

An Extract from NIFD and CLS Joint Forum Publication: Foreign Exchange Market Infrastructure to Support Stability of RMB Internationally.

1. Introduction

As China moves toward a more market driven financial market structure and toward further liberalisation of the capital account, the transference of market risk will move from the central government and central bank to broader market participants. This is a natural evolution of a developing financial system and requires market participants to assume the responsibility for managing these risks.

As the Chinese financial system grows, reflective of growth in Chinese trade, foreign and overseas direct investment as well as portfolio investment activities, it is expected to further integrate further into the global financial system. As a consequence, the currency and all capital market participants will be exposed to the need to actively manage exchange rate movements, namely market risk. This will drive an increased scope and scale of hedging and FX activity and in turn, increased exposure by financial market participants, including Chinese institutions, to market risk. In addition to normal market adjustments in relative values of currencies that play out in the global FX markets, events, such as significant political or economic events may give rise to periods of pronounced and protracted exchange rate volatility that requires management and risk mitigation by market participants.

2. Risk management challenges during periods of market stress and volatility

High volumes of trading during periods of volatility can lead to insufficient trading limits between counterparties, which in turn can limit trading and the FX market's ability to function appropriately. The accumulation of FX trades with counterparties can lead to significant exposures to a single counterparty on a daily basis, which can exceed the entire capital of the bank¹⁴ on a peak day.

2.1 A study of increased risk exposures on peak FX trading days

A study on FX trading banks' counterparty risk management was previously performed to

¹⁴ CPSS, "Progress in reducing foreign exchange settlement risk", May 2008.

quantify the range of exposures that trading institutions would need to accommodate with their counterparties (on a bilateral basis) on a normal/average day and on a peak day. The study was performed using FX trade settlement data from CLS¹⁵ for the 17 currencies settled in Q2 2015 at the counterparty level. CLS estimates that it settles approximately 60% of eligible¹⁶ global FX turnover that is subject to settlement risk¹⁷ and thus the data represents a significant proportion of the FX market and provides useful insights to daily FX trading behaviours in the currencies it settles.

The analyses of gross bilateral settlement amounts, which reflect exposures between banks, provide evidence of significant increases in bilateral counterparty exposures on peak days that can be several times greater than on a normal/average day (see 表 1).

Table 1: Counterparty peaks – gross settlement value for FX between counterparties for currencies settled¹⁸ in CLS in Q2 2015

	(A) Average daily gross settled in (USD bn)	(B) Peak day gross settled in (USD bn)	(C) Peak to average ratio (B/C)
Maximum exposure to counterparty	64.9	163.1	2.5
Average exposure to counterparty	1.7	7.1	4.2

The data in 表 1 shows that the average exposure between a bilateral counterparty on a peak day in Q2 2015 was approximately 4 times the average exposure to a bilateral counterparty on an average day. Similarly the largest exposure for a bilateral counterparty increased 2.5 times over the average on a peak day.

CLS data was further analysed to identify the potential pressures and stresses on counterparty limits under normal and peak trading conditions at the currency level. Data submitted by CLS's

¹⁵ CLS (Continuous Linked Settlement) is a global multilateral netting and PvP settlement service for FX trades. CLS provide FX settlement on behalf of some of the world's largest financial institutions including over 60 of the largest global banks as Settlement Members (direct members) and over 23,000 active third parties (indirect members).

¹⁶ For the currencies that CLS settled in Q2 2015 (AUD, CAD, CHF, DKK, EUR, GBP, ILS, HKD, JPY, KRW, MXN, NOK, NZD, SEK, SGD, USD, ZAR). The HUF was added as the 18th currency in Q4 2015 and was not included in the original analysis.

¹⁷ Excludes "On Us" activity, which does not involve transfer of funds across entities.

¹⁸ The data is based on the 17 currencies settled by CLS in Q2 2015, which are: Australian dollar, Canadian dollar, Danish krone, euro, Hong Kong dollar, Israeli shekel, Japanese yen, Korean won, Mexican peso, New Zealand dollar, Norwegian krone, Singapore dollar, South African rand, Swedish krona, Swiss franc, U.K. pound and U.S. dollar.

members¹⁹ during Q2 2015 was analysed, which included the trades in the 17 currencies that CLS settled and renminbi trades (which is not settled Pvp in CLS) between CLS members for the same period. The value of the offshore renminbi trades from these institutions was equivalent to an average daily value of USD 164.7bn (counting both sides).

The average gross bilateral settlement amounts, which reflect the exposures between banks, for renminbi FX trades and also for the top five currencies settled in CLS during Q2 2015 is summarised in Table 2. This also illustrates the magnitude of the difference between the peak and average day for each of the six currencies analysed.

Table 2: Bilateral gross settlement exposures between CLS Members in Q2 2015 for the offshore renminbi and CLS settled currencies (one side of the trade counted)

Currency	(A) Average exposure on an average day in USD bn	(B) Average exposure on a peak day in USD bn	Peak to Average ratio (B/A)	(C) Largest exposure on an average day in USD bn	(D) Largest exposure on a peak day in USD bn	Peak to Average ratio (D/C)
CNH ²⁰	0.05	0.17	3.77	0.76	5.62	7.39
USD	0.71	2.33	3.30	28.61	73.00	3.18
EUR	0.32	1.48	4.65	14.71	32.82	3.52
JPY	0.18	0.78	4.37	6.84	18.51	2.71
GBP	0.17	0.88	5.15	4.11	14.47	2.23
CHF	0.10	0.45	4.46	3.86	12.27	2.55

The above table highlights:

1. The scale and peaks of the amounts settled between trading institutions, across markets and currencies.
2. The increased demands on counterparty risk limit utilisation, of particular importance in periods of stress.

Table 2 illustrates the magnitude of the differences between bilateral settlement exposures on a peak and average day (i.e. the peak-average ratio) for (i) the average exposure for bilateral

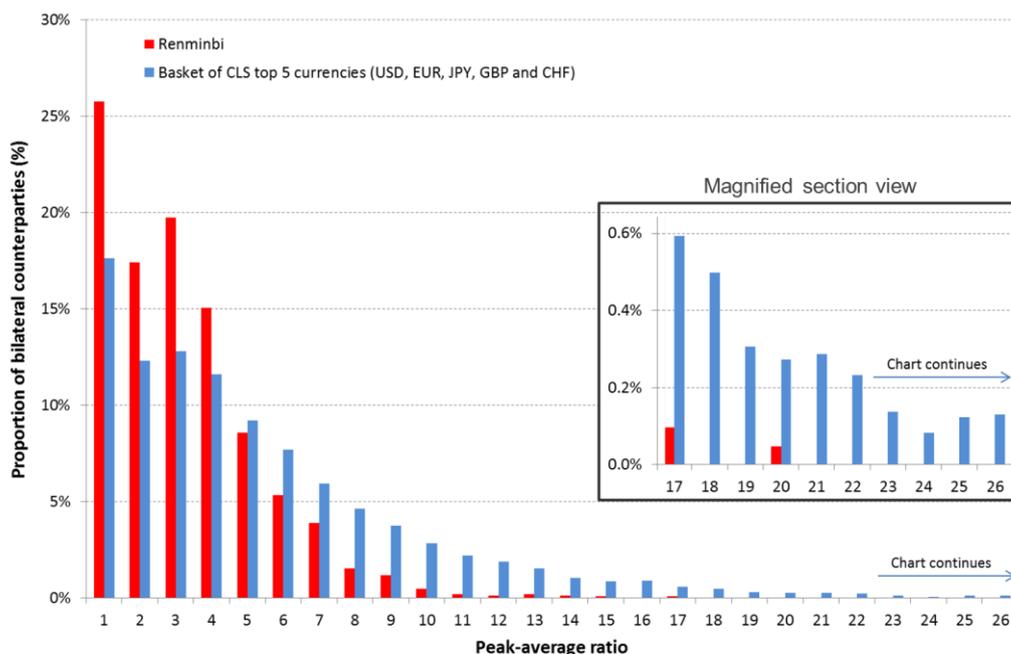
¹⁹ CLS provides a Pvp settlement service to qualified and regulated financial institutions and in Q2 2015, 62 settlement members' data contributed to the analysis, whilst a subset of 57 members who represent 90% of the total value settled in CLS, provided renminbi FX trade data executed with other CLS Members.

²⁰ The CNH is not settled using Pvp through CLS.

counterparties and (ii) the largest single bilateral counterparty exposure. As this average analysis may underestimate the range of ratios experienced between counterparties, the bilateral exposures underpinning these results were examined. The chart in Figure 1 is added to illustrate significant variations in the peak to average ratios amongst the individual trading institutions within the data sample.

Using the same data, Figure 1 shows the proportion of bilateral counterparty trading relationships across the reported peak-average ratios. The distribution of bilateral counterparty trading relationships for a number of currencies, namely the renminbi and the average of a basket made up of the top five currencies are plotted. The data underpinning the graph shows that for the renminbi, the peak day bilateral counterparty exposure can reach 20 times more than the average day exposure for the same bilateral counterparty i.e. peak-average ratio of 20. Figure 1 shows the results for the USD, EUR, JPY, GBP and CHF as a basket, which is indicative of the distribution profile for those currencies. The underlying data shows that the highest peak-average ratio was 25 for USD, 33 for CHF, 35 for JPY, 38 for GBP, and 47 for the EUR.

The long tail suggests two things: (i) institutions' trading profiles and exposures may be more extreme than the average results in Table 2 and (ii) given the longer tail in the most actively traded FX currencies, institutions are capable of accommodating a significant variation in bilateral counterparty exposure on a peak day compared to their average FX trading day.



**Figure 1: Proportion of bilateral counterparty relationships against peak-average ratios
(based on settlement amounts) for Q2, 2015**

As renminbi FX trading grows in absolute terms, the demands on counterparty risk limits will be even higher and potentially beyond the ability of the banks and the markets to accommodate and support demand for FX trades. This is particularly of significance for the Chinese banks as the renminbi is the base currency of their business.

2.2 A study of counterparty risk limit impact during two different currency market events

The relatively large variation in settlement values among bilateral counterparties raises a potential risk of insufficient counterparty credit limits during periods of high market volatility, due to inadequate risk mitigation between counterparties, resulting in dysfunctional markets and market pricing. To illustrate the impediment to FX trading as a result of counterparty credit limit restrictions, an analysis of pricing data from the EBS Market²¹ trading platform (a central limit order book) was performed to identify instances of *locked* or *crossed* market activity. The definition of a *locked* market is where the best *bid price* is equivalent to or higher than the best *offer price*. The data provided was for different currency pairs traded on the platform under normal and abnormal market conditions.

The instance when a market for a currency pair becomes *locked* or *crossed* can occur in the event that the counterparty showing the best bid price does not have sufficient bilateral credit with their counterparty showing the best offer price to execute a trade. EBS Market incorporates a number of measures that prevent participants from inadvertently publishing prices where a bid price exceeds the offer price in addition to minimum institutional requirements, which includes monitoring to ensure institutions have sufficient access to counterparty credit with other participants on the platform. Thus the reason that a crossed or locked market occurs, according to EBS²², is due to insufficient counterparty credit between participants.

The following analysis provides the opportunity to examine whether different settlement methods have an impact on trading performance. The analysis focuses on contrasting performance

²¹ EBS Market is a global trading platform which supports the execution of FX trades with an estimated 70% share of the FX spot traded offshore renminbi (CNH) market (April 2016). The EBS Market trading platform is an anonymous central limit order book for Spot FX, NDFs (and precious metals). The USDCNH currency pair ranks in the top 3 currencies traded on EBS Market by daily value.

²² While it is generally recognized that system lags can lead to locked markets, the infrastructure setup at EBS is such that only a lack of counterparty credit can lead to a locked or crossed market.

of trading in two currencies, the offshore renminbi (CNH) and the Swiss franc (CHF) during significant market events. The largest trading institutions settle a majority of their trades in CHF via PVP whilst very little settled PVP in the offshore renminbi market. The analysis relates to periods of increased FX market volatility with increased bid/offer spreads and market trading volumes. The periods in question relate to September 2015²³ for the offshore renminbi market (USD/CNH) and in January 2015 when the Swiss franc was de-pegged from the euro²⁴ (EUR/USD).

On the January 15, 2015, the Swiss National Bank unexpectedly discontinued the peg of the Swiss franc (CHF) against the euro (EUR).²⁴ The unexpected move increased market volatility and trading activity, which resulted in a depreciation of the EUR against the CHF of approximately 27% initially and 19% by close of trading. As an indication of the volatility and increased trading in the EUR/CHF market, CLS recorded a substantial increase both in value and volume. There was a 20% daily increase in EUR/CHF trade values submitted for settlement relative to the monthly average value over January 2015. Notably the proportion of EUR/CHF spot and forward trades in CLS increased by approximately 3 times and 5 times respectively, compared to the average EUR/CHF settlement values for January 2015.

On EBS Market (the trading platform), the EUR/CHF market spent only 196 seconds or just over 0.2% of the day with locked/crossed markets (see Figure 2). For comparison, other related currency pairs are also provided in Figure 2 showing the relative impact on those FX currency pairs. In contrast to the EUR/CHF on September 10, 2015 the USD/CNH market spent 7928 seconds (approximately 2 hours and 12 minutes) or 9.2% of the trading day with locked/crossed markets (see

) when the CNH appreciated against the USD by approximately 1.2% as a result of perceived measures to discourage speculation on the CNH.

²³ Reuters, *China's Yuan Jumps Offshore in Suspected Intervention*, September 2015.

²⁴ Swiss National Bank press release, *Swiss National Bank discontinues minimum exchange rate and lowers interest rate to -0.75%*, January 2015.

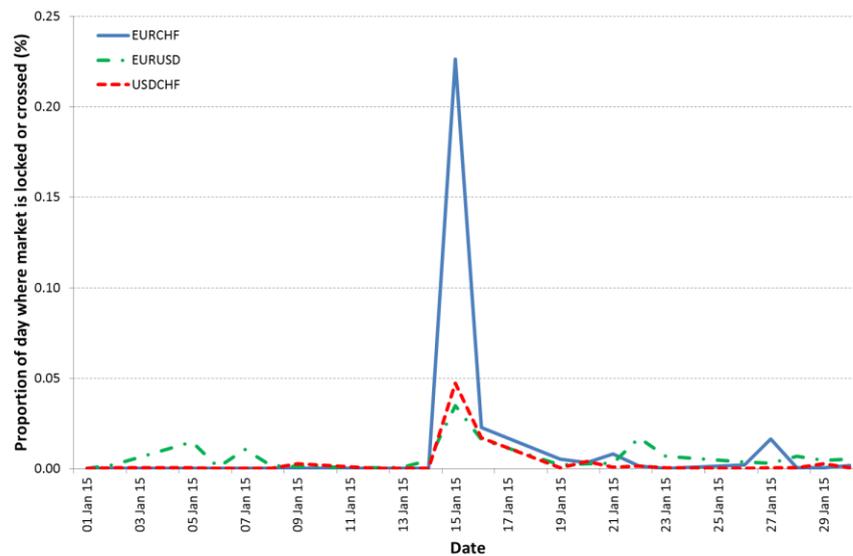


Figure 2: The proportion of time that markets were locked and crossed reported at daily intervals for January 2015

Source: EBS Markets

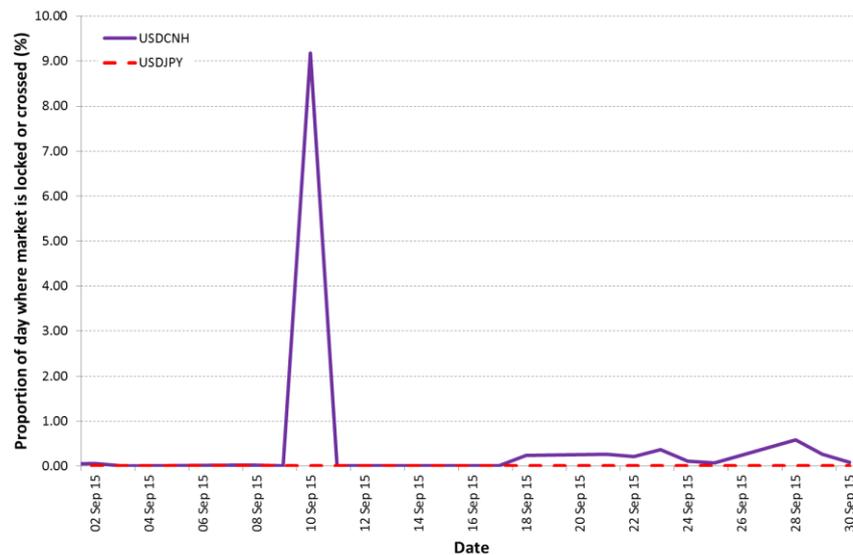


Figure 3: The proportion of time that markets were locked and crossed reported at daily intervals for September 2015

Source: EBS Markets

Despite the relatively small change in price for the USD/CNH (1.2%) compared to the EUR/CHF (19.0%) the USD/CNH was more susceptible to crossed markets (9.2% compared to 0.2% for the EUR/CHF), which would prevent trading institutions from fulfilling their FX orders to clients and carrying out day-to-day USD/CNH market transactions.

2.3 A study of Brexit events and impact on volatility

The global nature of cross-border transactions, which is facilitated by the FX market, directly links domestic institutions and the global markets in which they participate. Foreign macroeconomic and political events, such as the recent UK referendum on the European Union (EU) membership (held on June 23, 2016) illustrate how those events can lead to volatility and significant shifts in risk profiles of market participants. An analysis of data aggregated, executed FX trade data from CLS for the most actively traded currencies was conducted in order to ascertain consequences for trading values surrounding the Brexit events.

The daily settlement value for GBP/USD spot FX for the period before and after the British referendum is displayed in Figure 4. The chart shows notable spikes in daily settlement values, which coincide with significant Brexit related events or announcements.

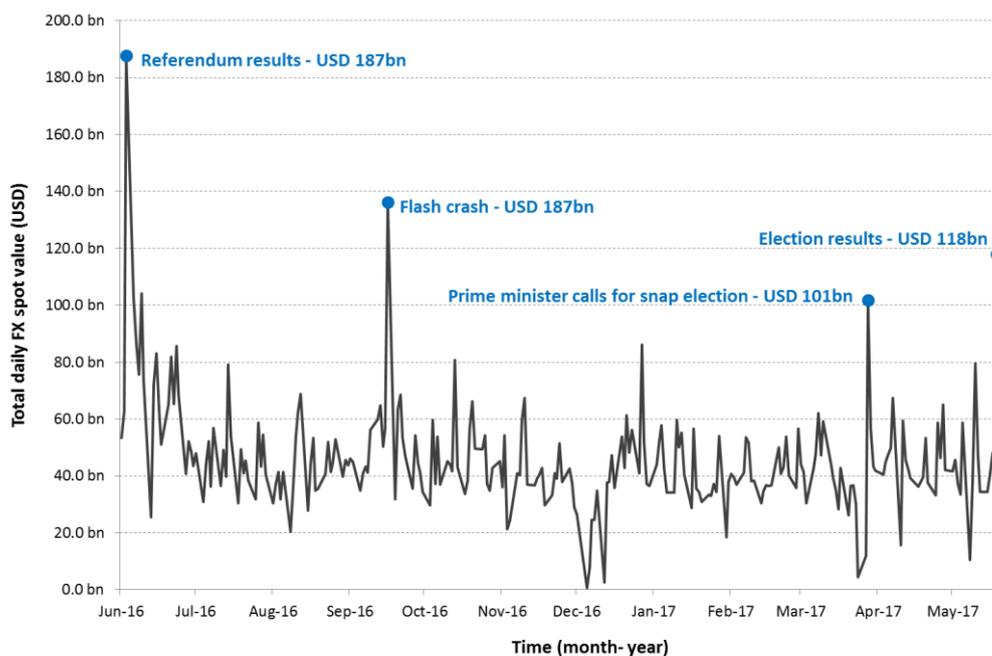


Figure 4: Impact of Brexit-related events on daily GBP/USD FX spot values in CLS

On the announcement of the UK referendum results on June 24, 2016, daily settlement value for GBP/USD spot FX was USD 187bn, which is almost 3 times higher than the previous day. At the intraday level, the increase is much higher. Figure 5 shows the hourly spot FX trading value for GBP/USD submitted to CLS on June 24, 2016.

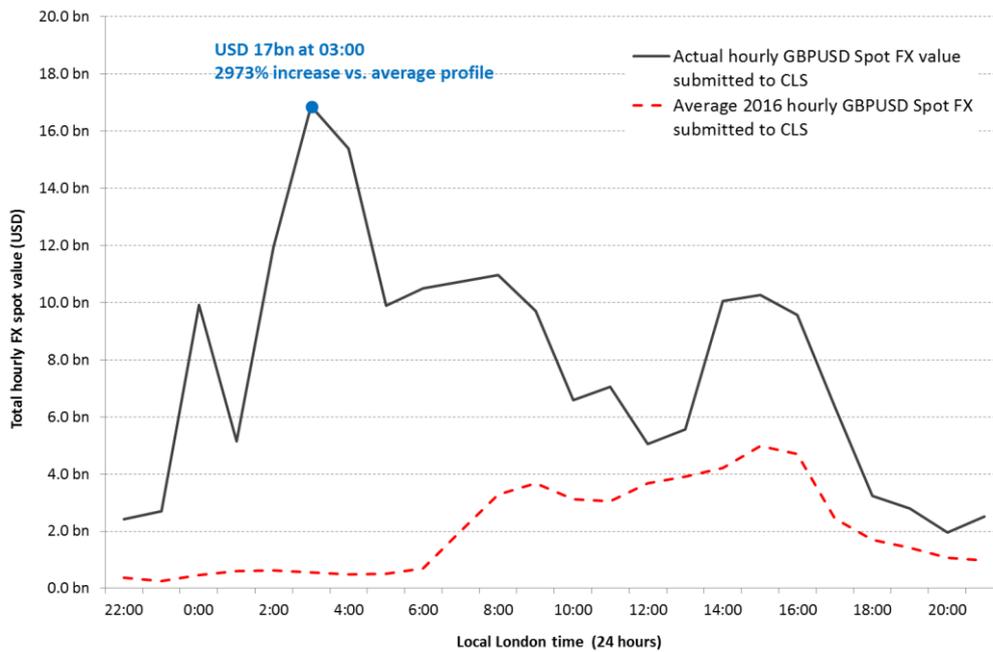


Figure 5: Intraday GBP/USD FX spot values submitted to CLS

In the lead up to the UK referendum, financial markets priced in a “Remain” victory and GBP/USD rose in the last days preceding the referendum. The YouGov “pseudo-exit” poll indicated that “Remain” was favoured by 52% vs. “Leave” at 48%. As a result, GBP/USD continued to rise to a high of 1.5018 at 22:00. With live results published in the early hours (UK time) on June 24, 2016, ITV (a British national broadcaster) forecasted a 75% chance of a “Leave” victory. This was an unexpected result for the market and volumes peaked at 03:00, coinciding with the opening of financial markets in Asia. GBP/USD plummeted to a daily low of 1.3229 by 05:00.

Using hourly interval submission values to CLS as a proxy for hourly FX trading activity²⁵, Figure 5 provides a number of useful insights.

- The average 2016 hourly trading profile of submission values for GBP/USD spot FX, shows that maximum value typically occurs at around 16:00, which coincides with the time-zone overlap between London near-close of trading and New York open trading. It also coincides with periods of greatest liquidity for this currency pair.²⁶
- Based on this 2016 average hourly trading profile of GBP/USD spot FX in CLS, GBP/USD is not usually traded during Asia market hours (in significant amounts).

²⁵ CLS members represent most of the largest FX market participants. Their processing of CLS submissions is generally fully automated and submissions to CLS are understood to be within minutes of actual trading taking place.

²⁶ Bank for International Settlements, Markets Committee, “The Sterling ‘flash event’ of 7 October 2016”, January 2016.

- On June 24, 2016, GBP/USD spot FX values peaked in Asia market hours, at 03:00 and was almost 31 times higher compared to the average for the year (2016). To put this into context, by 03:00, 26% of the daily value for GBP/USD spot FX was submitted to CLS on June 24, 2016 compared to 6% on an average day.
- The intraday profiles for GBP/USD spot FX for the other peak days show intraday peaks that exceeded the average daily profile by at least 4 times.

3. Implications and considerations for China

The settlement values related to FX trades can vary substantially driven by response to economic conditions and policy developments, market volatility or even bank holidays that can lead to an equivalent of two days settlement processed on a single day. If these trades were settled via a non-payment-versus-payment (PvP) system, FX market participants would need to accommodate this level of risk (and volatility) through their counterparty pre-settlement and settlement limits. Participants would be required to secure and manage counterparty settlement risk limits with their global trading counterparties at these levels, an undoubted challenge as foreign banks have reported to CLS that they could not settle such large volumes in the global FX market without PvP.

China has taken constructive steps to facilitate greater cross-border connectivity by creating a payment system to support cross-border payments, namely CIPS, and a global network of renminbi clearing banks. However, both the renminbi and the counter-currency leg of a FX trade do not fully benefit from settlement risk mitigation as no single jurisdiction can solve effectively for cross border settlement risk. This asymmetry has significant negative impacts on counterparty credit and settlement risks limits, bilateral trading limits and liquidity efficiencies. As the BIS's December 2016 Quarterly Review implies, not being able to settle renminbi payments through PvP such as CLS may act as one of the practical constraints in terms of further and broader international acceptance of the renminbi²⁷.

²⁷ Moore, M., Schrimpf, A., and Sushko, V., "Downsized FX markets: causes and implications", *BIS Quarterly Review*, December 2016, pages 35-51.