

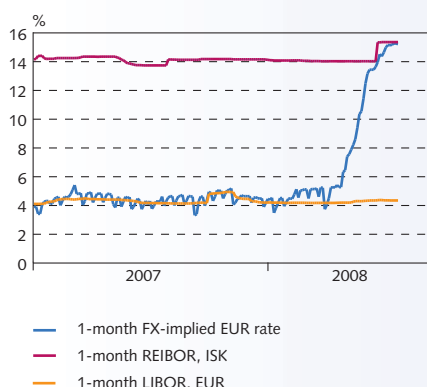
Box III-1

The recent turmoil in the Icelandic foreign exchange swap market

Chart 1

Icelandic and euro area interbank rates vs. FX implied swap-implied EUR rate

Daily data August 1, 2007 - April 8, 2008

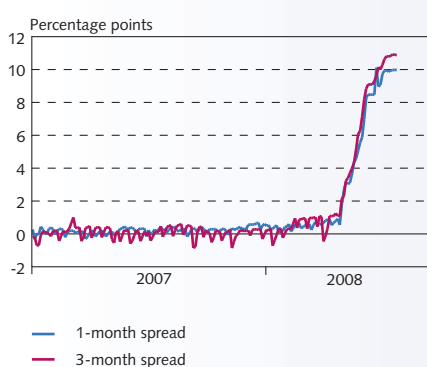


Sources: Bloomberg, Central Bank of Iceland.

Chart 2

FX swap-implied EUR rates minus LIBOR rate

Daily data August 1, 2007 - April 8, 2008



Source: Bloomberg.

The rapid rise in credit premia on Icelandic financial institutions and a strong domestic demand for foreign currency have resulted in substantial tensions in the Icelandic foreign exchange (FX) swap market and a breakdown of the covered interest rate parity (CIP). The Icelandic interest rate differentials with abroad according to FX swap-implied rates have plummeted, being a primary reason behind the recent depreciation of the Icelandic króna (ISK). This box analyses the spillover of the international credit market turbulence to the Icelandic foreign exchange swap market.¹

Strong demand for foreign currency

Before the start of the global credit crisis in mid-2007, foreign liquidity was relatively available and cheap, and there were few strings attached to raising foreign currency in foreign cash markets or launching offshore bond issuances. Turmoil in the international financial markets, however, resulted in soaring cost of overseas funding, and an Icelandic financing "risk premium" arose in global financial markets. Consequently, Icelandic investors turned to the FX market, as it offered advantageous funding relative to the deterioration in overseas borrowing conditions.

Chart 1 shows the Icelandic price for raising foreign funds through the FX market (FX swap-implied euro rates) and the euro area LIBOR (London Interbank Offered Rate). They co-moved quite closely in 2007, and the spread was normally in the range of +/-50 basis points. Funding cost through the FX swap market was thus lower than paying euro area LIBOR plus a risk premium. In late January 2008, however, the spread between the FX swap-implied euro rates and euro area LIBOR started to widen significantly, resulting in a very strong divergence by March 2008 (see Chart 2). This was also the case against other currencies like the US dollar. Hence, the risk premium of overseas funding – reflected in credit default swap (CDS) spreads on the Icelandic banks – has gradually been priced into the FX swap market. Chart 3 shows that the related FX swap-implied Icelandic rates fell substantially below onshore REIBOR (Reykjavik Interbank Offer Rate).

Even though the interest rate differentials between REIBOR and euro area LIBOR have been quite stable in recent months at around 10-11 percentage points, Chart 4 shows that the interest rate differentials between FX-swap implied Icelandic rates and euro area LIBOR have narrowed quite rapidly in 2008, especially at short maturities, where much of the trading in the Icelandic króna has hitherto taken place (three months and less).² Icelandic rates have effectively been lowered by around 10 percentage points on the FX swap market, and this has happened very quickly. Hence, it has been much less profitable to be long in the Icelandic króna. In fact, for a short while the interest rate differentials against the euro area were negative at short maturities (one day and one week) before the policy rate hike by 125 basis points in March. The hike raised onshore and FX swap-implied Icelandic rates by roughly the same amount and stopped the rapid weakening of the króna. A few days after the rate hike, however, domestic demand for foreign currency

1. For further reading, see the articles by Amatatsu, Y. and N. Baba (2007). "Price discovery from cross currency and FX swaps: A structural analysis", Bank of Japan working paper series no. 07-E-12; and Baba, N., F. Packer and T. Nagano (2008), "The spillover of money market turbulence to FX swap and cross-currency swap markets", BIS Quarterly Review, March 2008.

2. Whether FX swap contracts will be rolled forward at maturity depends on the attractiveness of the carry relative to the risk, often known as the carry-to-risk ratio (the FX swap-implied interest rate differential divided by the implied volatility).

intensified and thus narrowed the spread between FX swap-implied Icelandic rates and foreign interest rates again.³

The breakdown of the covered interest rate parity

One can recognise why domestic players choose to hoard foreign currency in the FX swap market via the covered interest rate parity (CIP), which implies that the interest rate differential between e.g. Iceland and the euro area should be reflected in the forward relative to the spot exchange rate (F/S); that is, the forward premium.⁴

Arbitrage arguments explain why the CIP holds under normal conditions. First, when euro area funding costs are higher than FX swap-implied euro rates, Icelandic firms would prefer to borrow at domestic interbank rates and exchange Icelandic krónur for euros at the FX spot rate and make a contract to do a reverse position at the forward exchange rate. Second, in the absence of credit/counterparty risks, it would be attractive for non-residents to place money in Icelandic currency deposits (at the relatively high interest rate) and cover the exchange rate risk in order to lock in risk-free profit. Both factors would tend to make the CIP hold. The crucial assumptions behind the CIP are low transaction costs, no political risk, absence of credit/counterparty risk and liquidity risk. Since mid-2007 credit/counterparty and liquidity risks have become important considerations in the functioning of financial markets. Concerns about credit risks associated with the Icelandic banks are manifested, for example, in the reluctance of non-resident investors to place money in the Icelandic deposit market directly unless they are generously compensated. The risk that one counterparty will default – and the entire principal is lost on a deal – makes investors prefer entering the FX swap market where swapped assets in the two currencies serve as collateral.⁵

The lack of traditional equilibrium mechanisms due to domestic players hoarding foreign currency and a substantial Icelandic credit premium has resulted in a near collapse of the FX swap market.

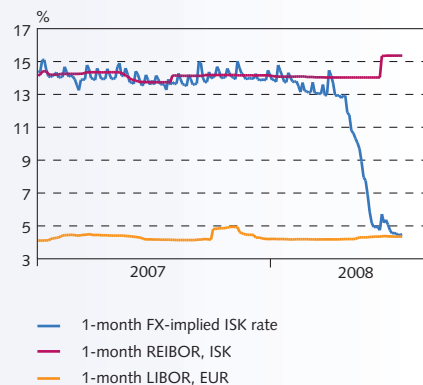
Longer-term swap market severely distorted

The longer-term cross-currency basis swap market (hereafter referred to as currency swaps) has also been severely affected by the global credit turmoil. Currency swaps are more regularly used than FX swap markets at longer maturities (currency swaps are similar to FX swaps, but the structure is a bit different)⁶ and have been an important tool for hedging the Icelandic currency risk associated

Chart 3

Icelandic and euro area interbank rates vs. FX swap-implied ISK rate

Daily data August 1, 2007 - April 8, 2008

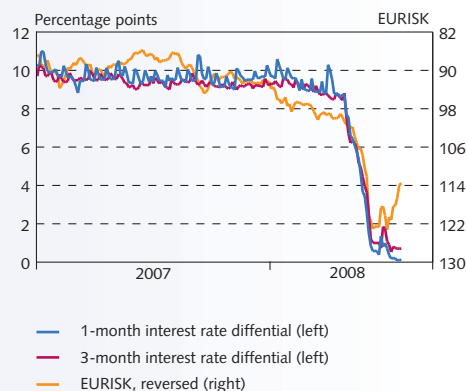


Sources: Bloomberg, Central Bank of Iceland.

Chart 4

FX swap-implied ISK rates minus LIBOR and the Icelandic króna

Daily data August 1, 2007 - April 8, 2008



Sources: Bloomberg, Central Bank of Iceland.

- FX swap-implied Icelandic rates appear positively related to the policy rate, negatively to the Icelandic credit risk as well as one-sided order flow for foreign currency.

- According to CIP the following holds:

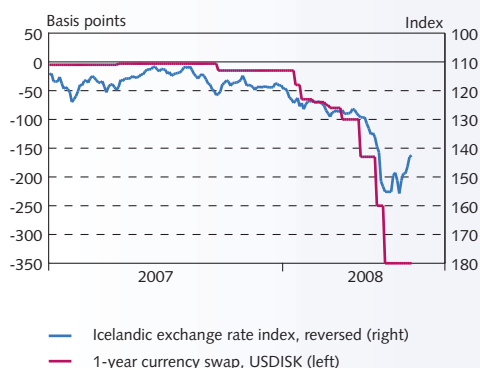
$$[1 + ((\text{days}/360) * r^{EUR})] = (F/S) * [1 + ((\text{days}/360) * r^{ISK})]$$

S is amount of Icelandic Króna per euro whereas F is the similar forward exchange rate. The right side of the equation shows FX swap-implied EUR rates which should equal the euro-area Libor. The price of an FX swap is quoted as the forward minus spot (forward rate points). It is common to use the Reibor and forward rate points to calculate the FX swap-implied rates. Instead of Reibor, financial institutions will use their own internal funding costs.

- The collateral does however not necessarily cover the entire credit risk. If a counterparty defaults during the contract period the loss is limited to the mark-to-market profit on the swap with the counterparty, reflecting the reconstructing of the position at the current market price. The credit risk should be rather small in short-term FX swaps (like one-week contracts), however, suggesting that impairment of liquidity is also a main reason behind the sharp decline in FX swap rates.
- In a currency swap, an Icelandic financial institution effectively borrows foreign currency from a foreign institution and simultaneously lends Icelandic currency, with an exchange of principal at the start and maturity of the swap (like an FX swap) but with regular interest payments based on three-month Libor. The future payment of the principal is agreed at the start of the contract and hence avoids any foreign exchange risk. The swapped assets in the two currencies serve as collateral. However, interest rate payments are subject to foreign exchange risk and a counterparty risk premium remains.

Chart 5

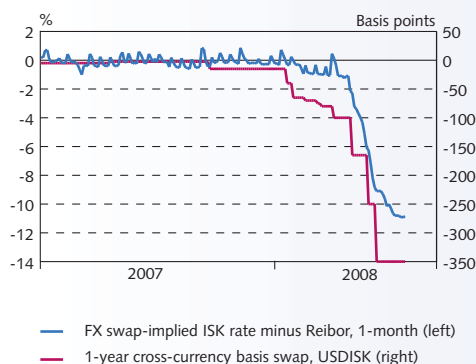
Cross-currency basis swap spreads vs. the króna
Daily data August 1, 2007 - April 8, 2008



Source: Bloomberg.

Chart 6

Currency swap spreads widened first
Daily data August 1, 2007 - April 8, 2008



Source: Bloomberg.

with Eurobond (Glacier bond) issuances and for domestic banks' off-shore bond issuances in foreign currency and swapping the proceeds back into Icelandic krónur.⁷ Longer-dated cross-currency basis swap spreads are determined by the health of the banking system and the underlying transaction flow of cross-currency bond issuances. Hence, currency swap spreads – which equilibrate total demand and supply for Icelandic krónur – turn negative when there is a limited supply of foreign currency and a willingness to receive lower interest rate payments on the money lent in Icelandic krónur.⁸

The US dollar against the Icelandic króna currency swap spread for one-year maturity is shown in Chart 5. In the first part of 2007, the spread was close to zero but spreads began to widen slightly in November 2007, and by January they had widened to 50 basis points. The widening explains a part of the initial weakening of the króna.⁹ Strains in the FX swap market first became apparent in January 2008, reflecting that tensions in the currency swap market have spilled over into shorter-term FX-implied rates (see Chart 6). It indicates that banks and other borrowers turned to short-term funding in the foreign exchange markets as long-term liquidity was drained. Currently, liquidity in the Icelandic currency swap market is very low (and market prices are not reliable).¹⁰ Going forward, demand for new Eurobond issuances is likely to fade on the back of the substantial widening in currency swap spreads.¹¹

Improvements in the FX swap market

An improvement in the funding conditions of the Icelandic banks seems to be a necessary condition for normalisation of the swap markets (since the Icelandic "credit premium" is tightly linked to the FX swap market). Potential triggers can be an easing in the global liquidity crisis or a reduction in CDS spreads for the Icelandic banks in the wake of favourable economic events. However, it does not mean that policy measures cannot contribute to improvements in the functioning of the FX swap market in the current environment.

One policy measure is the issuance of offshore accessible Government guaranteed certificates of deposit (CDs), which would make the relatively high onshore Icelandic interest rates attractive to non-resident investors and contribute to improved liquidity in the FX swap market. The idea is to make investors enter Icelandic CDs without involving the Icelandic banks and potentially sell the Ice-

7. See Barclays Capital (2008), "Basis swaps: The straw that may break the AUD's back". 25 March 2008; Ryan, C. (2007), "Some general observations from the kangaroo bond market", Reserve Bank of Australia speech, 29 March 2007; and Ólafsson (2005). "Króna-denominated Eurobond issues", Central Bank of Iceland, *Monetary Bulletin*.

8. The typical quoting of the currency swap is Icelandic REIBOR minus a margin (in basis points), where the borrower of US dollar funds agrees to receive REIBOR minus a margin every three months for paying US LIBOR.

9. Causation is likely to go in the other direction as well, with a weaker Icelandic króna increasing hedging pressures and contributing to wider currency swap spreads.

10. The severe tension in the Icelandic swap market is comparable to the Korean currency swap market from mid-2007, where dollar shortages on back of the US sub-prime crisis caused much wider currency swap spreads. As in Iceland, moderately high interest rates in Korea attracted Eurobond issuers and made domestic investors issue offshore bonds. Another case is the deterioration in the creditworthiness of Japanese banks in the later 1990s, which resulted in wider USDJPY currency swap spreads. Furthermore, in 2007 non-US banks converting euro into US dollar liquidity to support US conduits resulted in a widening in the EURUSD currency swap spread. See Federal Reserve Bank of New York (2008), "Treasury and federal reserve foreign exchange operations", February 2008; and Bank of Korea (2007), "Financial Stability Report", October 2007.

11. Eurobond issuances are only beneficial when the cost of switching Icelandic króna funding into foreign currency via currency swaps is lower than the cost of direct issuance in foreign currency; that is, the spread to swap in Iceland minus the currency swap spread premium paid is less than the spread to LIBOR that the issuer would have to pay abroad.

landic króna forward for foreign currency (in case investors want to avoid the foreign exchange risk). It will thus increase the supply of krónur on the forward market and drive down the forward price of the Icelandic króna. In addition, purchases of ISK in the spot market may drive up the spot price of the króna. Hence, it should enhance efficiency in the FX swap market and most likely narrow the spread between onshore and FX swap-implied Icelandic rates.

Another plausible policy measure is to provide further liquidity in the foreign exchange market through FX swaps, but these actions would require a larger amount of foreign exchange reserves or access to FX swap agreements with other central banks. In particular, the Central Bank of Iceland can play an active role concerning the distortions caused by liquidity shortages.