



Interpreting deviations from covered interest parity during the financial market turmoil of 2007–08

Naohiko Baba^{a,*}, Frank Packer^b

^a Bank for International Settlements and Bank of Japan, Centralbahnplatz 2 CH-4002 Basel, Switzerland

^b Bank for International Settlements, Centralbahnplatz 2 CH-4002 Basel, Switzerland

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ABSTRACT

This paper investigates the spillover effects of money market turbulence in 2007–08 on the short-term covered interest parity (CIP) condition between the US dollar and the euro through the foreign exchange (FX) swap market. Sharp and persistent deviations from the CIP condition observed during the turmoil are found to be significantly associated with differences in the counterparty risk between European and US financial institutions. Furthermore, evidence is found that US dollar term funding auctions by the ECB, supported by US dollar swap lines with the Federal Reserve, alleviated the level of dislocations, as well as the instability, of the FX swap market.

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1. Introduction

The functioning of money markets was severely impaired in the summer of 2007. What began as a deterioration in a relatively limited segment of the US subprime mortgage sector quickly spread to other markets, especially those of credit and securitised products (BIS, 2008; IMF, 2008; Brunnermeier, 2009). Uncertainty about losses increased the liquidity needs of financial institutions as well as their reluctance to lend to each other in money markets, particularly at maturities longer than one month. Reflecting these and possibly other factors, spreads of interbank short-term interest rates over overnight index swap (OIS) and treasury bill rates widened substantially in August 2007, and then, despite some degree of fluctuation, persisted at high levels (Taylor and Williams, 2009).

A much less well documented aspect of the turmoil is how the turbulence in money markets spilled over to foreign exchange (FX) swap markets. One of the few works to address the question is Baba et al. (2008), which documents heightened volatility in the FX swap markets across several G10 currency pairs soon after the financial market turmoil erupted. As noted in that paper, the three-month

FX swap-implied US dollar rate using euro as a funding currency moved together quite closely with dollar Libor (London interbank offered rate) prior to the summer turmoil in money markets (Fig. 1).¹ From mid-August 2007, however, the spread between the FX swap-implied dollar rate and dollar Libor widened considerably, reaching more than 40 basis points in September 2007, pointing towards a large and persistent deviation from the short-term covered interest parity (CIP) condition. Though the spread narrowed substantially after the beginning of 2008, it widened again from early March.²

Baba et al. (2008) argue that US dollar funding shortages of non-US financial institutions were largely responsible for these developments. Soon after the turmoil began, European financial institutions increased activity to secure dollar funding to support US conduits for which they had committed backup liquidity facilities.³ At the

¹ An FX swap is a short-term contract in which two parties borrow and lend different currencies by combining the FX spot and forward contracts in the reverse direction. The FX swap-implied dollar rate is defined as the total cost, in terms of the dollar rate, from raising euros in the uncollateralised cash market and converting them into dollars through the FX swap market. See Section 2 for more details.

² A similar tendency was apparent in some other currency pairs, particularly the sterling/dollar pair.

³ Using the BIS international banking statistics, McGuire and von Peter (2008) show that European banks faced relatively large dollar funding requirements, especially from mid-2007.

* Corresponding author. Tel.: +41 61 280 8819; fax: +41 61 280 9100.

E-mail addresses: naohiko.baba@bis.org (N. Baba), frank.packer@bis.org (F. Packer).

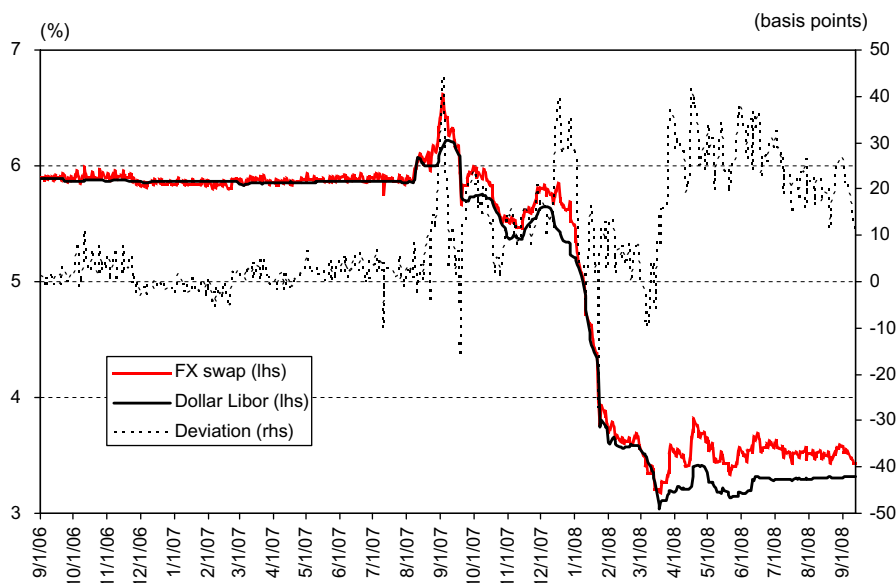


Fig. 1. Three-month FX swap-implied dollar rate from euro. (The FX swap-implied dollar rate is defined as a total cost, in terms of a dollar rate, from raising euros in the uncollateralised cash market and converting them into dollars through the FX swap market. Euro Libor is used as the uncollateralised euro cash rate.)

same time, US financial institutions appeared to become much more cautious about lending dollars to other institutions because of heightened counterparty risk and their own need to preserve funds on hand. Facing unfavourable demand and supply conditions and the associated impairment of liquidity in interbank markets, many European institutions moved to actively convert euros into US dollars through FX swaps.⁴ Deteriorating liquidity in the FX swap market likely contributed to further deviations of the FX swap market from the short-term CIP condition,⁵ despite coordinated efforts by central banks to make dollar funding more readily available to non-US financial institutions. More specifically, as part of a series of coordinated measures to provide term dollar funding, on December 12, 2007, the establishment of swap lines between the Federal Reserve and both the European Central Bank (ECB) and the Swiss National Bank (SNB) was announced. These swap lines allowed the ECB and SNB to conduct US dollar term funding auctions during European trading hours for depository institutions in continental Europe in a fashion that complemented the Federal Reserve's own term auction facility (TAF) for US institutions.⁶

In this paper, we empirically investigate the above-mentioned spillover effects of the money market turmoil of 2007–08 on the FX swap market. We examine the degree to which the deviations from short-term CIP observed in the three-month FX euro/dollar swap market are associated with factors reflecting the turbulence in global financial markets. Although we control for other relevant factors, we place particular emphasis on the following two issues: (i) the role of the perception of relative counterparty risk between European and US financial institutions, and (ii) the role of the ECB's dollar term funding auctions in easing tensions in the FX swap market.

⁴ ECB (2007) stated that many non-US financial institutions moved to actively convert euros into US dollars through FX swaps after the turmoil began in early August 2007.

⁵ This is consistent with FRBNY (2007), which stated that the impairment of trading liquidity in the FX swap market was particularly severe from mid-August to mid-September 2007.

⁶ The size of the transatlantic swap lines were increased several times beginning in March 2008, while the total amount of the term US dollar offers by the ECB were increased proportionately as well. For more details of the coordinated efforts by the central bank community, see Borio and Nelson (2008) and CGFS (2008).

In the extant literature, a number of studies test the short-term CIP condition, and some identify the specific periods in which such parity conditions collapsed. However, to the best of our knowledge, no study analyzes explicitly the relationship between money market tensions and CIP. This paper intends to fill that gap, both in the context of the financial market turmoil and in light of the rapidly growing role of FX swaps in foreign currency funding by financial institutions globally.

The rest of the paper is organized as follows. Section 2 gives an overview of the basic structure of an FX swap and its relationship to the CIP condition. Section 3 conceptually decomposes possible deviations from CIP and presents two major hypotheses. Section 4 describes the data and construction of the variables, and Section 5 provides the framework and results of the empirical analysis. Section 6 concludes the paper.

2. The FX swap and covered interest parity

An FX swap is a short-term contract in which one party borrows a currency from, and simultaneously lends a second currency to, another party. Although FX swaps can be viewed as effectively collateralised transactions, the collateral does not cover the entire counterparty risk. For example, if one party to the swap defaults during the contract period, the counterparty needs to reconstruct the position at the current market price, which entails replacement cost. Further, Duffie and Huang (1996) show that FX swaps are subject to greater counterparty risk than interest rate swaps because, unlike interest rate swaps, FX swaps entail the exchange of notional amounts at the start of the contract.⁷

A financial institution or other entity needing foreign currency funding can either (1) borrow directly in that currency's uncollateralised cash market or (2) borrow in another (typically the domestic) currency's uncollateralised cash market and convert

⁷ In addition, the volatility of FX rates tends to be greater than that of interest rates, another factor likely to elevate counterparty risk in FX swaps above that of interest rate swaps. Hanajiri (1999) suggests that the large deviations of yen/dollar swap prices from the CIP condition in the late 1990s were due largely to the deterioration of the creditworthiness of Japanese banks at that time, compounded by increased volatility of the FX rate.

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