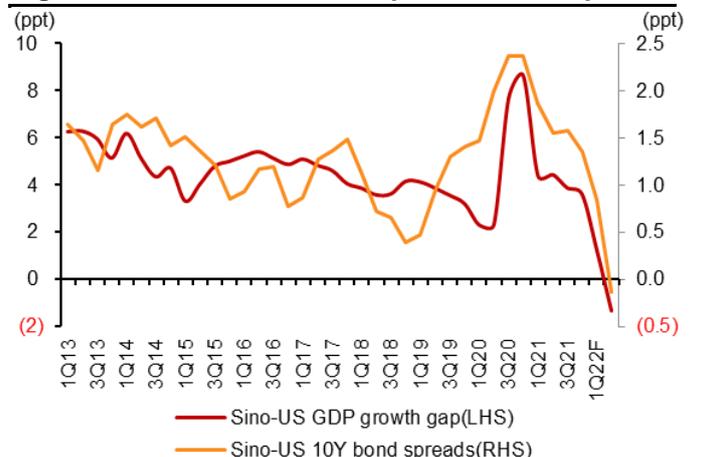
Source: Wind, CMBIGM

Figure 13: US Weight in Global GDP & US Dollar Index



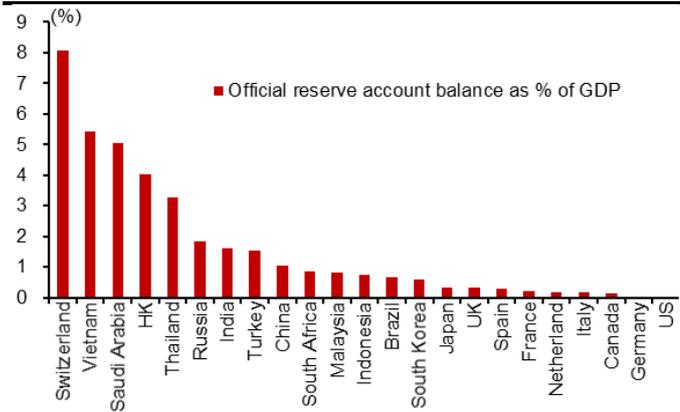
Source: Wind, CMBIGM

Figure 14: Sino-US Growth Gap & 10Y Bond Spreads



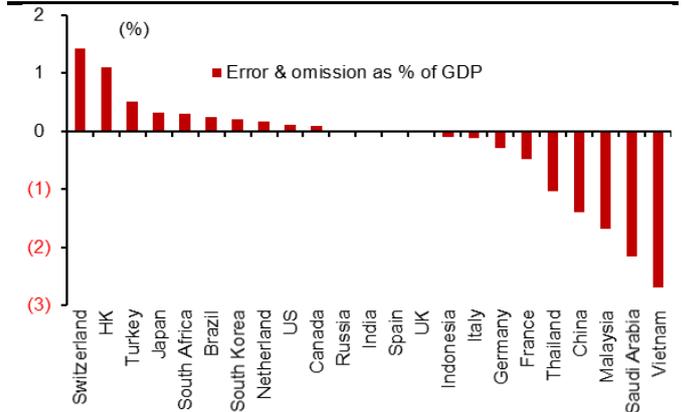
Source: Wind, CMBIGM

Figure 15: Official Reserve Account in 2017-2021



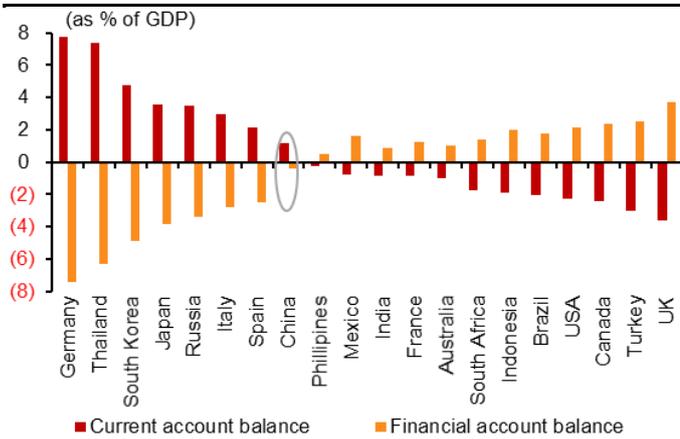
Source: Wind, CMBIGM

Figure 16: Errors & Omissions in 2017-2021



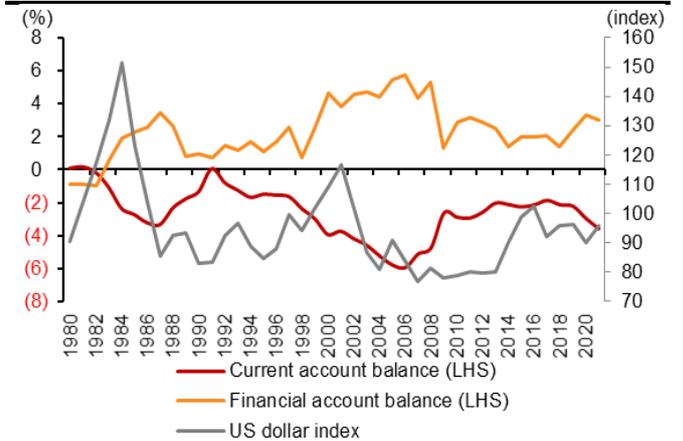
Source: Wind, CMBIGM

Figure 17: Current & Financial Accounts in 2017-2021



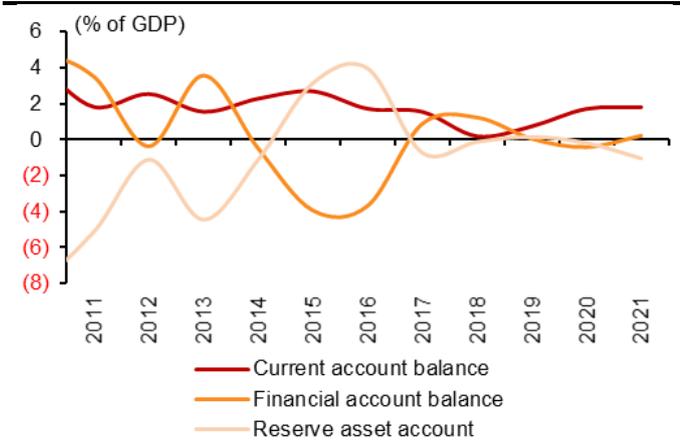
Source: Wind, CMBIGM

Figure 18: US BOP & US Dollar Index



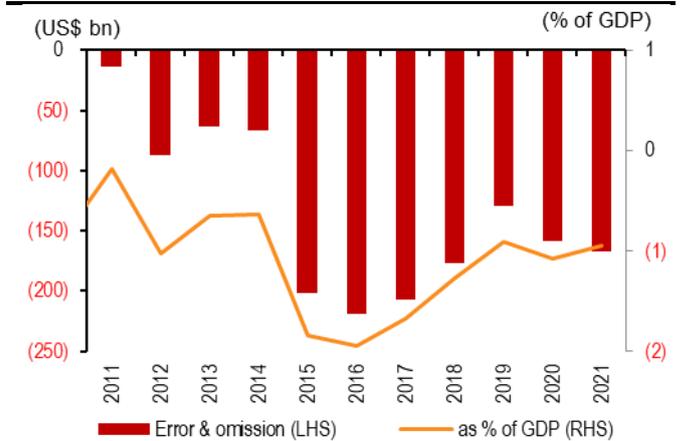
Source: Wind, CMBIGM

Figure 19: China's BOP



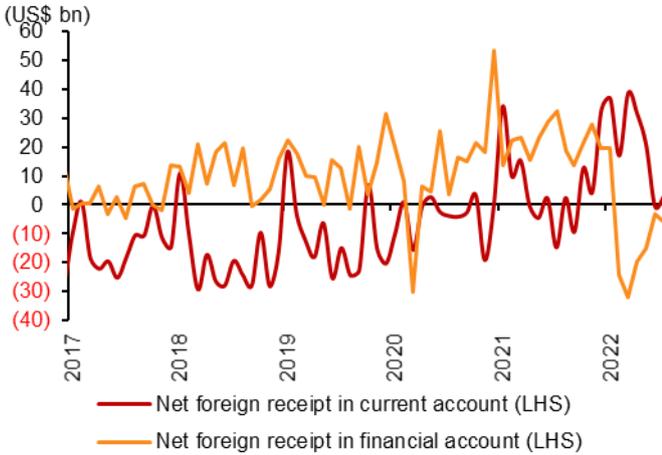
Source: Wind, CMBIGM

Figure 20: Error & Omission in China's BOP



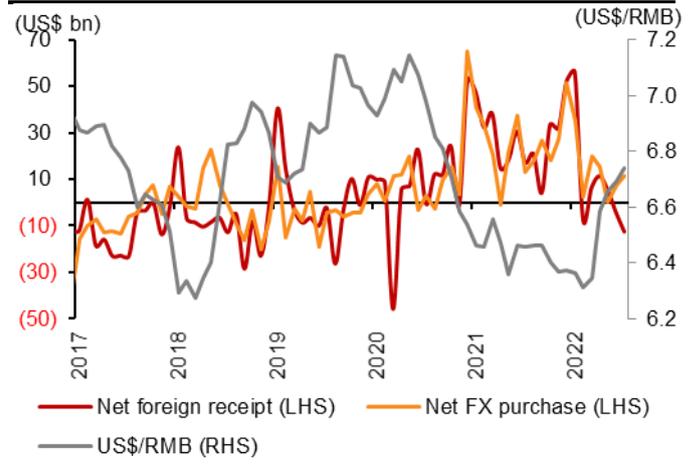
Source: Wind, CMBIGM

Figure 21: Chinese Banks' Net Foreign Receipt On Behalf of Clients



Source: Wind, CMBIGM

Figure 22: Net Foreign Receipt, FX Purchase & US\$/RMB Rates



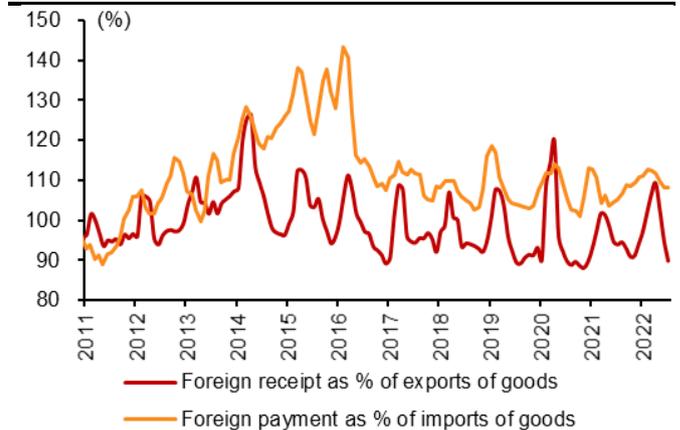
Source: Wind, CMBIGM

Figure 23: Correlation of US\$/RMB Rates & BOP Flows

Correlation coefficient	Net foreign receipt in CA	Net foreign receipt in FA	Net foreign receipt in BOP
US\$/RMB	(0.39)	(0.15)	(0.44)
US\$/RMB % change	(0.10)	(0.38)	(0.37)
RMB index	0.62	(0.28)	0.32
RMB index % change	0.24	0.01	0.21

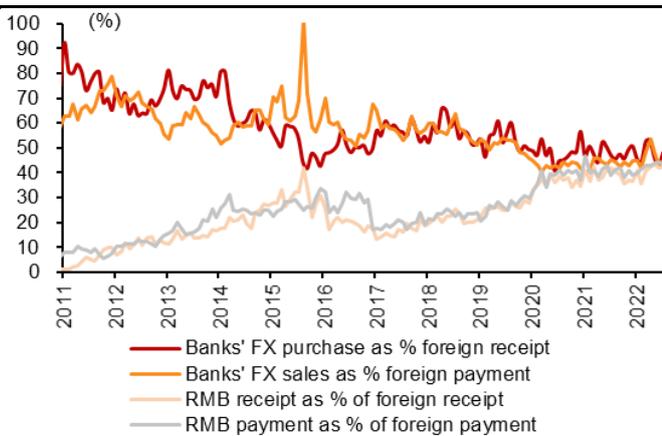
Source: Wind, CMBIGM

Figure 24: Foreign Receipt & Payment V.S Exports & Imports of Goods



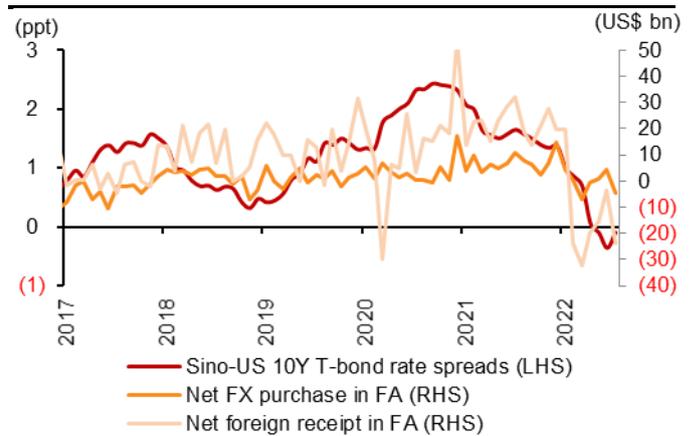
Source: Wind, CMBIGM

Figure 25: FX Settlement Ratios & RMB Use in Trade Settlement



Source: Wind, CMBIGM

Figure 26: Sino-US Interest Spreads & Financial Account Flows



Source: Wind, CMBIGM

US\$/RMB Rate Forecast

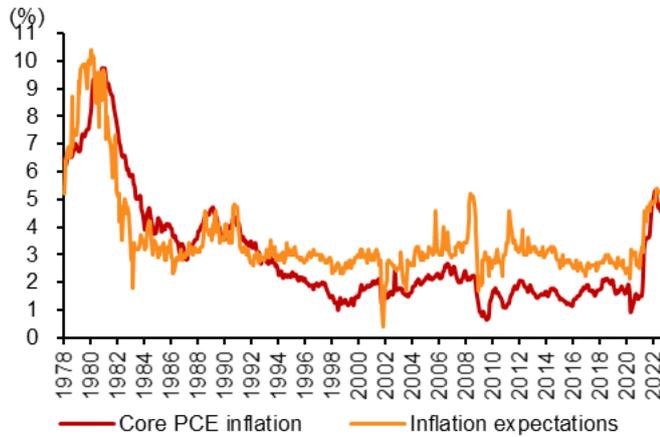
Renminbi experienced a new round of depreciation from this March due to the Russia-Ukraine war, the Fed tightening and China's economic slowdown. The Russia-Ukraine war caused stagflation risk in Europe and increased energy and food inflation in the worldwide. The Fed faced more pressure to tighten its policy as the inflation in the US reached new highs in four decades. China economy sharply slowed from April amid Shanghai lockdowns and the property market slump. China's GDP growth decelerated from 4.8% in 1Q22 to 0.4% in 2Q22, lower than the growth rates in the US and Eurozone. The Sino-US one-year bond spreads turned negative in April for the first time in the past decade. Renminbi sharply depreciated in April and May with US\$/RMB rate down about 10% from this March to last week.

US\$/RMB rate has moderate room to further rise in next 1-2 quarters. It is possible to see US\$/RMB rate to reach above 7 again. First, the US-Sino spreads in money market rates should further increase, as the monetary policy divergence in the two countries may continue to expand. The US labor market and inflation should remain strong in the short term as the Fed may raise the policy rate to 3%-3.25% at end-2022 and above 3.5% in 1Q23. The Chinese economy should remain weak in next 1-2 quarters as zero covid policy may last for some time and housing market could only see slowly recovery in the short term. Up to now, the easing liquidity condition has failed to spur credit expansion in China due to weak demand. The PBOC may have to further lower loan rates to stimulate credit demand while maintaining ample liquidity supply. Therefore, the US-Sino spreads in money market rates may further increase. Second, as it is close to the US midterm elections, the US-Sino tensions may further increase. The US ma technology competition and geopolitical risk related to Taiwan and the US continue to put pressure on China especially on technology and Taiwan issues. Renminbi exchange rate is also a thermometer for the US-Sino relationship. If the geopolitical risk related to Taiwan issue continues to rise, it is definitely to see further downside pressure on renminbi.

The PBOC **tries to** avoid renminbi overshooting, **but does not seek** to change the renminbi trend. The recent cut in RRR of FX deposits indicates the PBOC is reluctant to see renminbi depreciate too fast to cause possible instability risk in the financial market. However, it does not seek to change the moving trend of renminbi exchange rate or control the exchange rate at specific levels. The PBOC faces the difficult task of stabilizing Chinese property market. If it focuses on exchange rate stability, the central bank will lose the space of interest rate policy. This will result in a slow recovery of economy and it cannot truly stabilize the exchange rate.

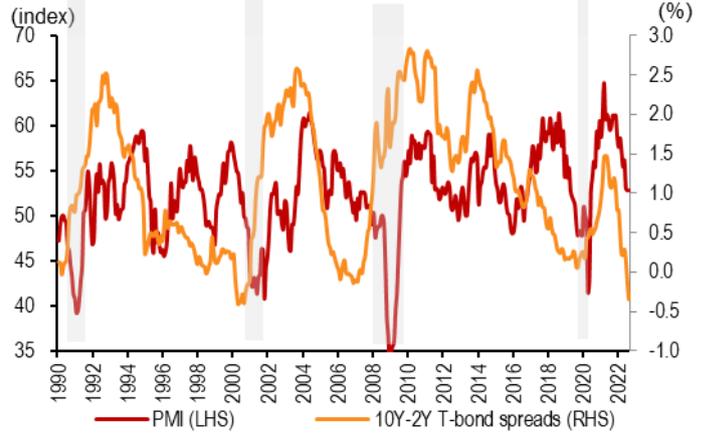
US\$/RMB rate may see some moderate decline in 2023. The wind may change in 2023 if the US sees a recession and China starts to reopen its economy after 2Q23. There are four key factors to determine the trend of US\$/RMB rate next year: 1) when will China change its zero covid policy; 2) how strong will China's housing market recover; 3) when will the US inflation declines sharply; 4) how severe will the US recession risk be. Figure 33 shows a simple scenario analysis on average US\$/RMB rate in 2023. In the neutral scenario, the GDP of China and the US respectively grow 5% and 0.5%, and the year average of US\$/RMB rate may reach 7.03 in 2023. In the most optimistic scenario, China's GDP grows 6% and the US GDP drops 0.5%, and the year average US\$/RMB rate would reach 6.74 in 2023. In the most pessimistic scenario, China's GDP grows 4% and the US economy rises 1.5% as the year average US\$/RMB rate is expected to reach 7.25 in 2023.

Figure 27: Inflation Remains High in the US



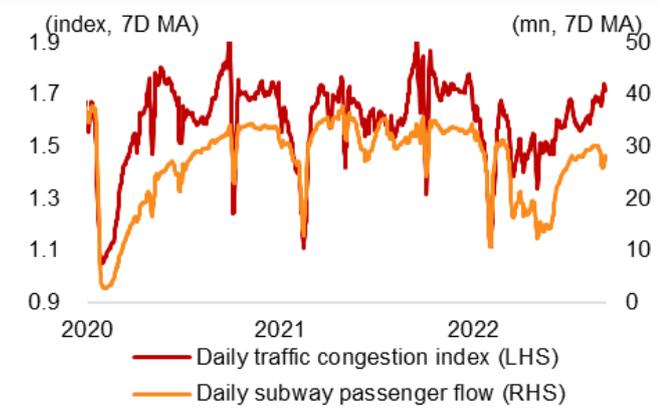
Source: Wind, CMBIGM

Figure 28: Recession Risk Increases in the US



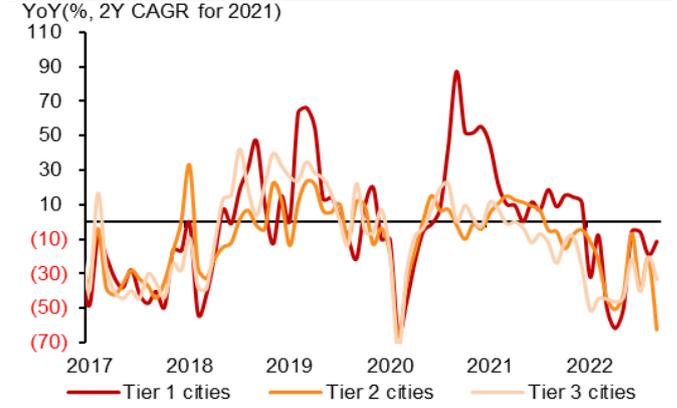
Source: Wind, CMBIGM

Figure 29: Mobility Index in China's Tier-1 Cities



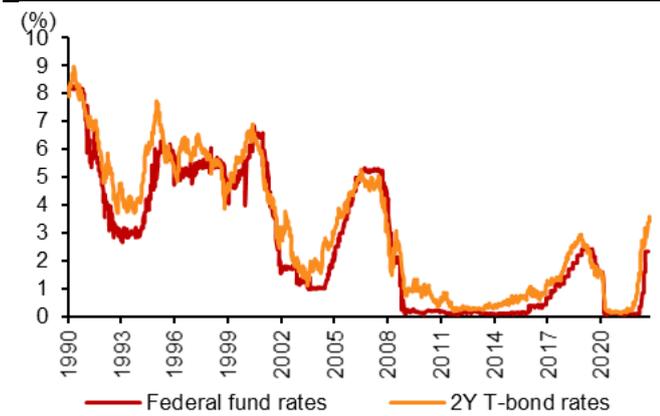
Source: Wind, CMBIGM

Figure 30: China's Housing Sales G in 30 Cities



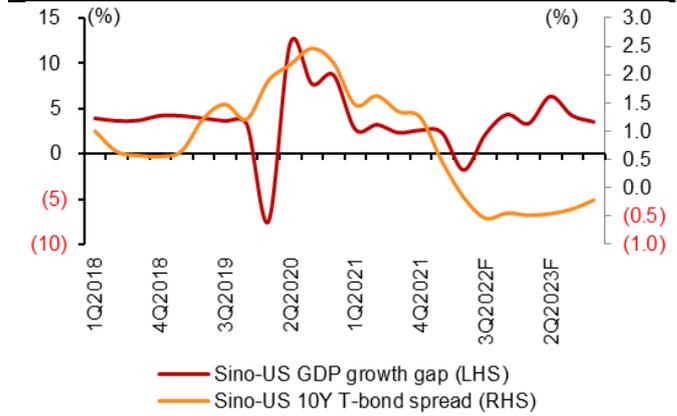
Source: Wind, CMBIGM

Figure 31: Interest Rates in the US



Source: Wind, CMBIGM

Figure 32: Sino-US Growth Gap in Consensus



Source: Bloomberg, CMBIGM

Figure 33: Forecast of Average US\$/RMB Rate in 2023

Scenario	Assumption	US GDP growth	China GDP growth	3M Shibor-Libor spreads	US\$/RMB (average)
S1	stable growth in the US, strong resumption in China	1.5	6.0	-0.8	7.16
S2	stable growth in the US, moderate resumption in China	1.5	5.0	-1.0	7.20
S3	stable growth in the US, weak growth in China	1.5	4.0	-1.3	7.25
S4	weak growth in the US, strong resumption in China	0.5	6.0	0.3	6.99
S5	weak growth in the US, moderate resumption in China	0.5	5.0	0.0	7.03
S6	weak growth in the US, weak growth in China	0.5	4.0	-0.3	7.08
S7	recession in the US, strong resumption in China	-0.5	6.0	1.8	6.74
S8	recession in the US, moderate resumption in China	-0.5	5.0	1.5	6.78
S9	recession in the US, weak growth in China	-0.5	4.0	1.3	6.82

Source: Wind, CMBIGM

Spillover Effects of US\$/RMB Rates

There are three cross-market linkages for US\$/RMB rates and other financial assets.

First is the fundamental linkage. US\$/RMB rates and other financial asset returns are driven by similar fundamental factors like economic growth, inflation and geopolitical risk. US\$/RMB rates should have strong correlation with those financial assets whose fundamentals are highly sensitive to macro factors in China or the US. Second is the liquidity linkage. More and more investors invest in multiple markets seeking for diversification, better risk-adjusted returns or arbitrage opportunities, making the liquidity linkage among different markets increase. US\$/RMB rates should have strong correlation with the financial assets where investor groups overlap. Third is the cross-market sentiment contagion. Investors have herding behavior especially in face of high uncertainty. When risk aversion sentiment increases, all risky assets face downward pressure.

Chinese stock returns have significant negative correlation with US\$/RMB rate changes.

As renminbi depreciates against US dollar, Chinese stock returns tend to decline. Figure 36 shows their correlation increased noticeably from 2018. The increase of cross-market linkages in China may be due to two reasons. First, macro factors seemed to play more important role in financial market fluctuations from 2018 as we saw macro shocks like the Sino-US trade war, the pandemic and the super-loosening monetary policy. Second, China further connected A share market with HK stock market and liberalized renminbi exchange rates from 2017. The entry of more cross-border investors may have increased the liquidity linkage between Chinese stocks and renminbi exchange rate.

HK stocks seem more sensitive to US\$/RMB factor than A shares. HK stock returns have stronger correlation with US\$/RMB rate changes than A share returns. HK stock market is an offshore market with most listed companies from mainland China and most investors from the overseas. The earning prospect of HK stocks is closely linked to “China” factor. However, the liquidity condition of HK market is highly related to the Fed’s policy stance. For one thing, global investors widely use the US dollar for investment or funding and global investors account for over 35% in HK stock trading. For another thing, HK dollar is pegged to the US dollar under the linked exchange rate regime. The US Fed determines HK dollar interest rates. Therefore, HK stocks are very sensitive to economic & policy divergence in China and the US, which is very similar to US\$/RMB rates. When China economy slows sharply and the Fed tightens its monetary policy, US\$/RMB rates and HK stock prices would face severe downside pressure due to the mismatch. For A share market, its liquidity condition is determined by the PBOC’s policy stance which should be counter-cyclical. As HK dollar is pegged to the US dollar, renminbi depreciation against the US dollar would lower A-H premiums. **By sectors, material, industrials, consumer discretionary, financials and air transportation has closer linkage with US\$/RMB rates while the linkage for telecom, energy and utility is weaker.** Stock returns in the former sectors are closely related to macroeconomic condition. Both financial stocks and US\$/RMB rate are quite sensitive to risks in financial system. Corporates in air transportation have large scale of foreign currency debt, making them more sensitive to US\$/RMB rate changes. For telecom and utility, they have lower sensitivity to the business cycle than other sectors.

US\$/RMB rates seem to have strong spillover effects on other currencies especially in emerging markets with close trade & investment linkage with China.

Figure 34 shows Singapore dollar, Korea won, Australia dollar, Norwegian krone, new Taiwan dollar and Thai baht have relatively high correlation coefficients with renminbi in exchange rate returns. Those economies have stronger trade or investment linkage with China as some currencies are commodity currencies. For most emerging markets in Asia Pacific, their

currencies have stronger correlation with renminbi than with the US dollar. For advanced economies, however, their currencies' correlation with renminbi is still weaker than with the US dollar. For one thing, emerging markets have stronger trade linkage with China than with the US. The trade linkage may be more important than the investment linkage for emerging markets, as their financial markets are undeveloped with low openness. For another thing, advanced economies have stronger investment linkage with the US and the investment linkage is more important than the trade linkage for those economies. The US dollar dominates in global monetary system and global financial market.

Global stock returns are also correlated with US\$/RMB rate changes. Specifically, stock returns in Korea, Chinese Taipei, the US, Singapore, India, Indonesia, France, Brazil and Japan all have negative correlation with CNY or CNH returns. For economies in Asia Pacific, their stock returns have stronger correlation with CNY than with CNH. For economies in Europe and America, however, the correlation of their stocks with CNH is much higher than with CNY. This difference indicates that the CNY market is more “regional” or “local” while the CNH market is more “global”.

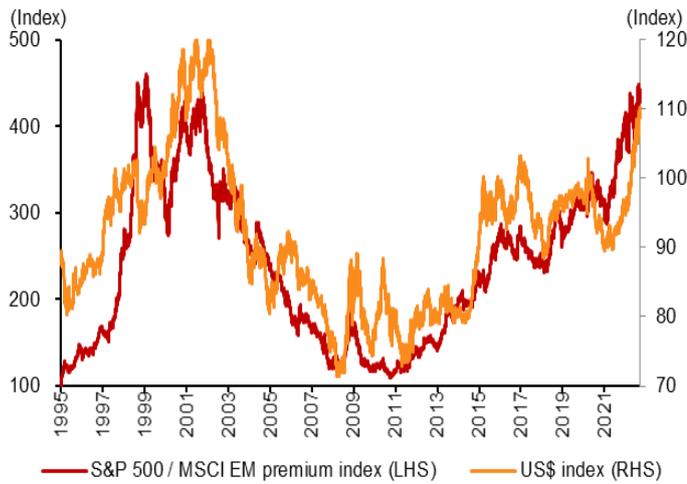
US\$/RMB rates have close linkages with some commodities like metals as China dominates in the demand and the Fed determines the US dollar liquidity in commodity market. Copper, gold, lead, zinc and aluminum have stronger return correlation with US\$/RMB rates than other commodities. For most base metals, their correlation coefficients with renminbi are higher than with the US dollar. Coal, soft commodities and crude oil has relatively weak correlation with renminbi exchange rates.

Figure 34: Correlation coefficients of US\$/RMB rate & global market returns in 2018-2021

Stock market	CNY	CNH	US\$ index	FX market	CNY	CNH	US\$ index	Commodity	CNY	CNH	US\$ index
China A	-0.38	-0.19	-0.14	US\$/SGD	0.37	0.67	0.74	Copper	-0.25	-0.35	-0.32
HK	-0.41	-0.25	-0.16	US\$/KRW	0.33	0.61	0.52	Gold	-0.11	-0.32	-0.38
Korea	-0.35	-0.16	-0.21	US\$/AUD	0.23	0.56	0.68	Lead	-0.21	-0.24	-0.28
Chinese Taipei	-0.33	-0.19	-0.23	US\$/NOK	0.22	0.49	0.62	Zinc	-0.16	-0.23	-0.20
Singapore	-0.28	-0.17	-0.08	US\$/TWD	0.31	0.48	0.37	Aluminium	-0.14	-0.23	-0.15
India	-0.25	-0.21	-0.08	US\$/THB	0.27	0.48	0.42	Tin	-0.21	-0.22	-0.21
Indonesia	-0.24	-0.17	-0.12	US\$/GBP	0.24	0.48	0.76	Soybean	-0.12	-0.16	-0.11
Japan	-0.22	-0.08	-0.18	US\$/CAD	0.20	0.47	0.53	Nickel	-0.11	-0.15	-0.07
France	-0.19	-0.25	-0.22	US\$/EUR	0.18	0.47	0.94	Crude oil	-0.09	-0.12	0.02
Germany	-0.19	-0.25	-0.22	US\$/NZD	0.22	0.46	0.69	Corn	-0.08	-0.12	-0.03
UK	-0.18	-0.24	-0.15	US\$/CHF	0.13	0.41	0.79	Cotton	-0.12	-0.10	-0.08
Australia	-0.16	-0.05	-0.17	US\$/JPY	0.04	0.25	0.58	Wheat	-0.01	-0.05	-0.05
US	-0.15	-0.31	-0.17					Thermal coal	0.01	-0.01	0.04
Brazil	-0.11	-0.25	-0.12								

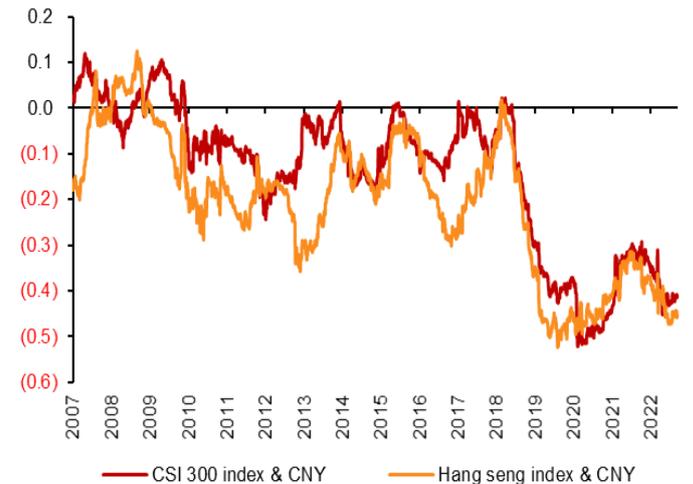
Source: Wind, CMBIGM

Figure 35: S&P 500/MSCI EM premium index & US\$



Source: Wind, CMBIGM

Figure 36: Correlation coefficients of daily returns



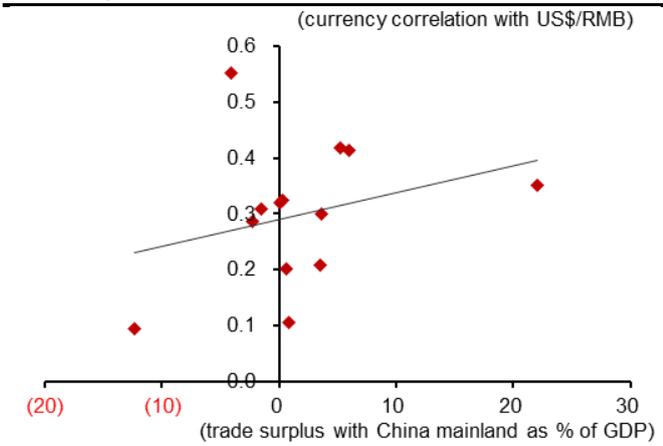
Source: Wind, CMBIGM

Figure 37: Correlation coefficients of Chinese stock and US\$/RMB rate returns

A shares by sector	CNY	HK stocks by sector	CNY
Industrials	-0.34	Material	-0.39
Consumer discretionary	-0.32	Consumer discretionary	-0.38
Air transportation	-0.32	Financials	-0.37
Financials	-0.29	Industrials	-0.37
Material	-0.29	IT	-0.34
IT	-0.29	Consumer staples	-0.32
Consumer staples	-0.29	Conglomerate	-0.32
Telecom	-0.28	Property & construction	-0.31
Health	-0.26	Health	-0.31
Property	-0.20	Utility	-0.30
Utility	-0.19	Energy	-0.24
Energy	-0.18	Telecom	-0.21

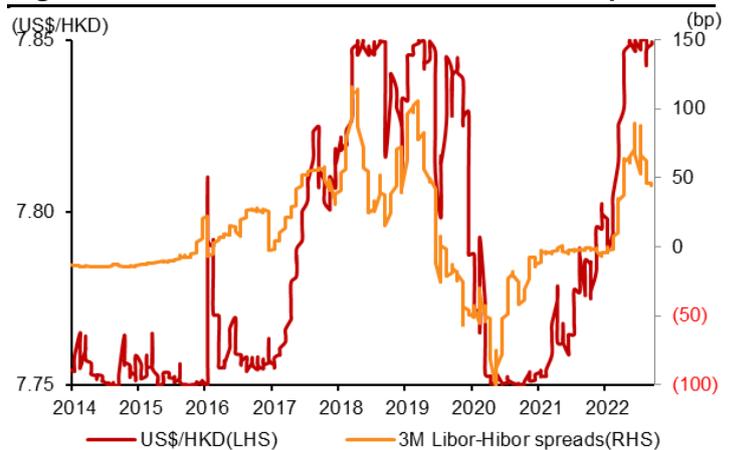
Source: Wind, CMBIGM

Figure 38: Dependence on China market V.S currency correlation with US\$/RMB for EMs



Source: Wind, CMBIGM

Figure 39: US\$/HKD Rate and 3M Libor-Hibor Spread



Source: Wind, CMBIGM

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