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A Study on Cross-Currency Transmissions in Money Market

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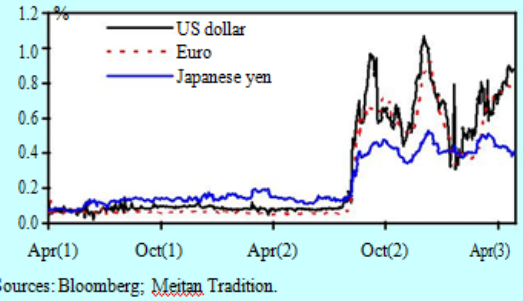
Abstract: ***In various currency-denominated money markets, term funding rates have come under upward pressure because of heightened concerns about counterparty credit and liquidity risks. We find that the increased volatility in these markets results from not only changes in the variances of shocks impacting the market but also changes in the structure of the market. Although the magnitude of upward pressure on interbank rates has differed across markets, the direction of its movements has followed a similar pattern. In this Review, using a vector auto-regression model, we analyze the cross-currency transmission mechanism of term funding premium across the US dollar, euro, and Japanese yen markets. Funding conditions in global money markets have tightened. Under heightened uncertainty about US dollar funding, the interdependent relationship across these markets has strengthened via cross-market rebalancing activities of risk-averse financial institutions. In addition, market liquidity of the foreign exchange (FX) swap deteriorated, which made it difficult for FX swap markets to mitigate the dislocation of US dollar liquidity. As a result, shocks for US dollar funding were not efficiently absorbed in global money markets, and the FX swap implied dollar rates from euro and yen were under persistent upward pressure. This strain in the FX swap markets was then fed back into the unsecured US dollar market, leading to further upward pressure on US dollar interbank rates.***

Keywords: FX swaps, Cross currency, money market tension.

1. Introduction

The tensions in term funding markets since August have been considerable. For example, the spreads between Libor and the comparable overnight index swap (OIS) rates rose sharply and have remained at high levels, reflecting the increase in credit risk and liquidity premium. Figure 1 shows the 3-month Libor-OIS spreads for three major currencies, the US dollar, euro and Japanese yen, and suggests two interesting facts. First, during the turmoil in money markets, these three spreads were highly correlated with each other. For example, three spikes can be identified in September, December and March next year for all currencies. Market contacts have suggested that the high correlation across currencies has been caused by cross-market rebalancing activities of financial institutions which have faced a shortage of US dollar funding. For example, these financial institutions have increased their borrowings in euro and yen, and actively converted them into US dollar through foreign exchange (FX) swaps, which has led to the tightening conditions in euro and yen markets.

Figure 1: Libor-OIS spreads



Sources: Bloomberg; Meitan Tradition.

Second, not only the mean but also the variance of each Libor-OIS spread increased. The standard deviation of the US dollar spread rose from 0.014% in the pre-turmoil period (April(2) - July(2)) to 0.198% during the turmoil (August(2)- April(3)), by roughly 14 times; that of the euro spread rose from 0.007% to 0.173%, by 24 times; that of the Japanese yen spread rose from 0.018% to 0.045%, by 2.5 times. In addition, the spreads have become persistent for all currencies. Although the degree of the increase in variances and persistence of the Libor-OIS spreads differs across currencies, the structure of the money markets appears to have changed since August.

In the following, we briefly explain the information content of Libor-OIS spreads, and then investigate the backgrounds of the two facts given above. Using a vector auto-regression (VAR) model, we show how the cross-currency transmission mechanism of term funding premium has changed since last summer, and explain how the tensions have propagated globally with interaction between money markets and FX swap markets.

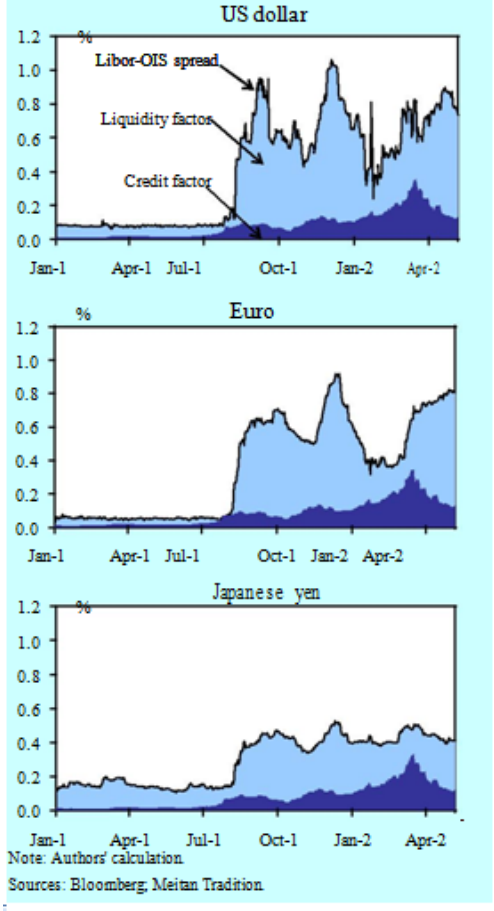
2. Decomposition of Libor-OIS Spreads: Credit Risk and Liquidity Premium

Libor is the most widely used benchmark for the short-term interbank interest rate. In principle, Libor reflects current and expected future overnight interest rates over the corresponding period of time and the premium associated with counterparty credit risk and liquidity risk. The counterparty credit risk premium arises because Libor is the rate on unsecured lending to financial institutions, and the lender requires compensation for the risk of a default on this credit. The liquidity premium arises out of banks' incentive to protect their liquidity positions under uncertainty. Liquidity can be seen as the ease with which a bank can access cash by obtaining credit from another bank. As uncertainty about market conditions increases or the strains in markets grow, banks find it harder to secure term funding. This is because some banks have an

increased demand for funding but other banks become reluctant to provide cash since they seek to protect their own liquidity positions. Such developments push the Libor well above what could be considered reasonable compensation for default risk. On the other hand, the OIS rate can be viewed as a mirror of pure expectation about future overnight interest rates since OIS transactions do not involve a cash flow and the premium for its liquidity and credit risk is quite limited. Therefore, the Libor-OIS spread can be considered as a good indicator of credit risk and liquidity premium.

Figure 2 shows the decomposition of Libor-OIS spreads into credit risk premium and liquidity premium. The estimates of credit premium are based on prices of credit default swaps for banks in the Libor panel. We assume that any difference between the observed Libor-OIS spread and the estimated credit premium reflects the liquidity premium. The credit premium affects the Libor OIS spreads for different currencies in a similar way because internationally active banks should pay the same credit premium in all currency markets and the Libor panels are very similar across currencies. This partially leads to the correlation between the spreads. Figure 2 shows, however, that the credit risk premium does not have much explanatory power for fluctuations in Libor-OIS spreads. Instead, the liquidity premium has larger explanatory power for all currency spreads, and seems to have played a crucial role in the cross-currency transmission of term funding premium.

Figure 2: Decomposition of Libor-OIS spreads

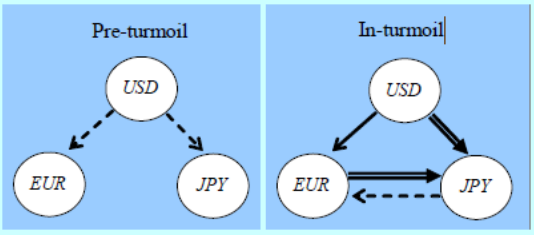


Note: Authors' calculation.
Sources: Bloomberg; Meitan Tradition.

3. US Dollar Liquidity Shortages in Interbank Markets

The high correlation of the Libor-OIS spreads across currencies suggests that a funding shock occurring in a certain currency money market led to an increase in the liquidity premium and then spilled over to the other currency markets. In order to statistically verify this view and analyze the cross-currency transmission mechanism of term funding premium, we estimate the tri-variate VAR model based on the 3-month Libor-OIS spreads (daily data) for the US dollar (USD), euro(EUR) and Japanese yen (JPY). VAR is an econometric model used to capture the evolution and the interdependencies between multiple time series. We set the beginning of the sample period at April(1) to exclude the Bank of Japan's quantitative easing period, and split the sample period into two sub-samples: April(1)- July (2) (pre-turmoil) and August (2) – April (3) (in-turmoil), in order to examine how the cross-currency transmission mechanism of term funding premium changed after the subprime woes.

Figure 3: Granger causality of Libor-OIS spreads



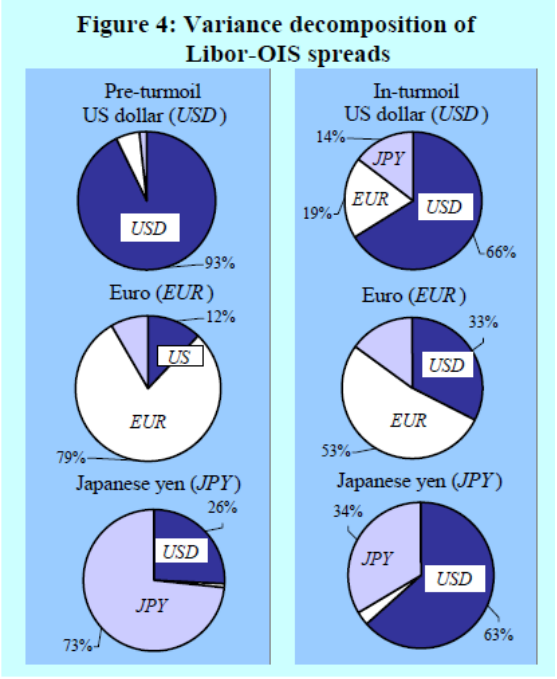
Note: The double, single and dotted arrows indicate that the null hypothesis of no causality can be rejected at the 1%, 5% and 10% significance level, respectively.

Figure 3 presents results of the Granger causality test. Granger causality is a statistical concept of causality that is based on prediction, i.e. a technique for determining whether one spread is useful in forecasting another. In the pre-turmoil period, there is no statistically significant causality between markets, and each currency market moved almost independently. This implies that the liquidity premium is currency-specific under normal market conditions and can be well-controlled by a central bank through its market operations. In the turmoil period, however, we find strong causalities in the Granger sense (1) from USD to EUR and JPY and (2) from EUR to JPY.

Figure 4 shows the results of the variance decomposition, which provides information about the relative importance of each shock in affecting the spreads in the VAR. The results are consistent with those of the Granger causality test: (1) While a large percentage of variances of EUR and JPY spreads is attributable to their own shocks in the pre-turmoil period, this proportion drops in the turmoil period, and USD shocks instead come to account for a larger percentage; (2) EUR shocks remain unimportant on the variance of JPY spread, implying that Granger causality from EUR to JPY in the turmoil period results from the indirect impact of USD shocks via EUR spread; (3) While more than90% of the variance of USD spread is attributable to its own shocks in the pre-turmoil period, this proportion drops in the turmoil period, and EUR and

JPY shocks come to account for a larger percentage.

Figure 4: Variance decomposition of Libor-OIS spreads



What drove the causality among currencies during the turmoil? As noted earlier, internationally active banks pay the same credit premium in all currency markets, and the credit premium affects the Libor-OIS spreads for different currencies in a similar way. Therefore, the credit premium leads to a correlation but not one-way causality among currencies, and the fluctuations in liquidity premium instead result in Granger causality from one currency to another. The results of VAR are consistent with the general view that a large shock of US dollar funding, i.e. US dollar liquidity shortages in interbank markets, caused the upward pressure on term funding rates, and its effect spilled over into other currency markets.

4. Source of Liquidity Premium and Its Cross-Currency Transmission

The shortage of US dollar liquidity in interbank markets mainly resulted from increased pressure on the balance sheets of banks. This balance sheet pressure is a consequence of the reintermediation process of financial flows back through the banking system. The collapse of large parts of the structured finance market left banks holding assets which they had expected to transfer off their balance sheets and facing obligations to off-balance-sheet vehicles whose normal commercial paper funding has dried up. For example, many banks including non-US banks had provided committed US dollar liquidity lines to specialist financial vehicles, conduits and corporates. Heightened uncertainty about if and when these lines might be drawn increased the banks' demand for US dollar term funds, and simultaneously made them reluctant to lend beyond short maturities.

In addition, the tensions in term funding markets were amplified by deleveraging. Many assets were viewed as having more credit risk, price risk, and liquidity risk than anticipated before. This perception of increased risk led to deleveraging, which pushed down asset prices for less liquid assets. The decline in asset prices generated losses for financial institutions and eroded their capital, making banks less willing to lend to others.

Facing a shortage of US dollar liquidity, many financial institutions, especially European banks, moved actively to convert other currencies into US dollars through FX swaps. In addition, internationally active banks target their liquidity positions and exposures at a global level, and therefore change their cash holdings and lending/borrowing position in a similar way across currencies: hoarding more liquidity and lending less cash to other banks. These changes in banks' behavior tighten demand/supply conditions in the global interbank markets and hence increase the pressure on term funding rates.

As noted in the Introduction, the prominent feature of Libor-OIS spreads during the turmoil is not only the increase in the mean but also the increase in the variance. With regard to the liquidity premium, the increase in the variance is caused by the rise in the magnitude of the funding shocks and/or the change in the propagation mechanism of funding shocks (Figure 5). The propagation of funding shocks to the liquidity premium crucially depends on the degree of uncertainty surrounding banks. For example, as uncertainty about if and when committed liquidity lines to borrowers might be drawn increases, financial institutions which face funding shocks become more cautious and try to hoard more liquidity and lend less cash to other banks for a longer period. This leads to a higher and more persistent liquidity premium.

In principle, central banks cannot control the magnitude of the daily funding shocks generated through the reintermediation and deleveraging process, because they are exogenous factors for central banks, at least in the short run. On the other hand, central banks may be able to affect the mechanism by which funding shocks propagate to the liquidity premium, by conducting market operations in order to reduce uncertainty about financial institutions' funding environment. In this sense, it is important to examine the significance of changes in the magnitude of the shocks themselves for explaining the increase in the variance of spreads, as well as the significance of changes in propagation and dynamic interaction between spreads, plausibly due to changes in uncertainty about financial institutions' funding environment.

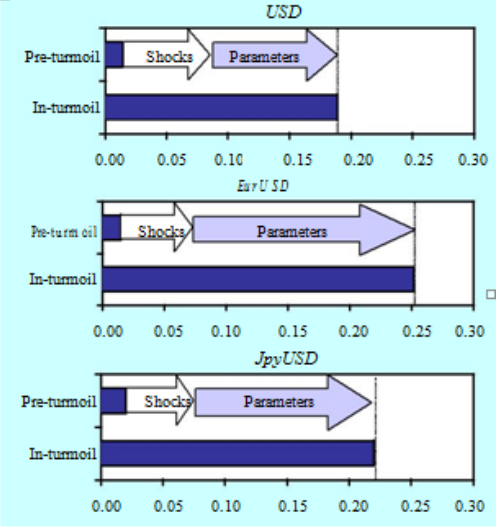
5. FX Swap Implied Dollar Rates and US Dollar Libor: Empirical Analysis

Facing the decline in market liquidity of FX swaps, banks rebalanced their positions both in the FX swap markets and in the US dollar unsecured cash markets. In order to investigate the significance of this effect, we again estimate the VAR model which comprises three variables: USD, EURUSD, and JPYUSD. All three variables are defined as the spreads over the corresponding US dollar OIS rate.

In order to quantify the impact of the deteriorated market liquidity of FX swaps on dollar rates, we again used our VAR models to compute unconditional standard deviations

of USD, EURUSD and JPYUSD (Figure 5). The increase in the unconditional standard deviation can be decomposed into contributions of changes in "shocks" and "parameter". The contribution of changes in "shocks" mainly represents funding shocks in each market, and the contribution of changes in "parameters" reflects changes in the propagation mechanism which is affected by uncertainty about financial institutions' funding environment including the state of market liquidity of FX swaps.

Figure 5: Decomposition of standard deviations of dollar rates



For all three dollar rates, the contribution of changes in "parameters" is larger than that of changes in "shocks." In addition, the standard deviations of EURUSD and JPYUSD are larger than that of USD, because the contribution of changes in "parameters" of EURUSD and JPYUSD is much larger than that of USD. This results from the influence of the deteriorated market liquidity of FX swaps, which exerted significant upward pressure on FX swap implied dollar rates in the turmoil period.

6. Conclusion

We reviewed the recent turmoil in global money markets triggered by the subprime woes. The analysis suggested that the cross-currency transmission mechanism of term funding premium changed after August 2007, and the risk premium associated with term funding became highly correlated across currencies. In particular, heightened uncertainty about US dollar funding had a significant effect on the other currency markets. We also found that the deterioration in market liquidity of FX swaps played a crucial role in the cross-currency transmission of liquidity tensions. To mitigate the liquidity tensions in money markets, central banks in the major economies initiated efforts from August 2007 to stabilize markets by providing substantial liquidity through flexible open-market operations beyond the traditional framework. Measures taken under the Federal Reserve's initiative included the establishment of a Term Auction Facility (TAF) and FX swap lines with the European Central Bank (ECB) and the Swiss National Bank (SNB). It is difficult to measure the direct effect of these liquidity policies, but the spread between the stop-out rate of TAF and the minimum bid rate has risen and fallen as term funding pressures have fluctuated, and the expansion of the size of the TAF program and the FX swaps program with the ECB and SNB has led to a fall in the stop-out rate. This suggests that these policies have been helpful in improving market function, although further study is needed.

References

[1] www.investopedia.com
[2] "Cross Currency Transmission of Credit and Liquidity Tensions in Money Markets," mimeo
[3] "The spillover of money market turbulence to FX swap and cross-currency swap markets," Bank for International Settlements Quarterly Review
[4] A lag length is selected using the Akaike information criterion. The VAR is identified by using Cholesky decomposition, with the order being the USD, EUR, and JPY.
[5] Review of Economics and Statistics, No. 86.
[6] Kei Imakubo-"Cross Currency Transmissions - money market tensions"