

Box 3

TRANSMISSION OF US DOLLAR AND POUND STERLING MONEY MARKET TENSIONS TO THE EURO MONEY MARKET

This box quantitatively evaluates the interaction between the tensions in three important money markets (the US dollar, pound sterling and euro money markets) by testing the hypothesis that tensions in the euro money markets can be attributed to tensions in the other two markets and the long-term no-arbitrage condition among them. The analysis attempts to determine the direction of the transmission of money market tensions, and it assesses the possible reasons for the directions detected.

The transmission of money markets tensions is modelled using a cointegrated VAR framework, with three-month deposit/OIS spreads as endogenous variables.¹ Daily spreads from 1 July 2007 to 11 September 2008 were used to give 314 observations. Money market integration causes the

¹ This is the most commonly used maturity in studies of a similar nature. See, for example, Bank of Japan, "Cross-currency transmission of money market tensions", 2008.

three spreads to co-move closely through time.² To model this apparent long-run dependence, a cointegrated VAR model was used, and two cointegrating relations were found for the USD/EUR spreads and the GBP/EUR spreads respectively.^{3,4} In this framework, evidence supports the claim that, in the short term, unexpected tensions are transmitted from the US dollar and pound sterling money markets to the euro money market, but not vice versa:

- First, the US dollar and pound sterling money market spreads are weakly exogenous, indicating that they are the attracting vectors on which the euro spreads converge. This was confirmed with Granger causality tests, which indicated that combined USD and GBP spreads Granger cause euro area spreads, controlling for reversed causality.
- Second, after orthogonalising the shocks, it can be noted that a unit basis point increase in the three-month GBP spread leads to an increase of 0.8 basis points in the euro spread after around 10 working days, while the same increase in the USD spread leads to an increase of 0.85 basis points over the same period. On the other hand, after an exogenous shock to euro spreads, the USD and GBP spreads do not increase significantly at the 95% confidence level.
- Third, in the variance decomposition of euro spreads, USD and GBP spreads explain around 75% of these movements 20 days ahead, while the share of euro tensions in the other two spreads is substantially lower (at most 10% of movements 20 days ahead can be explained with euro area market tensions).

Why are money market tensions in the US markets transmitted to the euro money market? One important channel is the foreign exchange swap market as a provider of US dollar liquidity. At the outset of the market turbulence in August 2007 and the start of a significant repricing of counterparty credit risk, non-US financial institutions increasingly took recourse to the foreign exchange swap markets (euro money market spreads and foreign exchange swap spreads are both positively correlated and, since August 2007, foreign exchange swap spreads have generally moved in the same direction as the spreads between deposit rates and OIS rates (see Chart B)). Foreign exchange swap rates increased because of higher counterparty risk, and the market became less liquid as liquidity became more valuable at the outset of the market turbulence.⁵ This increased swap rate carried through to the unsecured euro interbank markets and, as a final result, euro money market spreads increased in times of higher tensions in the US dollar money market.

2 The integration of money markets was tested by restricting the cointegrating coefficients in the relations between the three markets to unity; Wald tests failed to reject these restrictions.

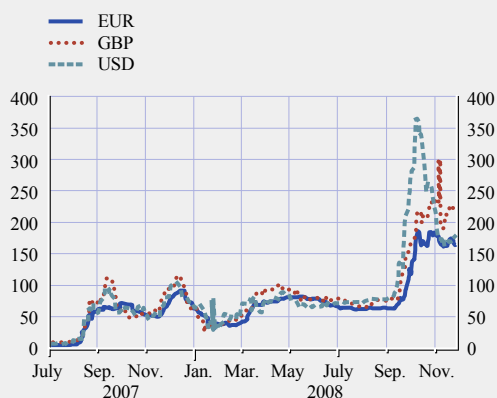
3 Preliminary testing indicated that the three money market spreads are integrated to order one, which is intuitive in view of the fact that market participants would eliminate any arbitrage opportunities that would persist across the money markets in the long run.

4 Based on a model with four lags in first differences, no trend and an unrestricted constant. The lag length was determined using the AIC criterion. The resulting model is well-behaved as the residuals do not exhibit autocorrelation, skewness or ARCH-type behaviour. The three spreads are non-stationary in the time period examined. ADF tests determined non-stationarity, and the Johansen approach to cointegration was taken.

5 Banks not headquartered in the United States can refinance part of their balance sheets in US dollars in several ways. The most obvious is to buy dollars against domestic currency (and to borrow the domestic currency in the repo market, the unsecured interbank market or from its central bank). This, however, creates a substantial foreign exchange balance sheet exposure that must be hedged. The required hedge normally involves buying a forward. Since a foreign exchange swap is equivalent to buying a currency outright and selling it forward, it is clear that non-US financial institutions with exposure to liquidity support for ailing US mortgages first take recourse to the foreign exchange swap market to cover their US dollar needs.

Chart A Three-month money market spreads: USD, EUR and GBP

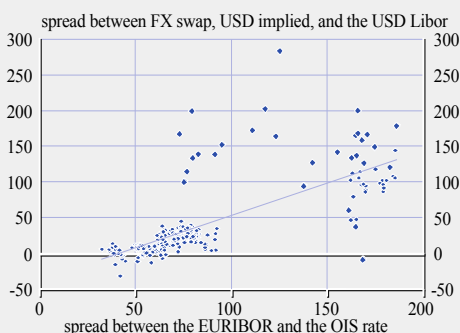
(July 2007 – Nov. 2008; basis points)



Source: Bloomberg.

Chart B Spread between the three-month foreign exchange swap, USD implied, and the USD Libor as a function of the spread between three-month EUR deposits and the OIS

(Aug. 2007 – Nov. 2008; basis points)



Source: Bloomberg.

An alternative to foreign exchange swap lending is to borrow unsecured US dollar funds in the interbank market, which should, however, be more expensive due to higher credit risk.⁶ The significant repricing of counterparty credit risk in the summer of 2007 led many US providers of US dollar liquidity to become more reluctant to lend to non-US financial institutions. At the same time, the latter faced rising US dollar liquidity needs, in particular on account of their exposures to US dollar asset-backed commercial paper (ABCP) conduits and structured investment vehicles. Widespread risk aversion induced investors to significantly reduce their demand for US dollar ABCP; as a result, those structures had to rely on their sponsor banks to provide them with US dollar liquidity, which again widened US dollar money market spreads.

The analysis shows that tensions in US dollar and pound sterling money markets are more likely to be transmitted to the euro money market than vice versa. Therefore, in order to address euro money market tensions, central banks could continue to facilitate access to US dollar funding. Central banks already took measures aimed at improving the circulation of US dollar liquidity throughout the world, in particular by way of the Term Auction Facility (TAF) agreed in connection with the foreign exchange swap lines between the Federal Reserve, the ECB and the Swiss National Bank, which was recently extended to include even more central banks. While these measures have certainly helped to address non-US financial institutions' US dollar funding needs, the foreign exchange swap market remains under considerable stress.

⁶ A foreign exchange swap is a quasi-collateralised transaction and carries much less credit risk than unsecured lending.