

István Mák and Judit Páles: The role of the FX swap market in the Hungarian financial system

During the intensifying integration of the global financial system experienced in recent years FX swap has become one of the most common financial products having the most liquid market. The scope of application of the FX swap transactions is extremely wide; they can be used for liquidity management, risk coverage, short-term yield speculation, and – combined with a spot foreign exchange transaction – for taking exchange rate positions. In recent years the Hungarian banking system financed foreign exchange lending mostly from forint funds. Domestic banks typically hedge the resulting on-balance sheet open foreign exchange position by using FX swap transactions concluded with non-residents. Accordingly – with the rise of foreign exchange lending in recent years – the net FX swap stock of the domestic banking system has increased significantly. The FX swap market played a key role during the financial turbulence in 2008, which prompted almost all central banks of the world to take fast and substantial measures. In the case of Hungary the disorder of the FX swap market represents significant risk for the operation of the banking system; thus in recent months the MNB has also taken several liquidity providing measures, due to which the functional disorder of the FX swap market has considerably eased, simultaneously preserving the stability of the domestic banking system.

INTRODUCTION

The FX swap transaction is one of the most common financial derivatives¹ having one of the most liquid markets. It is often considered as the most important product of global financial integration. The importance of this market may be traced back to its dynamic expansion in recent years and to the broad applicability of the FX swap instrument. In the case of Hungary – in addition to the foreign exchange liberalisation of 2001 – this was also facilitated by increased foreign exchange lending in recent years, as well as being partly a result of that due to the accumulation of significant net external debt. The resulting foreign exchange rate exposure taken by the domestic corporate and household sector, as well as the increase of the banking system's intermediary role jointly led to the increase of the domestic banking system's demand for direct and synthetic foreign exchange funds. On the other hand, the active role of non-residents in the FX swap market is attributable to the large demand for liquidity in forint resulting from the purchasing of forint assets (primarily government securities), the hedging of the foreign exchange exposure originating from the holding of the former, and the taking of exchange rate positions. The FX swap market gained an outstanding role in the operation of Hungarian financial markets primarily at shorter terms.

In our article first we describe the cash flows and basic features of the FX swap and then we illustrate the typical applications of the transaction. Further on we provide a detailed analysis of the domestic FX swap market's supply and demand sides, paying special attention to the role of the banking system, which has considerable demand for foreign currency. Finally,

we briefly describe the FX swap market impacts of the financial disturbance in 2008 and the roles taken by the central banks, touching upon the FX swap instruments introduced by the MNB.

INTRODUCTION TO THE FX SWAP TRANSACTION

The FX swap transaction may be interpreted as borrowing in one currency and simultaneously depositing in another, where the claims denominated in one currency serve as collateral for the liability outstanding in the other currency. That is, under the FX swap transaction the parties agree to exchange the currency in their possession (on day T_0) at spot rate for the other currency, and to re-exchange it at a later date (on day T_1) at a forward exchange rate, which represents the interest rate difference, stipulated on the deal date. Thus the FX swap consists of a spot foreign exchange sale/purchase transaction (spot leg) and a forward transaction (forward or termin leg). The table below illustrates the cash flows of the FX swap transaction from the perspective of the counterparty, who buys foreign currency at the initial (*spot*) leg:

Table 1
EUR/HUF FX swap transaction

	T_0 Purchase of EUR	T_1 Sale of EUR
Cash flows of FX swap transaction	+X (EUR) -S*X (HUF)	-X (EUR) +F*X (HUF)

Note: The terms in brackets refer to the currency of the cash flows.

¹ Derivative product, the value of which depends on the value of one or more underlying products or factors.

where \mathbf{X} represents the amount of the foreign currency purchased, \mathbf{S} is the initial (spot) EUR/HUF exchange rate and \mathbf{F} is the EUR/HUF maturity (*forward*) exchange rate. With properly functioning markets, the maturity exchange rate depends on three factors: on the initial exchange rate, the tenor and the interest rate difference between the two currencies. The forward exchange rate – based on the principle of covered interest rate parity – can be calculated as follows:

$$F_{EUR/HUF} = S_{EUR/HUF} \cdot \frac{1 + r_{HUF} \cdot \frac{t}{360}}{1 + r_{EUR} \cdot \frac{t}{360}}$$

where r_{HUF} means the uncovered HUF interest rate, r_{EUR} means the uncovered EUR interest rate per annum, while t ($t = T_1 - T_0$) represents the tenor measured in days. The value of the $F_{EUR/HUF} - S_{EUR/HUF}$ difference expressed in HUF multiplied by 100 is given in swap points. If the interest rate of the base currency quoted (in this case EUR) is lower than that of the counter-currency (in this case HUF), the swap point takes a positive (in the opposite case a negative) value.

The evolution of the swap point reflects the yield gap between the two currencies on the one hand, and the change of counterparty risk on the other. By transforming the above expression, from the swap point quoted for the maturity concerned one may calculate the implied yield difference between the two currencies, which – in the case of a properly functioning FX swap market – approximates the interbank yield differences of the corresponding maturities in the two countries. The implied currency interest rate may be approached as the difference of the domestic interbank yield on matching tenors and the implied yield difference. If, for example, a Hungarian bank wishes to exchange its HUF liquidity to EUR liquidity, it will receive as the FX swap transaction fee (swap point) the difference between the HUF deposit interest rate and the EUR lending interest rate from the foreign bank providing EUR liquidity to it. If supplies in one of the currencies involved in the transaction become tight, the yield thereof will jump, which can also be detected in the change of the swap point. A similar process may be observed if the rating of one of the counterparties deteriorates, i.e. its default risk (counterparty risk) increases: in this case the implied interest paid by this counterparty will increase.

As an example, let us assume that the initial EUR/HUF exchange rate is 264.78, the EUR interest rate is 2.5%, the HUF interest rate is 9.5% and the tenor of the transaction is one month. In this case:

$$F_{EUR/HUF} = 264.78 \cdot \frac{1 + 0.095 \cdot \frac{30}{360}}{1 + 0.025 \cdot \frac{30}{360}} = 266.32$$

Table 2

Example for the cash flows of an FX swap transaction

	T_0	T_1
Cash flows of an FX-swap transaction	+1 (EUR)	-1 (EUR)
	-264.78 (HUF)	+266.32 (HUF)

Note: The terms in brackets refer to the currency of the cash flows.

That is, based on the relations above, the exchange rate at maturity is 266.32, while the yield gap is 154 swap points ($= 266.32 - 264.78) * 100$).

It follows from the derivative nature of FX swap that the product may also be generated in a synthetic way. This facility is attributable to the fact that the FX swap transaction may be interpreted as borrowing in one currency, and placing a deposit in the other currency. In this case – based on the example above – a bank borrows one euro for one month at an interest rate of 2.5%, converts this amount to forint at a EUR/HUF exchange rate of 264.78 and places it as a forint deposit with the lending bank at an interest rate of 9.5%. Upon repaying the loan the amount payable in EUR will be 1.0021, and at the maturity of the deposit the receivable will amount to HUF 266.88. This at maturity will be HUF 266.32 per EUR, i.e. it represents a net cash flow equivalent to the FX swap transaction. Thus, the amount of demand and supply in the FX swap market do not have to correspond directly, since the difference may come from such synthetic generation.

APPLICATION OF THE FX SWAP, FX SWAP MARKET PLAYERS

The applicability of the FX swap transactions is extremely wide; they can be used for liquidity management, risk hedging, short-term yield speculations, as well as – together with a spot foreign exchange transaction – for the taking forward exchange rate positions. Below we briefly describe four strategies of these, together with the typical applications for Hungary.

The first strategy involves *foreign exchange liquidity management*. Concluding an FX swap transaction on its own – depending on the direction of the transaction – may be considered as borrowing in foreign currency covered by HUF collateral or borrowing in HUF covered by foreign currency

collateral. Accordingly, the transaction is suitable for raising both HUF and foreign currency funds, without conversion in the spot market and taking the exchange rate exposure. In addition to this, the parties to the transaction do not take – due to the existence of the cash collateral – a credit risk either. Hungarian banks extensively use this method for providing the foreign exchange liquidity necessary for hedging foreign exchange-based lending.² Due to the high liquidity of the FX swap market, foreign investors often obtain the forint liquidity required for buying government securities not by spot market purchases, but via the spot leg of the FX swap transaction, even if they assume the exchange rate exposure arising from holding the government securities in the longer term.

The second strategy is to take a forward *exchange rate position for speculative or hedging purposes*. The liquidity of the FX swap market has increased to a larger extent than that of forward transactions; thus FX swap transactions are also often used for generating synthetic forward positions,³ since from a spot foreign exchange sales/purchase transaction and an FX swap transaction one may set up a synthetic foreign exchange purchase or sales transaction. The synthetic forward position⁴ is created by the simultaneous usage of a spot market and an FX swap market transaction (with opposite direction spot leg) (Table 3).

At the time of concluding the deal the value of the synthetic forward position is zero, thus it involves no net cash flow. The position may be neutralised prior to maturity by a forward position of opposite direction – where the amount and maturity of which corresponds to the original transaction – or by a simple forward transaction. In this case the profit or

loss of the transaction is settled at the time of closing the position – upon concluding the opposite direction forward deal – and the cash flow takes place at maturity.

The forward transaction may be concluded for FX hedging or speculation purposes. A synthetic forward HUF sale may be generated by an FX swap transaction – purchase of HUF against selling EUR – and by the simultaneous spot sale of the HUF amount thus obtained. This on its own would be profitable upon the weakening of the forint; thus it may be perceived as a speculative *short position* taken against the forint. The economic agents taking an exchange rate position are usually taking the forward position with the banks which have been already generated synthetically by the bank from an FX swap and a spot transaction. However, when making a quote for this, they separate the spot exchange rate and the FX swap point (in this case the latter is also referred to as forward point).

In recent years speculation taking advantage of the interest rate difference between currencies, so-called *carry-trade*, has become extremely popular. In this case the speculator grants a (short-term) loan in the currency bearing the higher interest rate (takes a *long position*), while borrowing in the lower rate currency. This strategy yields profit if until the maturity the weakening of the spot exchange rate does not exceed the swap point. That is, the higher the extent of the implied yield gap specified by the swap point, the riskier it is to speculate on the weakening of the exchange rate of the currency bearing the higher interest rate, since in order to realise a gain the weakening of the exchange rate should exceed the yield difference paid.

Table 3

Synthetic forward (short HUF) position

	T_0	T_1
Cash flows of an FX swap transaction	-EUR	+EUR
	+HUF (=S*EUR)	-HUF (=F*EUR)
Cash flows of a spot transaction	+EUR	
	-HUF (=S*EUR)	
Overall cash flow	0	+EUR-HUF (=F*EUR)

² See chapter 'The role of FX swap in the financing of the banking system' on page 28.

³ The synthetic position includes a net cash flow and risk identical with that of the actual position, but it is generated from different transactions.

⁴ In respect of a certain foreign currency asset we talk about short position if the player taking the position realises a profit on the future devaluation of the currency concerned. For example, if a market player expects that the HUF exchange rate against EUR will be weaker at the maturity of the transaction than the corresponding forward exchange rate, it may realise a profit – based on its expectation – by the forward purchase of EUR and by selling it in the spot market in the future. This is because, if the HUF exchange rate develops in line with the expectation, it means that the player is able to acquire the foreign currency at a pre-agreed price lower than the HUF amount he could get for it on the spot market in the future. This also means the forward sale of HUF (short HUF). We talk about long position if the market player realises a gain on the appreciation of the currency concerned.

The synthetic position may be generated not only for speculative, but also for hedging purposes. A typical example of this is when the party concluding the deal mitigates the previously unhedged part of the exchange rate risk arising from the cash flows of the forint asset portfolio (e.g. shares or government securities) held by him. This strategy is typically followed by investors when the exchange rate volatility is increasing.

It is common both with the speculative and the hedging purpose exchange rate positions that the FX swap transaction is concluded not for the entire expected duration of holding the exchange rate position, but for a shorter tenor, and upon the maturity of the transaction the economic agent does not close his position, but rather rolls it over by generating a new synthetic forward position. The profit/loss arising from the exchange rate change is settled at the time of the roll-over. The players taking the exchange rate position are usually speculators taking advantage of the HUF exchange rate fluctuations.

The third strategy involves the *purchase of government securities without taking an exchange rate exposure*. This can be particularly practicable for foreign investors to finance the purchase of government securities from FX swap, since upon the sale of the government securities the HUF proceeds may be converted to foreign currency immediately at the exchange rate pre-determined for the forward leg of the swap transaction (see Table 4). In this case they can purchase Hungarian government securities from foreign currency funds without assuming exchange rate exposure. Investors usually do not know in advance how long they will hold the purchased government securities, i.e. the date of selling the government securities is uncertain. Consequently financing typically takes place from short-term FX swap, and the

investor seeks protection from the exchange rate risk by the continuous renewal, roll-over of such swap. The purchase of government securities hedged by the roll-over of FX swap transactions may be deemed as medium-term yield gap speculation: in the case of the shorter-term swap transactions the non-resident player pays variable forint interest, while upon the interest payment of the government securities held until maturity he receives the longer-term HUF interest rate prevailing on the date of the purchase.

The alteration of the non-residents' government securities portfolio and FX swap portfolio carries important information concerning the market players' motivations and expectations. The weakening of HUF would generate an exchange rate loss for the non-resident holders of Hungarian government securities upon the interest payment and maturity of the government securities; therefore they conclude FX swap transactions (spot purchase and forward sale of HUF) to minimise this risk. If non-residents reduce their government securities portfolio and convert the received HUF liquidity to EUR in the spot market, the remaining maturity leg of the previously concluded FX swap transaction (comprising a spot purchase and a forward sale of HUF) represents a synthetic forward position speculating on the weakening of HUF. If the non-resident sector's government securities portfolio increases while its FX swap portfolio (spot purchase and forward sale of HUF) remains unchanged, the purchase of the government securities can be financed by its spot foreign exchange transaction.

When non-resident players purchase government securities with the help of FX swap, an arbitrage opportunity may emerge if the implied FX swap yield is lower in the currency of the government securities than the government securities'

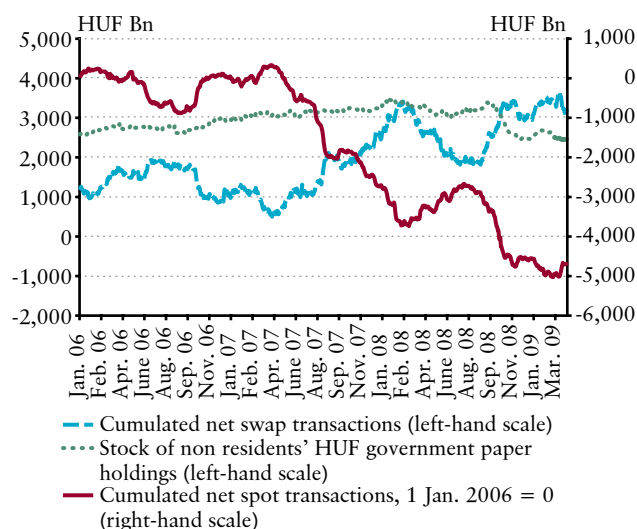
Table 4
Purchase of government securities financed by FX swap transaction

		T_0	T_1
Cash flows of an FX swap transaction		Spot leg	Forward leg
		-X (EUR)	+X (EUR)
		+ $S_0 \cdot X$ (HUF)	- $F \cdot X$ (HUF)
Cash flows of purchase of government securities		Purchase of government securities	Redemption of government securities/interest payment
	Principal	- $S_0 \cdot X$ (HUF)	+ $S_0 \cdot X$ (HUF)
	Interest		+ $S_0 \cdot X \cdot r_{HUF}$ (HUF)
Overall cash flow	Principal	-X (EUR)	+ X (EUR)
	Interest		$(S_0 - F) \cdot X + S_0 \cdot X \cdot r_{HUF} =$ $= F \cdot X \cdot r_{EUR}$ (HUF)

Note: For the sake of illustration we assume that the tenors of the government securities and of the FX swap are identical.

Chart 1

Purchase of HUF by non-residents and their net FX swap position



Note: The increase of the cumulated net swap transactions of non-residents indicates swaps with long forint spot leg. Based on the daily FX reports of credit institutions. Calculated from swap transactions between credit institutions and non-resident investors. The cumulated swap position shown in the chart is the sum of spot legs' HUF values.

yield and the maturity of the FX swap corresponds to the planned duration of holding the government securities.

Due to the FX swap transactions' role in the financing of government securities, the lack of availability of (spot leg) HUF purchase/EUR sale swap transactions – i.e. the functional disorders of the FX swap market – may lead to a decrease of non-residents' demand for government securities or to the fast and extensive liquidation of the existing position. Namely, upon the halt of the FX swap market the non-resident investor holding HUF government securities is unable to hedge his exchange rate risk.

The fourth strategy involves *short-term interest rate gap speculation*. Since the FX swap may also be interpreted as a deposit and a loan transaction concluded in parallel in two currencies, it is suitable for money market interest rate speculation. It can also be used for this because up to a horizon of one year it has usually larger liquidity compared to the rest of the money market segments. Thus the combination of two swap transactions – of opposite direction and different tenor – is suitable for taking an interest rate

position. For example, in the case of strong interest rate cut expectations, by the roll-over of the swap with shorter tenor, the bank in fact pays variable interest, while on the long-term swap it receives the fixed interest prevailing at the date of taking the position.⁵

THE ROLE OF FX SWAP IN THE FINANCING OF THE BANKING SYSTEM

As the aggregate result of the high net external debt of the national economy accumulated in recent years, the resulting exchange rate exposure taken by the domestic corporate and household sector and the increased intermediary role of the banking system, the domestic banking system's demand for foreign exchange funds has increased. The rise of the net external debt experienced in recent years as a matter of course entailed an increase of exposure to the HUF exchange rate. As the resultant of the various economic players' decisions, the opening of the exchange rate position was assumed by the domestic private sector.⁶ As a consequence of the banking system's increased intermediary role, its dependency on foreign funds increased. The external foreign exchange funds also play a role in the management of the banking system's on-balance sheet exchange rate risk. The remaining foreign currency needs are satisfied by the domestic banking system on the one hand through the foreign exchange deposits placed by domestic players, and on the other by synthetic generation with the application of FX swap transactions.

Apart from foreign exchange liquidity management, FX swap transactions also play an important role in managing the banking system's exchange rate risk. In recent years the domestic banks have mostly financed foreign currency lending from forint funds. At the same time, under the FX swap transactions concluded with non-residents they borrow short-term foreign currency funds and grant HUF loans. With this, the generation of the foreign currency liquidity necessary for foreign currency lending *on the one hand* (via the spot leg), and the hedging of the exchange rate risk arising from the foreign currency assets standing against the HUF liability (via the forward leg) *on the other hand* is guaranteed until the maturity of the FX swap.

The domestic banks can convert the HUF amount originating from the deposits to foreign currency and then place it with clients either via the spot leg of the FX swap transaction or by the spot FX transaction.⁷ In both cases – as a result of the

⁵ In the case of that member of the currency pair, in which a loan is granted under the swap with longer tenor.

⁶ The portfolio allocation decision of the various players depends on the HUF-FX interest rate difference, the Hungarian risk premium and on the exchange rate expectations. Bethlendi and co-authors (2005).

⁷ In the case of foreign currency loans, the loan is really granted in FX to the clients, while in the case of foreign currency-based loans the currency is converted into forint for (and to the benefit of) the clients.

sales/purchase transaction – the HUF liquidity arising from the deposits decrease, while the FX liquidity increases by the corresponding amount, after the placement of which there is a foreign currency asset against a forint liability within the banks' balance sheet. Accordingly, the domestic banks will have an exposure against forint (long foreign currency, short forint position) in their balance sheet: foreign currency assets increase, while foreign currency liabilities do not change. However, the forward leg of the FX swap transactions – appearing as an off-balance sheet item – from the bank's perspective represents foreign currency liability and simultaneously HUF receivables,⁸ thus it results in the closure of the total foreign currency open position (on-balance sheet and off-balance sheet) (Table 5). Thus, by applying FX swap transactions the banking system is able to keep its total open foreign exchange position at a consistently low level.⁹ If the bank provides the foreign currency liquidity by a simple spot FX transaction (conversion), then its exchange rate risk exposure will persist and this may entail additional capital requirements.¹⁰

In addition, even if the on-balance sheet position closes at the aggregate level of the banking system, it still may be necessary to reallocate the foreign – typically foreign exchange – funds among the individual banks within the domestic credit institution sector, where FX swap transactions once again may play a significant role.

Accordingly, in parallel with the rise of foreign exchange lending in recent years and the broadening of the on-balance sheet FX open position, the net swap stock of the domestic banking system has significantly increased (Chart 2).

The opening of the on-balance sheet position and thereby the increase of the FX swap portfolio may basically be generated by three effects of different type. It may be generated by the change of the balance sheet total, if that takes place under the increase of foreign currency assets (e.g. foreign currency lending) resulting in the increase of HUF liabilities, or under the decrease of forint assets accompanied by simultaneous withdrawal of foreign currency liabilities (*volume effect*).¹¹ In

Table 5
Granting foreign currency loan from forint funds and the cash flows arising from the hedging thereof by FX swap transactions from the bank's perspective

Transaction		Currency	T ₀	T ₁
FX credit	Principal	EUR	-X	+X
	Interest	EUR		+X*r _{EUR}
HUF deposit	Principal	HUF	+X*S ₀	-X*S ₀
	Interest	HUF		-X*S ₀ *r _{HUF}
FX-swap spot leg		HUF	-X*S ₀	
		EUR	+X	
FX-swap termin leg		HUF		+X*F
		EUR		-X
Overall cash flow	Principal	HUF	0	0
		EUR	0	0
	Interest	HUF	-	-X*F*r _{EUR}
		EUR	-	+X*r _{EUR}

Note: For the sake of illustration we assume that the tenor of the foreign currency loan, of the forint deposit and of the FX swap transaction is identical. Based on the model it is obvious that in this case the FX swap transaction hedges only the principal's exchange rate risk, not the part attributable to the foreign currency interest.¹²

⁸ Generating thereby off-balance sheet short foreign currency and long HUF position.

⁹ The management of the banking system's exchange rate risk by FX swap transactions typically takes place not by individual transactions, but at a 'macro level': on any given day transactions are basically concluded in the volume and in the direction depending on the change of the total on-balance sheet foreign currency position (foreign currency assets – foreign currency liabilities). The net balance of the newly and previously concluded, but yet unmatured swap transactions is approximately identical with the banking system's balance sheet open position. (It is not fully identical, because the off-balance sheet items include not only the forward leg of the FX swap).

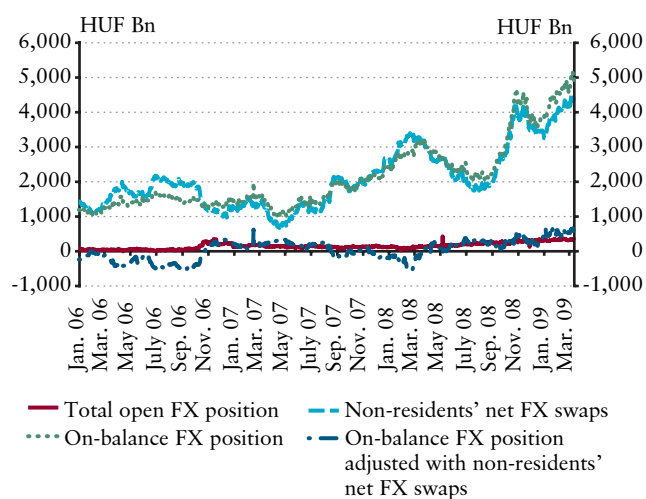
¹⁰ If the total open FX position exceeds 2% of own funds before deductions for excesses on limits, then capital must be generated for 8% of the aggregated open position.

¹¹ The volume effect should be interpreted as the position change calculated from transactions net of revaluation.

¹² The interest payable in HUF at maturity: $(X*F - X*S_0) - X*S_0*r_{HUF} = X*F - X*S_0*(1+r_{HUF}) = X*F - X*F*(1+r_{EUR}) = -X*F*r_{EUR}$

Chart 2

The on-balance sheet and the total open FX position of the banking system



Note: The increase in the swap stock stands for swaps with a long forint spot leg. Based on the daily FX reports of credit institutions calculated from swap transactions between credit institutions and non-resident investors. The swap stock is the sum of termin legs calculated at actual HUF exchange rates. The total open FX position is the sum of on-balance sheet FX assets and off-balance sheet FX receivables net of on-balance sheet FX liabilities and off-balance sheet FX debts.

this latter case not only the FX swap demands of the banks, but also their HUF liquidity requirement may increase in the short term.¹³ The change in the composition of the assets and liabilities may also entail the increase of exposure against the HUF in the balance sheet (*composition effect*): this usually happens when converting foreign currency deposits to HUF, or upon converting forint loans to foreign currency. The additional liquidity requirement arising from the significant devaluation of the forint against the major currencies and from the maturity mismatch of the assets, liabilities and FX swap transactions results in increased dependency on FX swap transactions. If the forint weakens compared to the FX swap transactions' (implicit) forward exchange rate, the banks will be able to renew the expiring transactions and – depending on the agreements – to meet the margin call requirements applicable to the existing stock (*exchange rate, margin call impact*)¹⁴ only under higher forint liquidity requirements. Thus the high FX swap position makes the banks' liquidity situation vulnerable to changes in exchange

rates. At the time of the market disturbance in autumn – i.e. in September and especially in October 2008 – an even faster than previously observed increase in the FX swap market exposure could be observed, and all three factors mentioned above played a considerable role in this.

In connection with the rise of CHF-based lending in recent years the domestic banking system typically converted HUF and EUR liabilities into CHF denominated loans. Thus a considerable CHF/EUR cross exchange rate risk exposure was also generated. In the hedging of this the EUR/CHF, the EUR/USD and the USD/CHF swap transactions may play a significant role. This also means that in the hedging of the CHF exposure, not only the HUF/CHF (or HUF/USD and USD/CHF), but the EUR/CHF FX swap market also plays an outstanding role. In recent years the application of HUF/USD transactions dominated liquidity management, thus the joint usage of HUF/USD and USD/CHF transactions could also be observed in the management of exchange rate risk arising from CHF-based lending.

The maturity of the FX swap transactions – playing a dominant role in the hedging of the on-balance sheet exchange rate exposure and in the management of FX liquidity – is usually shorter than that of the loan, thus there is a renewal risk in the case of managing exchange rate risk with the application of these. The roll-over of the short-term FX swap transactions may stumble over difficulties: it may happen that banks are only able to renew them at less favourable prices or for shorter tenor. In extreme situations, in the case of the FX swap market's functional disturbances, they can obtain the currency becoming due upon the maturity of the FX swap transaction by spot market transactions, thereby opening a balance sheet open position and the mass spot market FX purchase/HUF sale by the banks may lead to the significant weakening of the exchange rate. In addition, in the medium term domestic banks may react to the severe disorders of the FX swap market by curtailing newly granted loans, which may have unfavourable real economic effects. The renewal risk, however, may be mitigated if the parent banks take an active role in the providing of foreign currency liquidity, due to their higher commitment on the one hand, and to their access to ECB's assets providing foreign currency liquidity on the other.

¹³ For example, if in parallel with the withdrawal of foreign FX funds the stock of HUF deposits does not increase and the asset items are not sufficiently liquid, then the individual banks' demand for interbank forint loans will increase: they will convert the HUF funds thus obtained to foreign currency with the application of FX swap transactions. However, as a result of the conflicts of the interbank market and the narrowing of the interest rate corridor it is more likely that the individual banks sustaining the outflow of FX funds will borrow forint from the MNB against eligible collaterals.

¹⁴ This impact is strengthened by the shortening of the net swap position.

DISORDERS OF THE FX SWAP MARKET AND THE ROLE PLAYED BY THE CENTRAL BANKS

The international money market turbulence which commenced in September 2008 led to partial drying up of the FX swap markets. This process was mostly generated by two factors: the significant decrease of confidence in the interbank markets, and – as a result of this – the unprecedented collapse of USD liquidity. As a consequence, due to decreasing USD supply and growing counterparty risk the implied USD yields increased on the market of the FX swap transactions against the USD, thus in the domestic market as well. As already mentioned, the riskiness of FX swap transactions is mitigated by the fact that assets generated in one of the currencies serve as collateral for the liability outstanding in the other currency. However, counterparty risk cannot be eliminated by either of the parties to the transactions. In recent months this factor has been emphasised.

The unfolding crisis prompted the central banks to make fast and significant interventions in the FX swap markets as well. During 2008 the Fed concluded so-called swap-line agreements with several other central banks. Within this framework the Fed – which has the potential of issuing an unlimited quantity of dollars – concluded FX swap transactions with the central banks of other countries, which otherwise would have been able to provide limited USD liquidity for their own banking systems only up to the extent of their foreign exchange reserves. In the beginning of the year an FX swap line of USD 30 billion and USD 6 billion was available only for the ECB and the Swiss National Bank, respectively; however, during the year the range of central banks and the USD liquidity put at their disposal broadened significantly. As of mid-September the Fed had already granted such USD liquidity to the Bank of England, the Bank of Japan and to the Bank of Canada, the total amount of which by then was close to USD 250 billion. By the end of the month this amount increased to USD 620 billion, and the agreement was extended to the central banks of Sweden, Norway, Denmark and New Zealand. From mid-October until end of January 2009 the Fed already provided unlimited liquidity to the ECB, the Swiss National Bank, the Bank of England and the Japanese central bank.

The declining confidence among the major European financial institutions had an unfavourable impact on the

situation of the Hungarian banks, too. With the strengthening of counterparty risk concerns the limits set by the banks for each other were severely reduced, as a result of the parent banks' risk management decisions, thus it became extremely difficult for the domestic banks to find partners ready to lend them foreign currency, and they could borrow only subject to high implied FX yields. Due to increased mistrust, it was primarily and typically domestic banks without a stable parent bank background that found themselves in a more difficult situation when trying to obtain the necessary foreign exchange funds. It was less likely that the foreign parent banks would stop the foreign currency financing of their subsidiaries operating in Hungary, especially because they had access to the ECB's (or other large central banks) instruments providing foreign exchange liquidity.

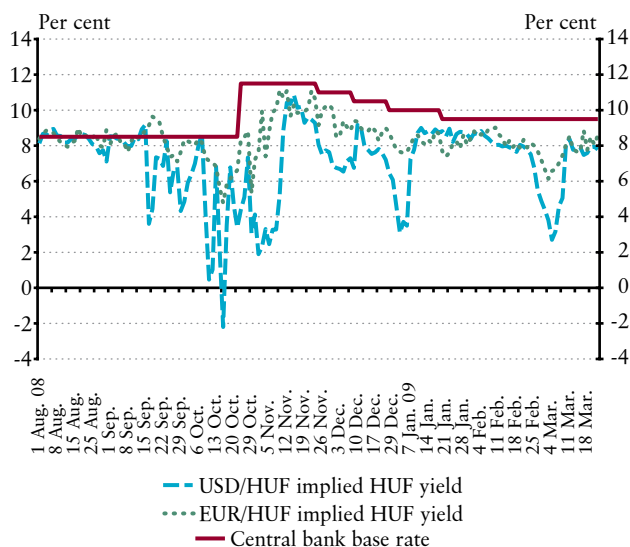
As a first reaction to the USD liquidity squeeze the USD/HUF segment of the domestic FX swap market dried up. The ratios between the overnight USD/HUF and EUR/HUF swap transactions' turnover shifted; thus the previous clear dominance of USD observed in liquidity management was temporarily replaced by the headway of EUR in the autumn, which was later followed by a restoration. Our turnover and stock figures do not suggest that the entire Hungarian FX swap market was shattered (the turnover decreased only in the overnight USD/HUF segment temporarily); however, the price-type indicators (implied yield, spread between the purchase and sale rate) referred to considerable risks in all sub-markets.

The deteriorating liquidity situation *on the one hand* was reflected by the rising costs of the newly concluded swap transactions. The implied yield differences and the implied foreign exchange interest rates significantly increased, while the implied HUF yield decreased in September and October. Negative swap points occurred on the short tenors on several occasions, which meant that the implied EUR interest rates were higher than the HUF interest rates. Taking the interbank EUR interest rates as fixed, this meant decreasing implied HUF interest rates for the parties to the FX swap transaction (Chart 3). That is, Hungarian economic agents could obtain EUR liquidity against HUF from the non-resident players only at less favourable prices. It should be noted here that, in such cases in the course of synthetic forward transactions generated from FX swaps, short positions¹⁵ against HUF can be taken essentially without interest expenses.

¹⁵ There were similar processes in Iceland, where investors – taking advantage of the negative swap points – could short the Icelandic crown for a long period free of charge, thereby contributing to the collapse of the domestic currency and banking system.

Chart 3

Overnight implied HUF yields based on the FX swap transactions concluded by the Hungarian banking system



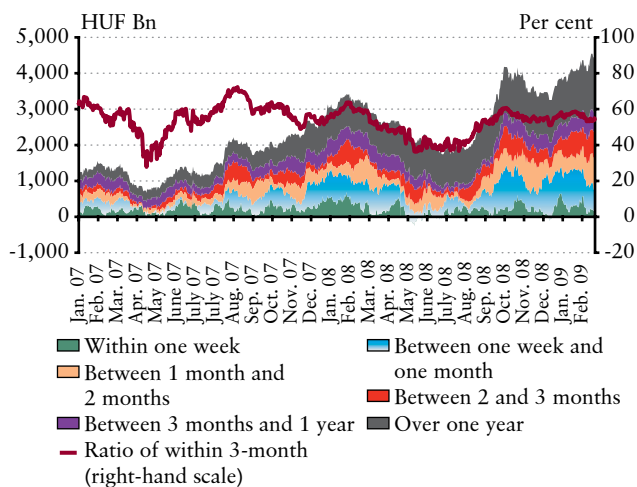
Note: The implied forint yields calculated from these correspond to the total of the overnight interbank foreign exchange yields and the implied yield gap. The decrease of the implied forint yield suggests that from the bank's perspective the price of hedging by FX swaps increases, provided that the central bank base rate remains unchanged.

On the other hand, the fact that until mid-October the domestic banking system could conclude only shorter (typically overnight, tom next or one-week) tenor FX swap transactions suggested that there were functional disorders in the market. As a result of this, the renewal risk linked to the management of exchange rate risk increased. The ratio of transactions expiring within one month increased within the swap portfolio. Concurrently, following the development of the market disturbances in autumn, within the net swap portfolio of foreign-owned banks the ratio of deals concluded with the parent banks increased, thereby mitigating the financial stability risks arising from the functional disorders of the FX swap market (Chart 4).

As of the end of October, initially the decrease of the implied foreign exchange yield, the reappearance of the transactions concluded for longer tenors and, as of December, the reduced use of the instruments introduced by the MNB reflected the recovery of the FX swap market (see the chapter 'MNB's FX swap instruments'). In parallel with the stabilisation of the HUF exchange rate and the reduction of the yield levels observed in the international market, the implied yield gaps and the implied HUF yields – i.e. the interest revenues of FX swap hedging – increased. The ratio of swap transactions maturing within 3 months to the swap portfolio and the renewal risks stopped increasing. In order

Chart 4

The net swap portfolio concluded with non-residents by remaining maturity



Note: Based on the daily FX reports of credit institutions calculated from swap transactions between credit institutions and non-resident investors. The swap stock is the sum of termin legs calculated at actual HUF exchange rates.

to facilitate the recovery of the market, the MNB introduced several FX swap instruments as of mid-October: in October the functional disorders of the market also manifested themselves in the banking system's dependency on the MNB; however, from December the utilisation of these instruments fell significantly.

The unfavourable scenario – according to which, due to the freeze of the FX swap market, the domestic banks are unable to renew their synthetic foreign exchange liabilities, which could lead to the broadening of their total FX position – did not materialise. In this case they could have been forced to buy foreign currency against HUF in large volumes in the spot market, which would have led to a significant weakening of the HUF.

FX SWAP INSTRUMENTS OF THE MNB

The MNB introduced several new instruments with the objective of contributing to the reinstatement of the FX swap market's normal functioning. The first of these was the *two-way (providing EUR and HUF liquidity) FX swap tender* introduced in mid-October. With this instrument the central bank does not provide extra foreign exchange liquidity to the system, but reinforces its intermediary role in order to mitigate the liquidity problems arising due to the counterparty limits. This means that a bank having foreign exchange liquidity cannot provide foreign currency above a certain limit – due to its risk management rules – with another bank in need of that currency. However, these tight

limits are not applicable to the central bank; therefore it is capable of raising larger volumes of foreign exchange funds, which it then forwards under another transaction to the bank suffering from tight foreign exchange liquidity. Technically, the instrument comprises two opposite direction overnight FX swap transactions, which are put up for auction in parallel, at the same time.

Starting from 16 October 2008, based on a cooperation agreement between Magyar Nemzeti Bank and the European Central Bank, the MNB introduced an *overnight FX swap standing facility* – providing EUR liquidity – up to a limit of EUR 5 billion, under which the Hungarian banks could place HUF with the central bank in exchange for EUR on each trading day at a pre-specified price in the form of FX swap transactions. The objective of the MNB with this instrument was to increase the systemic foreign exchange liquidity, which was decreasing because of the scarcity of market-based opportunities for raising foreign currency funds from abroad. Recourse to the standing facility typically takes place at a price that is less favourable than the market price. This encourages the banks to realise liquidity allocation primarily on the interbank market.

As of 2 February 2009, Magyar Nemzeti Bank introduced a new *CHF liquidity providing, fixed price one-week EUR/CHF FX swap tender* up to the limit of EUR 5 billion. Under the tender scheme Hungarian banks may conclude EUR/CHF FX swap transactions with the MNB at a pre-specified price. The standing facility is provided by the central bank in Swiss franc, because the Hungarian banking system's considerable retail FX loan portfolio generated the highest open position in this currency.

Following this, from 2 March 2009 the MNB – in order to further eliminate the uncertainties existing in the Hungarian money market due to ad hoc tight liquidity and to mitigate the tensions observed in the area of corporate lending – introduced a new *EUR liquidity providing, fixed price, six-month EUR/HUF FX swap tender*. The tender is open to domestic credit institutions that undertake to at least keep constant or increase (after adjusting for exchange rate change effects) their domestic corporate loan lending from the second quarter of 2009 until the end of 2009 compared to the level at the end of 2008, while their net foreign liability does not fall below the end-2008 level either. In addition, the credit institutions also undertake to raise new, long-term foreign funds in 2009, at least to the extent of the swap limit undertaken by them and/or reduce the value of their total foreign assets adjusted for exchange rate effects. By the deadline seven domestic banks in the amount of EUR 2.81 billion had reported that they wished to take advantage of

this new facility provided by the central bank. Furthermore, as of 9 March 2009 the MNB introduced a new *euro liquidity providing, variable price three-month EUR/HUF FX swap auction* – up to the undrawn portion of the EUR 5 billion facility appropriated for the purpose of the six-month EUR/HUF FX swap auctions – which is open to all resident credit institutions. In this auction the MNB announces a maximum allotment amount and a minimum expected implied euro interest rate (expressed in maximum swap points). The main difference between the two instruments is that while the purpose of the six-month FX swap is to ensure the long-term and predictable financing of the banking system, the three-month swap auctions should facilitate ad hoc longer-term liquidity management.

CONCLUSIONS

In recent years the FX swap market has significantly expanded due to its dominant role played in providing foreign exchange liquidity to and managing the exchange rate risk of the Hungarian banking system, the financing of the purchase of government securities by non-residents and the taking of exchange rate positions by resident and non-resident players. The smooth and efficient functioning of the HUF/foreign currency FX swap market is essential for the stability of the banking system and also has an important role in the operation of the government securities' market. In the case of functional disorders of the swap market, foreign currency financing via FX swap transactions could become increasingly difficult for domestic players. In this case the players would be forced to obtain the foreign currency necessary for meeting their liabilities using their forint funds – in the spot FX market. This process could lead to a considerable devaluation of the foreign exchange rate, the widening of the banking system's on-balance sheet open positions, and in an extreme situation to the curtailment of newly granted loans in the medium run, thus causing unfavourable real economic consequences. In order to assess the pressure on the HUF exchange rate, it is essential for the central bank to monitor FX swap market processes. The instruments introduced by the MNB – apart from strengthening the stability of the domestic banking system – contribute to increasing the liquidity of the FX swap market, which may mitigate the undesirable fluctuation of the exchange rate, facilitate the recovery of other markets and absorb the decrease in the placement of new credits by the Hungarian banks.

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