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Repo Markets

Experiences and opportunities in Hungary

NBH OCCASIONAL PAPERS
5

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Preface

More and more questions have arisen recently in the National Bank of Hungary about repo markets. The topic came into the limelight with the latest changes of monetary policy instruments. In addition, speculative activity on repo markets has given rise to some interesting questions.

We have tried to sum up the main characteristics of repos beginning with the definitions and with the practices of international and Hungarian repo markets. We have attempted to investigate whether the size of the Hungarian repo market is really as insignificant as statistics show. Finally, we make a few suggestions which may increase the effectiveness of monetary policy by the stimulation of repo markets. Given that Hungarian literature on this topic is very scarce, our study is mainly based on foreign publications and consultations with market participants.

When analysing the Hungarian repo market we faced a lot of problematic questions, some of them we have already met, others we faced here for the first time. These problems arise because of the lack of overall regulation, the misinterpretation of existing regulations, the reserve requirements of the National Bank, the settlement and accounting standards of repos, and because of the insufficient knowledge of market participants.

We would like to express our special thanks to Dr Éva Istvánovics and Dr Krisztina Bana for their help with legal questions, and to Balázs Romhányi and Enikő Gyulafalvi for the translation of German and French publications. We would also like to thank all those people who helped us with their remarkable ideas and experiences in creating this study.

1. | Definition and the different types of repo

repos consist of a loan of securities in one direction and a loan of cash in the other

The name 'repo' comes from the expression 'sale and repurchase agreement' and covers a transaction where the two parties involved agree to do two deals as a package. The first deal is a prompt sale of a security – most often a government bond – followed by a reverse transaction on a future date. The first deal of the transaction is often called the *first leg*, while the future deal is usually called the *second leg* of the repo. Because the cash and security transfers of the first leg are reversed on a future date, repo deals are equivalent to a loan of securities in one direction and a loan of cash in the other.

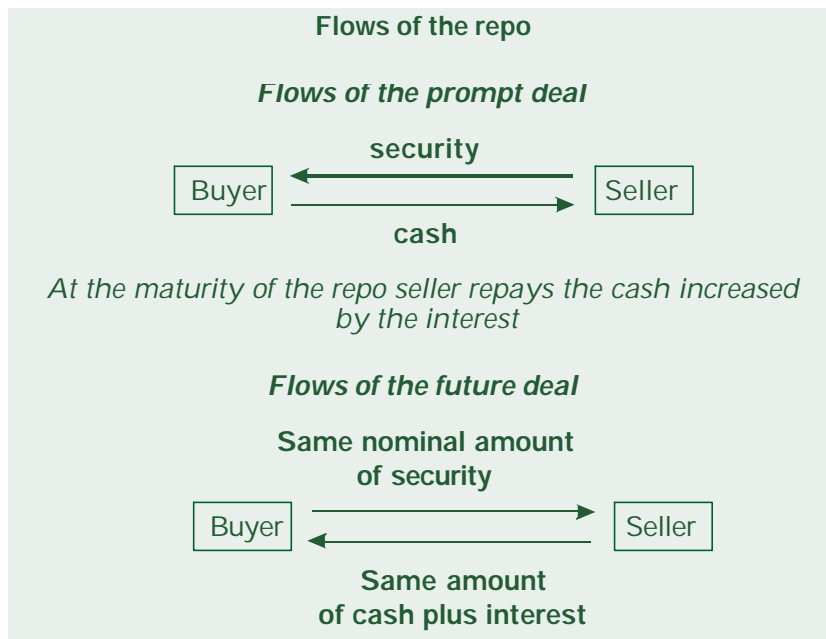
According to the typical repo agreement, rights connected to the borrowed securities (income and capital gains/losses) remain with their original owner. Repos are driven by either the need to lend or borrow cash – which is collateralised by securities – or the need to borrow specific securities. Prices of the prompt sale and the subsequent repurchase are agreed at the outset. The difference between the two prices is calculated to be equivalent to the cost of a secured loan.

the two (essential) parties of a repo

The two (essential) parties of a repo are the **seller** (or lender), who sells his securities at the prompt deal and repurchases them on a future date, and the **buyer** (or borrower or investor) who grants a collateralised cash loan. This terminology is taken from the bond market, not the money market – the party borrowing cash is usually known as the lender in the repo.

If the repo is driven by the investor's purpose of lending money, he is not interested in the exact conditions (yield, maturity etc.) of the collateral, though it is important for him that the collateral is tradable and that the issuer is credit-worthy. This is why government papers are the most frequently used securities as collateral.

Repos can be driven by the need of security borrowing if the buyer is short of a particular security. In this case it is very important for him to receive the specific securities he is short of – thus the collateral is called **special**, as opposed to **general collateral** (GC). The extent to which any particular security becomes special depends on the supply of, and demand for that security in the market generally. The more special the security, the lower the repo interest rate can be.



Repos generally have short maturity varying between one day (O/N) and one year. Flexible maturity is one of the main attractions of repo – it gives a wide range of possibilities for investing cash on different time horizons. Yet this is only one advantage of repos. Since repos are collateralised loans, the low risk makes them very popular with investors. If the seller defaults in repaying the cash, the buyer (investor) can keep the collateralised securities. It is advisable for the investor to check the creditworthiness of both the seller and the issuer of the collateral prior to the deal. The advantage of the repo for the borrower of the cash is that he can make use of an investment in his portfolio to borrow funds either relatively cheaply, or which he might not otherwise be able to borrow at all.

the main attractions of repo

1.1 Main types of repo

Repos can be classified by many factors. In terms of maturity a difference can be made between **term** and **open** (or *day-to-day*) **repo**. If the period is not fixed and agreed in advance, it is an 'open repo'. In this case both parties have the right to call for the repo to be terminated at any time, although often requiring two days' notice. In an open repo, the repo interest rate changes each day – effectively the repo is rolled over each day. The alternative is a 'term repo', where the maturity of the repo is fixed and agreed in advance.

repos can be classified by many factors

*from the viewpoint of
the counter parts*

From the viewpoint of the counterparts a repo can be **repo** or **reverse repo**. The same transaction is a repo for the seller, who sells his securities on the first leg and repurchases them on the future date, while it is a reverse repo (or simply reverse) for the buyer, who buys the securities in the first deal and resells them on the future date.

*the ownership of the
collateral*

If the ownership of the collateral is transferred to the buyer, the deal is called a **delivery repo**. The buyer has the right to use the securities during the term of the repo, but is obliged to return them to the seller at maturity. If the securities are pledged for the beneficiary of the buyer, but the ownership remains with the seller, the deal is called a **hold-in-custody repo**. If the seller defaults on repaying the cash loan at the end of the deal, the ownership of the securities is automatically transferred to the buyer.

Repos can be subdivided into three basic constructions: the classic repo, the buy/sell-back and securities lending. The economics of the deal is the same in all three cases.

1.1.1 Classic repo

*classic repo contracts
are usually based on
the PSA agreement*

Classic repo contracts are usually based on the PSA agreement in the USA, while in Europe the PSA/ISMA Global Master Repo Agreement is the most widely used standard.

Coupon payments (of the collateral) during the term of delivery repo are received by the buyer, who is obliged to make a matching payment to the seller at the end of the deal. In the case of a hold-in-custody repo, the securities remain in the seller's possession, thus coupon payments are received by him, too.

In international practice, repos generally involve gross-paying securities, that is securities where the issuer pays the coupons gross, without deduction of income tax. The GMRA is designed for gross-paying securities. Under the GMRA, if the buyer does receive any payments of net tax, he is still liable to pay the gross amount to the seller. Clearly the two parties involved can instead establish a different agreement for net-paying securities if they chose.

Price calculation

*the price of the repo is
the repo interest rate*

The price of the repo is the repo interest rate, which appears as the difference of the cash flows in the two legs of the repo. In the spot transaction the borrower pays the price of the security and in the future deal he gets back the same amount plus the accrued repo interest. Since securities transacted in repo deals are used as collateral,

the price paid for them can differ from the actual market price – it usually contains a hair cut (or in some cases a discount).

In the case of a hold-in-custody repo, the cash flow of the second leg contains only the original purchase price and the repo interest rate, but it does not contain the interest on the security accrued during the term of the repo. The reason for this is that the papers remain in the property of the seller and so the cash-flows involved are credited on his account.

In a delivery repo, the property of the collateral passes to the buyer, so he will be receiving the actual coupon payments. These inflows must be repaid to the seller at the end of the deal.

Cash flows of the repo

Cash flow of the first leg = nominal amount of bond x (net price + accrued interest) / 100

Cash flow of the second leg:

Hold-in-custody repo: spot cash flow x (1 + repo interest x term of the repo / 360 or 365¹)

Delivery repo: spot cash flow x (1 + repo interest x term of the repo / 360 or 365) + accrued interest during the term of the repo x (1 + repo interest x T),

where T = number of days between coupon payment and the maturity of repo / 360 v. 365.

The calculation above supposes that the deal is driven by the seller's need to lend a particular amount of securities. Here the cash flows are to be calculated on the basis of the nominal amount and the conditions of the bond transacted. This is typical with **security-driven** repos when the lender does not need his securities for a certain period of time and he wants to make use of his portfolio. An other group of repos are based on the need for lending or borrowing money; these are the so called **cash-driven repos**. In cash-driven deals the amount of cash lent is given, so the nominal amount of securities transacted needs to be calculated.

the driving forces of repos

Calculation of cash-driven deals

Nominal amount of securities = spot cash flow / (net price + accrued interest) / 100

Cash flow on the future date = spot cash flow x (1 + repo interest rate x term of repo / 360 or 365)

¹ Repo calculations can be based either on 360 or 365 days depending on the counter parts. Banks prefer using 360 days as a standard for the interbank market, and brokerage firms rather use the 365-day year as it is usual for bond calculations.

Collateral management

The price of the collateral during the term of the repo can change as market interest rates vary. To balance these price changes it is advisable to recalculate the value of the collateral daily and to check whether the actual market value of the securities equals the value of the cash lent. Should the value of the collateral fall, the buyer may require a margin call, which means that the seller needs to transfer extra collateral or cash to the buyer. If the value of the collateral rises rather than falls, the seller can similarly make a margin call, requiring the buyer to return some of the collateral.

daily marking-to-market US high haircut

Revaluation of the collateral (marking to market) is usually exercised daily. If the haircut (or initial margin) is high enough, daily marking to market is not necessary. High haircut means disadvantage for the seller who gets less cash for the same amount of security than he would receive by daily marking to market. For the lender, high haircut is advantageous because he is covered even at higher price falls of the collateral (as long as the haircut is higher than the price loss).

Haircut calculation

$$\text{Cash paid at first leg} = (\text{nominal amount of bond} \times (\text{net price} + \text{accrued interest}) / 100) / (1 + \text{haircut rate})$$

$$\text{Cash repaid at the second leg} = \text{cash paid at the beginning} \times (1 + \text{repo interest rate} \times \text{number of days} / 360 \text{ or } 365)$$

The extent of haircut rate depends both on the type of collateral management applied and on the credibility of the counterpart. If the credibility of the seller is higher than that of the buyer, the amount of the cash lent can exceed the value of the collateral. Since bond prices are constantly changing, there would be small transfers of collateral each day if the collateral value were always to be marked to market precisely. To avoid the administrative costs and burden of this, the two parties agree a **threshold**, below which changes in the collateral's value do not trigger a margin call.

When marking to market the collateral, it is the dirty price including accrued coupon that is considered, because this is the amount of money which could be realised by the buyer by selling the collateral if necessary. Similarly, the amount of cash which is secured by the collateral takes account of accrued interest on the cash.

In some markets, where the securities settlement system is not ready for daily marking to market, readjusting the value of the collateral can be implemented by closing the original transaction and opening a new repo deal with the same maturity and value as the original. In some cases the new deal is not based on the cash lent but on the amount of securities transacted in the original deal. This is usual when the repo is security-driven.

Substitution

If counterparties agree (and the settlement system is well enough developed), it might be possible to replace the original collateral with other securities during the term of the repo. If the deal is not security- but cash-driven, it is not important for the buyer to receive a particular bond as collateral. However, it is important that the collateral has the required credibility and value both before and after the substitution. The number of substitutions allowed during a repo is usually settled in the repo agreement. Substitution is generally not allowed with security-driven repos, since it would negate the original purpose of the buyer.

to replace the original collateral with other securities

The following section describes some of the most popular subtypes of classic repo.

Bilateral, tri-party and hold-in-custody repos

Repos discussed above had one thing in common: they all had two counterparts. These are the so called bilateral repos. It may occur, though, that the two parties hire a tri-party agent as a custodian. In this case the seller transfers the securities to the tri-party agent, who keeps the papers on a separate account on the buyer's behalf. The custodian's duties include:

risks can be lowered by hiring a triparty agent

- asuring DVP settlement at each end of the deal;
- daily reporting of the value of collateral for both parties;
- ensuring that the collateral satisfies the buyer's criteria in all respect;
- daily marking to market in order to ensure that the collateral is adequate;
- overseeing any substitution.

The agreement with the custodian is settled in a separate contract between the three parties. The custodian's fee charges the seller. In Europe Euroclear and Cedel – in ter-

national clearing houses – are the two main custodians involved in cross-border repo settlements, while in the US it is the Bank of New York or the Chemical Bank.

The Hungarian Central Depository and Clearing House (KELER) signed a custodian agreement with Cedel Bank in 1996. Under this agreement it is now possible for Cedel-client foreign investors to directly settle their Hungarian securities transactions. The agreement also made possible for cross-border securities transactions of Hungarian banks, brokerage firms and custodian banks to be settled through Keler, and for their rights connected to the securities to be exercised while holding the papers at Keler.

advantage and disadvantage of the tri-party repo

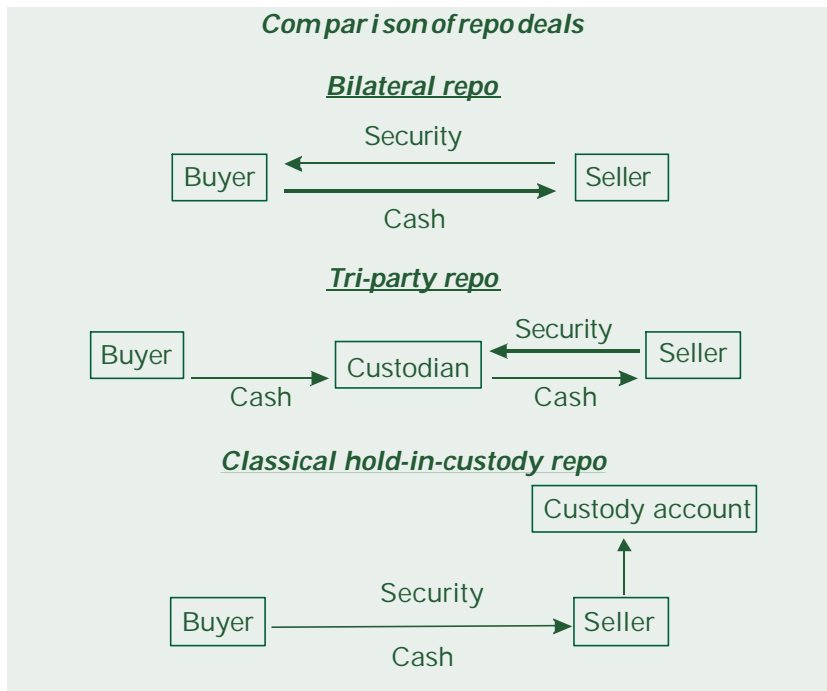
With a tri-party repo it is a disadvantage for the buyer that he cannot use the securities during the term of the repo. However, it is beneficial for the seller because he has the possibility of substitution. If, for example, he needs the collateral for another transaction during the term of the repo, he can substitute the original papers with other adequate securities on the buyer's account. The participation of the third party is advantageous for the buyer because it guarantees that the collateral is uniquely used for the repo. There are some other advantages of the tri-party repo for the buyer:

- the seller might pay higher repo rate for the possibility of substitution;
- low partner risk secured by the independent custodian;
- low administrative and legal costs.

Tri-party repo was initially used exclusively by central banks for obtaining more security in settlements. Market participants began using this form of repo later. Security of settlement certainly has its price: local custodians of developed markets usually charge a fee of 1.5–4 basis points for repo settlements. Fees usually decrease proportionally with the increase of quantity. At the end of 1997, 70% of the one trillion dollar American O/N repo market involved tri-party repos. At the same time, according to Euroclear reports, only 25% of the 170 billion dollar turnover on the European O/N repo market was transacted as tri-party repos. Although the proportion of tri-party repos is constantly growing, the growth is limited both by the extra costs and the infrastructural burdens of depositories.

difference between the classical hold-in-custody repo and tri-party repo

If the term of repo is very short or if the seller wishes to make substitution, the transfer costs of the securities might end up relatively too high. The **classical hold-in-custody repo** eliminates this problem by leaving the securities on the seller's segregated account. For the buyer, this certainly means a higher partner risk, which enables him to ask for higher repo rate. As in the case of tri-party repo, the buyer does not have the right to use the collateral during the clas-



sical hold-in-custody repo. This type of repo is very convenient for the seller, because all the administration is carried out by the custodian, and in addition he has the right for substitution. It is noteworthy that the collateral can only be used for one deal at a time.

Repos of the National Bank of Hungary (NBH) are tri-party repos rather than classical hold-in-custody repos. The security settlement is done by a third party (KELER), as is usual with tri-party repos, but the cash settlement is done by the NBH, not by KELER.

The segregation of the securities and cash settlement is due to the fact that KELER is not authorised to open cash settlement accounts for its clients; that is done by the NBH in the case of banks. The settlement of repos is DVP, thanks to the so called "hot line" connection between KELER and NBH.

The securities settlement system in Hungary is not yet prepared for substitution during the term of repos. Because of the relatively short maturity of repos in Hungary, substitution has not been a real need until now (NBH repos are mainly O/N, only the recently introduced and very rarely applied quick tender repos and the not yet applied normal tender repos might have maturity longer than one day). The importance of substitution is much higher with market repos (see later).

It does not seem necessary to change the NBH's repos from hold-in-custody type to delivery repos. During the term of repos, the NBH does not use the collateral, it only serves as guarantee.

Delivery repo would be beneficial for the counterpart of the NBH in the case of reverse repos, because they might intend to use the securities during the period of repo.

Variations of classic repo

As a result of the diversified demand, the market introduced a large variety of sub types of the classic repo.

Equity repo

Repos are not always collateralised with government bonds. Since the beginning of the 1990s, repos collateralised by equities became increasingly popular. The birth of equity repo was boosted by investment companies seeking attractive opportunities to make use of their large equity portfolio. Offering equities as collateral for repos made it possible to draw loans with more favourable conditions than normal bank credits. This new type of repo was also attractive for investors with temporary high liquidity, because they could gain higher return on equity repos than on normal repos. (The reason for this is that the higher risk of equities caused by their higher price volatility and lower liquidity involves higher profit expectations.)

Option repo

This type of repo is most widely used in France (they call it *vente à remercée*) and it is quite widespread in Hungary, too. In an option repo, one of the counterparts writes an option to fulfil his obligations on the second leg of the repo. This means that either the securities or the cash transfer at the end of the deal will be optional, which increases the risk for the counterpart and it gives a possibility for him to modify the repo rate.

Cross-currency repo

If the cash and the security transferred in the repo are denominated in different currencies, the deal is called cross-currency repo. In this case the security has higher volatility than in a normal repo, because its price is determined by both the interest rate and the exchange rate movements. To compensate for this, the buyer may require a higher repo rate.

Dollar repo

In a dollar repo, the buyer has the right to re-sell different papers than the original at the end of the deal. The nominal value of the securities transferred at each end of the deal have to be equal.

Forward start repo

The first leg of a repo is normally settled on the usual settlement date for the security involved. In a forward start repo, the first leg is settled on a pre-agreed future date.

Flex repo

In a flex repo the cash is repaid to the buyer in stages. This is useful, for example, when the seller is using the repo to finance the purchase of an amortising asset such as a mortgage-backed security.

Floating rate repo

In this, generally a longer-term repo, the repo interest rate is re-set at pre-determined intervals according to such benchmark such as LIBOR. In France, floating rate repos based on the domestic TMP index are common.

Reverse to Maturity

In a reverse to maturity, the maturity date of the repo is the same as the maturity date of the security used as collateral. The reverse to maturity is basically equal to the outright selling of the security used as collateral.

1.1.2 Buy/sell-back

Buy/sell-back (B/S) is very similar to classic repo. The difference is that, unlike in a classic repo, the two legs of the deal are handled within two contracts. Buy/sell-backs are basically the consequences of two straightforward purchase agreements, where the economics of the deal are the same as with a classic repo.

the two legs of the deal are settled within two contracts

Coupon payments

If there is a coupon payment on the security during the term of buy/sell-back, it is received by the buyer in the same way as in a classic repo. In contrast to a classic repo, however, it is typically not then paid over to the counterparty. Clearly, this affects the economics of the deal, as the counterparty needs to be compensated. The compensation is usually taken into account in the pricing of the security.

If there is no coupon payment during the term of buy/sell-back, the cash amount paid at the end of the deal can be calculated as below.

Cash paid at the end of the buy/sell-back

Cash paid at the end of the deal = (original purchase price + accrued interest) \times (1 + B/S interest \times t),

where: t = period in days / 360 v. 365.

If there is coupon payment during the term of deal, the cash repaid at the end must be decreased by the amount of the coupon received by the buyer. Since the buyer has the possibility of investing

the coupon received during the term of the deal, his earning on this also needs to be deducted from the seller's repayment. (A usual assumption is that the coupon can be invested at the original repo rate; although unlikely to be correct, the effect of using a different rate would generally be very small.)

The general formula for calculating the cash repayment in a buy/sell-back with coupon payment is the following.

Cash flow at the end of a buy/sell-back with coupon payment

Cash flow at the end = (original purchase price + accrued interest) x (1 + B/S interest x t) - coupon payment x (1 + repo interest rate x T),

where: t = term of B/S in days / 360 or 365,

and T = days between coupon payment and the maturity of B/S / 360 or 365.

If there are any other payments due on the collateral during the buy/sell-back, these need to be taken into account in the same way as coupon payments.

*no substitution
within buy/sell-backs*

As the two legs of the transaction are separate, there is no possibility of substituting one security for another. The only possibility for the two parties is to agree to close out the existing buy/sell-back and establish a new deal based on the same B/S rate and maturity, but with a different collateral.

The advantages and disadvantages of buy/sell-back compared with classic repo

Disadvantages of buy/sell-back:

- Traditionally, buy/sell-backs have no special contractual close-out rights in the case of a default, since there is no legal documentation to specify events of default. The inclusion of buy/sell-backs in the revised PSA/ISMA documentation, however, allows for this.
- Buy/sell-backs have no margining rights, although in practice an initial margin may be taken, and variation margin can be achieved through closing out and repricing the transaction, and this is now covered under the PSA/ISMA agreement.
- In buy/sell-backs, the seller of a security has no right to the return of any coupon, and so must factor the expected cou-

pon into the buy-back price. In practice there might be an understanding that the buyer will compensate the seller if he receives a coupon which, through oversight, has not been factored into the forward price.

- There are no rights of substitution in buy/sell-backs, although a buyer may be prepared to accept this in practice through close-out and repricing.
- The ability to net obligations, in the case of default, reduces counterparty risk. This is increasingly recognised by central banks in determining capital adequacy requirements, so that undocumented buy/sell-backs may imply higher capital requirements. Again, the revised PSA/ISMA documentation does allow netting and close-out for buy/sell-backs.

Advantages of buy/sell-back:

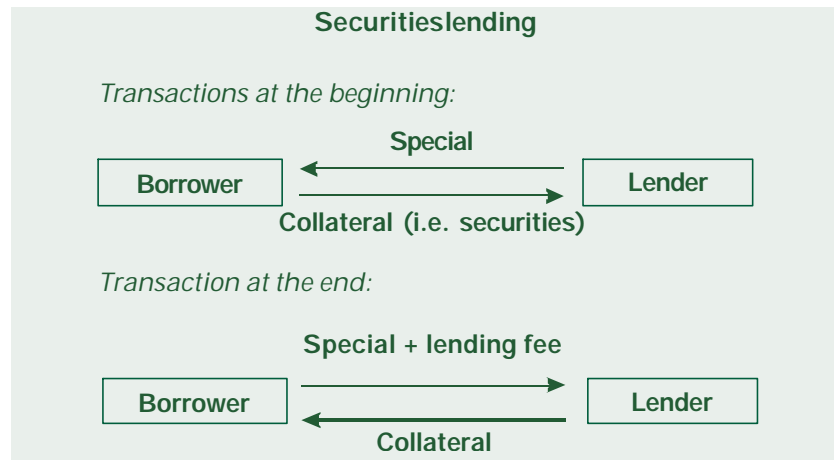
- A buy/sell-back is easier to book than a classic repo, as it does not require systems for marking-to-market and margining.
- Lack of documentation may reduce legal costs and shorten the approval process.
- In contrast with classic repo, buy/sell-back is definitely not a credit deal but two simultaneous purchases, which in some countries (including Hungary) involves an advantage for banks in terms of reserve requirements.

1.1.3 Securities lending

As mentioned earlier, a certain part of repo deals are security-driven, which means that the deal is motivated by the buyer's need to borrow a particular security. It may be, however, that the lender of the security does not wish cash in return; if he is already cash-rich, then borrowing more cash which he would then need to place on deposit would probably cost him the bid-offer spread. Nevertheless, he wishes to take advantages of the fact that he owns a security in short supply. In this case he simply lends the securities for a fee. This type of transaction is called security lending (or stock lending).

Certainly, the lender wishes to be secured against default by the borrower, and he takes collateral from the borrower, usually in the form of securities. Collateral is not necessarily some kind of securities, it can be anything that is accepted by the lender. In practice, government papers are most commonly used as collateral, but CD's, cash, banker's acceptances, etc. can also be used.

collateral can be anything that is accepted by the lender



Securities lending transactions are treated under one agreement like classic repos. The standard documentation generally used in the UK for international lending transactions is the 'Overseas Securities Lender's Agreement' (OSLA) or the 'Equity Stock Lending Agreement' (ESLA), depending on whether the collateral is bond or equities. In the US, the documentation used is the PSA's 'Master Securities Loan Agreement'.

the absolute legal title is not always transferred to the borrower

In securities lending, the absolute legal title is not always transferred to the borrower as in classic delivery repo or buy/sell-backs. Under the OSLA agreement, ownership of the securities lent is transferred from lender to borrower, and ownership of the collateral is transferred from borrower to lender. Under the PSA documentation, however, the transfer of collateral involves a pledge rather than an outright transfer of ownership.

If a coupon or other payment is payable on the security lent during the transaction, it is the borrower who receives it, and he is obliged to make a matching payment to the lender to compensate him for the loss of the income. Similarly, if there is a payment on the collateral, the lender is obliged to make a matching payment to the borrower. In securities lending transactions where the collateral is only pledged with no transfer of ownership the coupon continues to be paid to the original owner.

Other rights attached to the collateral (such as voting rights or rights to convert the security to different security) are transferred to the lender only if the agreement allows it. In the case of a bearer security, the current holder of the security (who is the borrower) can exercise the voting rights. The treatment may include the provision that the borrower has to exercise the rights attached to the security lent according to the lender's wish.

Securities lending in the practice of clearing houses

If the trader is short of the particular securities he needs to sell on the settlement date, well-developed clearing houses are able to settle the transaction by their automated securities-lending systems. Automatic securities lending provides the assurance that the buyer receives the securities always on the settlement date. The clearing house borrows the particular securities from the members of the lending pool and lends the papers to the seller, who is obliged to return the papers within a certain time. He usually has one-two days to buy the papers in the market. Automated securities lending has especially great importance with multinetting systems, because here the default of one single player can ruin the settlement of all deals of the given day.

automatic securities lending

In Hungary, there is an automated securities lending system connected to KELLER's T+2 government bond settlement system. The system operates as follows.

Dealers, who have a securities account with KELLER, deposit their government papers (which they don't need temporarily) in the so-called 'technical government paper pool'. The clearing members of the T+2 settlement system who are short of the securities at T+1 are automatically credited with the papers they lack, unless the pool does not have the required paper or the member does not have the cash value of the required securities on his account.

The period of the security-loan can not be more than three days. Automatic lending is implemented on the afternoon of T+1, when there are no more transfers on the accounts. Settlement is done on T+2, and the borrower returns the papers on T+3. After this, KELLER credits the account of the lender with the returned papers.

This securities lending system is indirect, which means that all the members have agreements with KELLER; they don't necessarily know each other. KELLER does not take guarantee against companies taking part in the securities lending. It maintains the accounts needed for the securities lending, makes the registrations, keeps contacts with the lenders, monitors collaterals, establishes limits and implements emergency measures in case of default. Until now, there has been no need for the automated securities lending, because there have not been any defaults since the implementation of the system.

A securities lending system can enhance the security of a local settlement system if the security pool contains a large quantity of papers with appropriate quality. It works only if the system assures high security and attractive yield for its members, and does not charge the borrowers too high fees.

automatic securities lending enhances the security of settlement systems

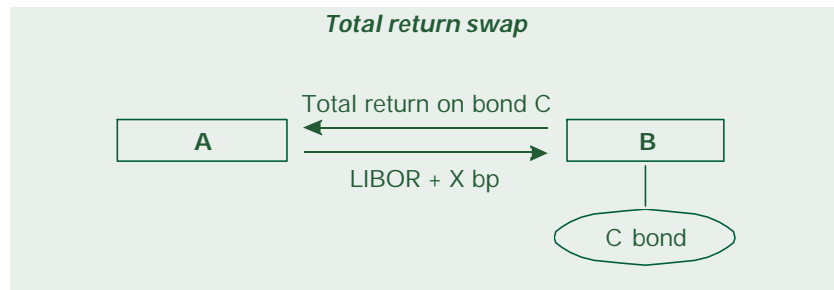
1.1.4 TR swap as an example of synthetic repo

combination of other transactions called synthetic repos

Repos can be substituted by a combination of other transactions. These (non straightforward deals) are called synthetic repos. Buy/sell-backs are also examples of synthetic repos, but because of their popularity they are considered as a subtype of repos.

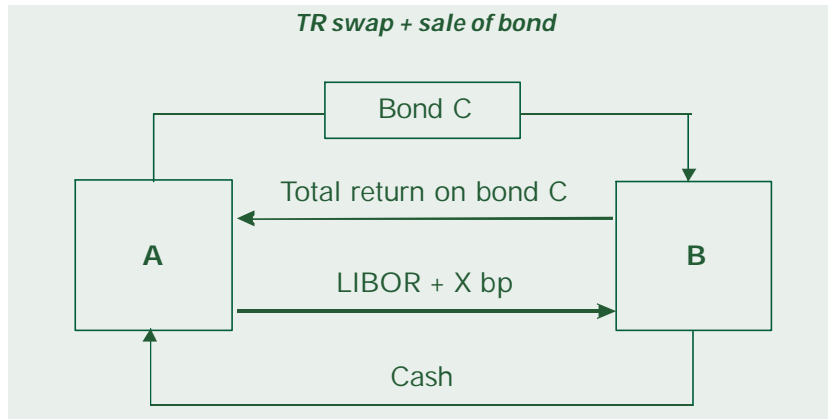
A little bit more complicated than the buy/sell-back, the total return (TR) swap combined with the sale of the reference asset is also very popular in some countries, and the economics of the deal is equal to a classic repo.

Like most swaps, a TR swap does not involve the physical transfer of the underlying asset, only the netting of the positions is done at the end of the deal. With a TR swap, the risk of revaluation of the reference bond is transferred with the accrued interest to the counterparty in exchange for the safe fixed interest. The transaction is as follows: B owns bond C, but he does not want to take the credit and market risk of the bond for a period of time. Therefore he agrees with A (who is willing to take higher risk in order to achieve higher return) that A will take over these risks and the yield of bond C without having to make the outlay of cash required to purchase the bond. So A accepts both the upside and the downside of bond C, while party B has no exposure to either. B receives the pre-determined LIBOR+spread in interest rate. A is lucky if there is no significant downside in yield C in the given period, and the return of C will be higher than the pre-determined interest he is obliged to pay for B.



The TR swap, when combined with a sale of the reference asset, can be a substitute for a repo transaction. For example, turn the situation around so that party A and not party B already owns bond C and wants to finance it. Party A could achieve this by selling bond C to party B and simultaneously entering into a TR swap agreement with party B. At the maturity of the deal A has an option to repurchase the bond from B (or from somebody else). This synthetic transaction gives the same cash flows as a delivery repo and so the

economics of the deals are the same, too. If we consider A as the seller and B as the buyer of a delivery repo, the TR swap produces the same result.



- A TR swap has a number of advantages comparing to a repo:
- In some countries the costs of swap and sale transactions are lower than repo's (including the costs of staff and pledging).
 - It is more flexible than repo, since both parties can implement the synthetic transactions with more parties. The counterparties have the freedom to decide whether they make a repurchase agreement for the underlying paper or they keep their position existing at the end of the deal.
 - Probably the most important reason why TR swaps are so popular is that many dealers' portfolios contain huge high-risk bond and repo positions. The collateral of repo have to be presented in the balance sheet because the repurchase transaction is an organic part of the deal. This means that even if the dealer repos out his high-risk papers for the reporting period, they will still negatively affect the results of the company. Companies with tight balance sheets need to find a solution to make their risky assets 'disappear' from their balance sheet during the reporting period. TR swap combined with the sale of the reference bond is a perfect tool for this – the asset temporarily disappears from the balance sheet, but the risk remains with the seller. The buyer needs to be motivated not to make a repo with the same economics of deal as opposed to a TR swap. This can be achieved, for example, by higher yield. (It is often said that companies with a tight balance sheet buy the unexploited possibilities of companies with high reserves.) When repos are substituted with TR swaps and simultaneous bond sales, it is usual for the volume of repo deals to be much higher during the month and to decrease by the end of the month.

Lack of legal regulation and customary law can be an obstacle to the use or at least a factor decreasing the popularity of the above-mentioned transaction. Even ISDA (the association offering the widest range of documentation on credit derivatives) does not have international standards for TR swaps.

1.2 Factors affecting repo rates

there are numerous factors influencing the repo rate

Repo rates are generally lower than interbank lending rates. The simple reason for this is that repos can be considered as collateral-backed loans. In addition, there are numerous other factors influencing the repo rate:

- Repo rates are based on comparable money market rates (deposits, CD) rather than on bond yields.
- Bond market conditions do affect repo rates, however. In a generally bearish bond market, when dealers are shorting bonds and need to borrow them, repo rates will tend to be lower. Conversely, in a bull market for bonds, dealers need to finance their positions, which tends to raise repo rates.
- The repo rates should be higher when the market in the particular collateral is less liquid, because the buyer can less easily realise the value of the collateral in the event of default.
- A right of collateral substitution provides a convenience for the seller and an administrative burden and loss of flexibility for the buyer, for which the seller must be willing to pay. The higher the number of substitutions allowed, the higher the repo rate in general.
- A hold-in-custody repo is more expensive than a delivery repo because of the greater credit risk to the buyer. The risk, and hence the rate, for a tri-party repo lies between the classic hold-in-custody and the delivery repo.
- Repo rate is most likely lowered when collateral is special. The lower the supply for the security, the lower the repo rate can be – some times several percentage points below the normal cost of funds.

An open repo on which the repo rate is re-set daily, for example at an agreed spread compared to overnight interest rates, should be cheaper than a renewed overnight repo with the same maturity. Although the overnight repo can be closed at a day's notice and the collateral can be substituted, the costs incurred each day with overnight repos through transferring cash and securities are avoided.

1.3 Risks connected to repo

One of the main attractions of repo is its low risk. The use of collateral involves a significantly lower risk for these deals than normal loans, but there are still some factors that allow the possibility of default.

At first glance one might think that the counterparties of the repo are covered from all risks, because they send their cash and security transfer at the same time to each other, so they receive an asset equal in value to what they have transferred. This presumes that both parties fulfil their obligations both at the beginning and at the end of the deal. The risk that the counterparty will default is called **counterparty risk**. To eliminate or at least diminish counterparty risk it is worthwhile agreeing with a clearing house, which assures DVP settlement.

the risk that the counterparty will default is called counterparty risk

In a delivery repo, the buyer also has to face the **issuer risk**, which is the risk that the issuer of the collateral will become bankrupt. If the issuer becomes bankrupt, and so the seller of the repo does not want to repurchase the collateral, the owner of the papers (the buyer) will possess a claim of low priority against the issuer company. In this case his claim can be unfulfilled. (With an equity repo the situation can be even worse, because shareholders stand at the very end of the line at winding up.) To reduce issuer risk, government papers are the most frequently used as collateral in repos.

the issuer of the collateral will become bankrupt

Even if the collateral is government bond, with longer term repos a significant change in the value of the collateral can cause serious losses if there is no regular marking to market of the collateral. In those countries where interest rate changes are frequent and relatively high, the value of fixed income papers can change significantly (**market risk**). Potential loss incurred from the revaluation of the collateral is less with shorter term repos. Losses can be avoided by appropriate collateral management. The safest collateral management system for both parties is daily marking to market.

a significant change in the value of the collateral can cause serious losses

Market risk can be increased in cross-currency repos. Because of the different denomination of the cash and the collateral transferred, exchange rate changes also affect the risk of the deal. This is called **exchange rate risk**.

market risk can be increased in cross-currency repos

2. | The origin of the repo

*bankers' acceptance
certificate (BA)*

The origin of the repo can be traced back to the early 20th century United States. It was built up as an instrument on the basis of the commercial credit instruments' market, bank guaranteed instruments, bankers' acceptance certificate (BA) and the government securities markets.

The BA is not really available outside the money market. There are many similarities with bills of exchange or letters of credit. It can be very beneficial to use, if secondary market yields are below the credit rates of banks, but the size of the company would involve relatively high transaction costs of direct participation in the money market.

The BA can appear in several forms, but the basis is always the same. The BA is used for assistance in commerce over a long time. It was widespread in the USA in connections with the import of raw materials. The importer does not pay for the product immediately, but asks a bank to issue a letter of credit in favour of the exporter. Receiving the letter of credit, the exporter discounts it at his bank. The bank stamps "accepted" on the letter (hence it is called BA). The security could then start to operate as a different instrument; it was discountable at the bank of issue, it was marketable on the secondary market or it could be a valuable part of the bank's portfolio for the longer run. At the beginning of the century a huge BA secondary market gradually began to operate. There were banks with a desk specialising in BAs and they operated with high expertise and safety, so the market soon became very liquid. In many aspects the BAs that were available on the secondary market were in the same category (or close to it) as short maturity government securities. Typically those investors who bought T-Bills were the buyers of the BAs.

Since an essential portion of USA exports were backed by BAs, after the 1913 establishment of the FED it became one of its most important tasks (written in the Federal Reserve Act) to assist the development of the BA market. The FED backed the foundation of BA brokerage companies and several government bond dealers took part in the BA trade. At that time the FED expected big commercial banks to take on a large portion of responsibility for financing BA traders. Since this did not happen, the FED introduced a quotation available publicly for repurchasing agreements collateralised by BAs.

in 1923 the FED introduced the instrument of short maturity repo

During the World War One the US central bank introduced several instruments with the aim of maintaining the level of commercial bank reserves. In the beginning various sorts of credit instruments issued by banks were purchased. Then some problems emerged with these issues and the Fed started to intervene in the Treasury's

market. Since the large amount of prompt purchases were not beneficial for trade, in 1923 the FED introduced the instrument of short maturity repo collateralised by government securities. The operations were technically processed by the New York FED.

These very early forms of repo agreements were quite simple; they had two special attributes. First, it was the responsibility of the central bank either to collect the interest payment and credit the account of the counter party or to pass the interest coupon of the collateral credit instrument to the bank. Second, these repo transactions were so called "open repos", thus the Fed had the right to reverse them any time before maturity.

"open repos"

However, it was not clear whether the FED had the right to make such transactions with a bank not participating in the system. A 1925 amendment of the Federal Reserve Act clarified the picture, entitling the FED to make credit contracts with banks from outside the system.

American corporations used to place their temporarily unnecessary liquidity mainly in T-Bills. But as repo spread and became a more liquid instrument, corporations could target an even better or exactly matching maturity for their invested excess money. So, together with the FED, these corporations frequently assisted the repo dealers to possess the necessary repo credit.

During the 1930s, because of the global financial crises (even though the FED and the corporations supplied sufficient repo deals) the demand for repo transactions sharply declined, since the fall of trade involved the fall of the BA market. At that time, budget financing was not as weighty a question as it became during World War Two. Thus during that decade repo transactions gradually ceased.

The reintroduction of repo by the FED after the Second World War was not designed to assist trade or back the domestic money market, but was done for monetary policy reasons.

reintroduction after the Second World War was done for monetary policy reasons

The monetary authority is able to balance the liquidity and the daily level of the reserves of the financial system by government bond outright sales and purchases, or by repo and reverse repo. First the FED sold repo at fixed rates, then it changed to tenders. In the USA repo is the most accepted of the fine tuning instruments.

The repo has several advantages. It is not very optimal for monetary policy to change the maturity of a main instrument too frequently and using outright sales or purchases the operation could happen only with the maturity of the background security. It is not easy to deal with large turnover and big volumes of securities in an outright transaction.

Preparation for central bank intervention can be faster using repo. On the prompt government bond market the central bank interventions can disturb the habitual reactions of investors (even if the interventions are different in direction and the volume is large).

reverse repo transactions of the FED begun in 1960

Another advantage of the repo is the option of changing the collateral paper.

The first reverse repo transaction of the FED took place in 1960, when a huge excess liquidity of the banking system was forecast.

The first reverse repo transaction of the FED could be traced back to the following reasons. The central bank was aware that a forthcoming air line workers' strike could cause trouble in the USA. The strike could result in a sharp rise in excess reserves of banks, since cheques could not be delivered to their target destinations and so the settlement process could not start. The FED was considering how to temporarily reduce the too high excess liquidity of the market. At the time the FED was cautious about calling the transaction a "credit given to the central bank", so "Matched Sale-Purchase transaction" (MSP) was given as a name for the transaction. This was financially exactly the same as a reverse repo, but in the books it was kept as an outright sale.

The repo transactions among market participants started to spread in 1950. In the very beginning of the repo market history the portfolio manager of General Motors could not invest in a matching available maturity T-Bill the money allocated to finance the dividend payment. So he agreed with a discount house to purchase some government papers slightly below the market price and later (on a date agreed) sell them back. Since the transaction seemed to be beneficial for both parties, the repo instrument became very popular in the USA.

3. | National repo markets

3.1 Great-Britain

3.1.1 The market repo

The Bank of England already applied repo twice a month from the beginning of the 1990s. This was well before market repo transactions were formalised (in 1994) and it became possible for official government bond dealers to make such transactions.

The complete liberalisation of the Gilt repo on the money market took place on 1 January 1996. Before that time securities lending was more widespread.

The British Gilt repo market were formalised on the basis of PSA/ISMA, and since the Gilt market had some special characteristics it was supplemented by an attachment. The Bank of England also issued an attachment, called "Code of Best Practice", and it regulated the market since the main rules were set out in this document.

The settlement of the Gilt repo is done by the Central Gilt Office (CGO) backed by the electronic accounting system of the Bank of England. Because of the advantages of CGO membership with tri-party repo and international repo, some institutions obtained membership of the CGO, such as Cedel, Euroclear and the Bank of New York.

The Bank of England reduced the interest transfer on the Gilt from 37 to 7 days, precisely to assist the development of the repo market. Essentially this means that the buyer of the Gilt receives the interest directly if he bought it at least seven days before the date of interest payment. However within the 7-day period the seller receives the interest, even if he does not possess the security. Thus in a repo transaction with an interest bearing collateral the parties have to be aware of the interest payment timing and if necessary calculate the gap.

The interest rate of the special in the UK is usually 5–10bp lower than that of the general repo.

In Great Britain the share of the special repo is higher (around 65% of the total), than the general repo (35%).

*complete
liberalisation on
1 January 1996*

"Code of Best practice"

3.1.2 Central bank repo

The Bank of England used the repo as a monetary policy instrument before the liberalisation of the Gilt repo market. It fulfilled the very important task of addressing the need for liquidity on the money market during the ERM crisis in 1992.

*new techniques for
smoothing liquidity*

One of the 1997 reforms of the Bank of England was the introduction of new techniques for smoothing liquidity on the money market. This was an important step, since the BOE did not levy statutory reserve on credit institutions with averaging and so there was a need for an instrument to limit the fluctuations of the short-term market rates. The liberalised and dynamically developing repo became the primary instrument of liquidity management.

The one week liquidity forecast is important for liquidity management with the central bank. To be able to forecast the liquidity shortage or the excess on the market precisely the BOE receives information from the government administration about the transactions of the budget in the near future, from the different departments of the Bank about Gilt transactions, about the foreign exchange management, about the monetary aggregates and about the maturity dates and amounts of the monetary instruments. The BOE collects further important information from the market. Big banks notice if a client is about to send a weighty and unforeseen amount to the budget. In the forecast the BOE also takes into consideration weekends, national holidays and seasonal factors. The Bank publishes the forecast for the day at 09.45 through its electronic communication channels.

The central bank repo interest rates are fixed, but can be changed by the decision of the Monetary Policy Committee (MPC). The repo is sold on fixed interest rate tenders with a quantity limit. There are at least two repo tenders a day; the tender call contains the amount offered, the fixed interest rate and the maturity.

Generally at the first daily auction 70% of the daily liquidity shortage is offered, and at the second the remaining 30%. It is also possible for banks to run into negative balance with the BOE during the day, but they have to close with positive balance. Sometimes there are banks not able to fulfil the requirement of the positive end-day balance, because they could not allocate the adequate amount. This can be traced back to two different reasons: the bank mismatched the in-and-outflow or the BOE daily forecast of liquidity shortage proved too small. If after the daily normal auctions a liquidity shortage remains on the market an extra auction can be made with a limited number of counterparties. If shortage remained because of a mistaken forecast, and it turns out till the call for the extra auction the BOE does not apply higher rates (if it turns out later, banks assume the burden of the higher interest rate).

The “normal” repo share from the open market activities of the BOE is about 71%, outright sales and purchases take 23% and the extra auction repo has a 7% stake.

3.2 Germany

3.2.1 Market repo

Until 1997 the German repo market primarily operated in London. The main reason behind this was that the Bundesbank required a 2% minimum reserve requirement without remuneration on every kind of deposit placed by clients with credit institutions. So it seemed better for German banks to trade repo in London. This resulted in a larger German security-based derivatives market in London than in the German domestic market.

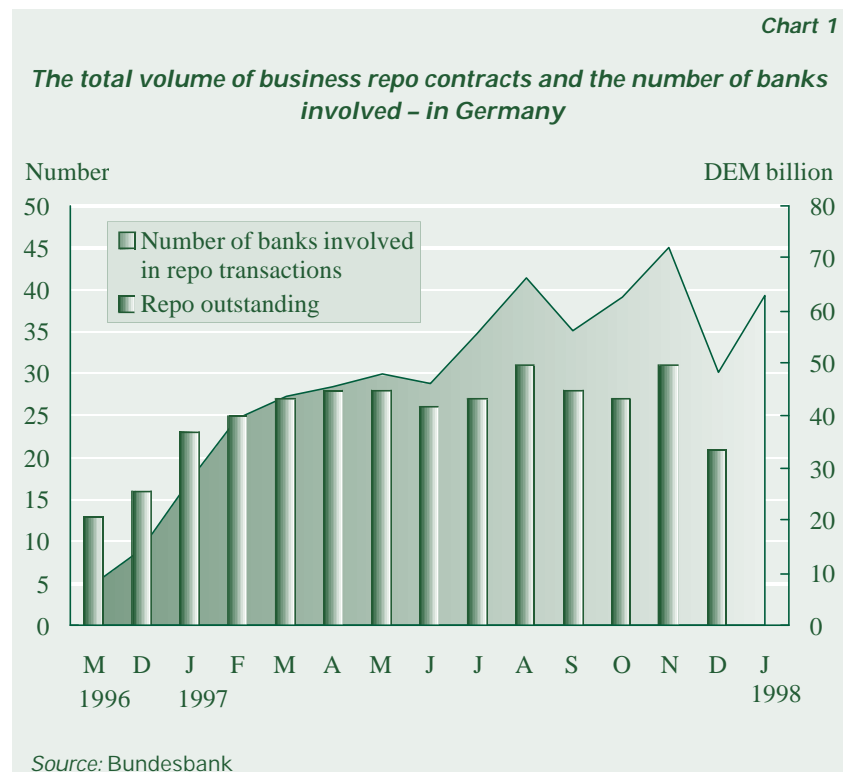
the German repo market primarily operated in London

At this time – when London was the leading derivatives trade centre for German instruments – the traditionally large market of securities lending was spread, since it was not considered to be deposit. At that time the central bank repo was already applied and buy-and-sell-back was also available on the market. Market participants using these instruments were motivated more by access to some special security, than by the need to cover liquidity shortages or reduce excess liquidity.

The Bundesbank perceived the problem and made a survey about the probability of loopholes appearing in statutory reserve regulations should an exception be made for the repo transactions. The analysts said in the survey that in Germany the transaction costs of the repo were quite high and thus only large volume (wholesale) contracts could be profitable, and that the majority of banks had such large amount contracts. It presumed a low probability of loopholes appearing (which could happen if bank depositors placed their cash in the form of repo instead of deposit). In December 1996, taking its survey into consideration, the Bundesbank decided to exempt from statutory reserve requirement repo transactions with collateral quoted on the stock exchange and with maturity shorter than one year. The collateral cannot be the issue of a bank.

the transaction costs of the repo were quite high and thus only large volume contracts could be profitable

After the exemption came into force on 1 January 1997 many credit institutions moved their derivatives trade back to Germany. According to a Bundesbank survey, in March 1996 the total stock of repo transactions of the banks was DEM 8 billion; soon after the exemption it rose to DEM 14.4 billion; in December 1997 to DEM 48.3 billion and in January 1998 to DEM 63 billion. The Bundesbank expects that the real amounts could be even higher.



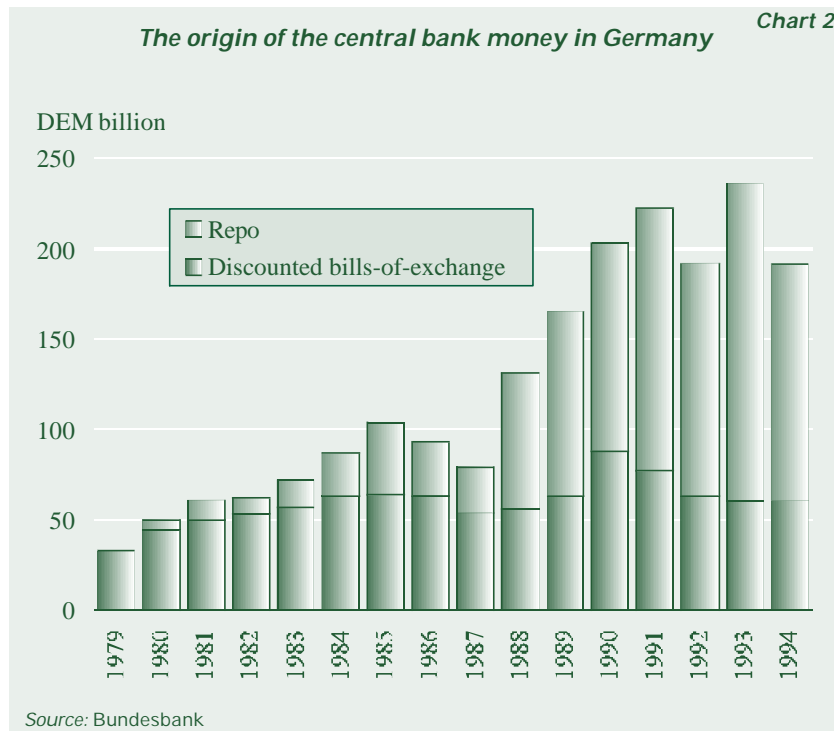
3.2.2 Repo as an instrument of the Bundesbank

The Bundesbank applied repurchasing agreement to intervene in the money market for the first time in April 1973. Since at the time there was insufficient legal and technical infrastructure to accept bonds as collateral, bills-of-exchange were used as background paper.

An important modification took place in 1979, when the central budget ran into considerable deficit, involving foreign-exchange outflow. To ensure a satisfactory amount of central bank money for the banking system, the Bundesbank increased the discount limit and reduced the statutory reserve requirement. However, this seemed to be effective only to a limited extent; furthermore, the volume of bills-of-exchange on the market was very small. Thus (in May) the Bundesbank introduced a new activity, contracting repurchase agreements collateralised by bonds. These transactions were applied only occasionally in the beginning.

*regular repotenders
from 1985*

The Bundesbank made a fundamental change in 1985, when it started to call for repo tenders on a regular basis. From 1985 to 1999 the Bundesbank had repo tender every week for 14 days maturity.



The institutions under the regulation of statutory reserve requirement were entitled to participate in the tenders for repo. Setting the conditions of central bank repo, the Bundesbank was concerned the about number of counterparties being as high as possible. Thus there were around 3400 credit institutions entitled to participate in the tenders and 600–1000 of them were effective and regular participants, even though the primary Bund dealers were not allowed bid directly at the tenders.

According to the Bundesbank Act the Bundesrat was the main decision-making body determining the strategy of the Bank and the main principles concerning the credit and open market operations. Defining the framework of repo operations activity and the major modifications to it was also the prerogative of the Bundesrat. This body had a regular meeting once every two weeks, so the framework could not change between the two meetings.

The announcement of a repo tender and the beginning of the process was the task of the Board of Directors of the Bundesbank. The Board sent a note to the Regional Banks about the start of the repo transaction process. It was very important for the Board to have sufficient room for manoeuvre whenever necessary on the money market, e.g. in the case of larger-than-normal foreign exchange inflow or outflow.

The function of the Bundesrat and the Board is divided by the practice of setting the framework and defining the exact conditions. The Bundesrat was responsible for deciding the type of repo, the dates of the auctions, the target amount to sell, maturity and, in the case of fixed interest rate tenders, the interest rate desired.

Technically the partners of the market participants were directly the regional central banks. This function involved the task of informing banks, receiving bids, channelling them to the Board, debiting or crediting the accounts of the bank accounts, and furthermore pledging of the collateral of the repo.

the collateral valuation is connected with a "pool system"

The collateral valuation is connected with a so-called "pool system". This meant that each of the clients of the central bank had to keep an operational safe custody account specifically for Lombard (collateral) purposes. The credit institutions could only apply for a Lombard loan if there was a sufficient amount on the account as collateral. (At the end of 1997 the total amount of the pool account was DEM 558 billion.)

The securities eligible for repo were bonds listed on the stock exchange or on a concentrated security market, and bills issued by the federal government or a fund of it or the provincial governments. A bond issued by a credit institution that wants to submit it for collateral is an exception.

The Bundesbank applied repo on fixed interest rate tender or fixed quantity tender (with minimum interest rate defined) using either the Dutch or American auction method. In 1997 the Bundesbank organised 53 repo auctions each in the form of interest rate tender. At the end of 1997 the amount of repo outstandings of the Bundesbank had risen to DEM 170 billion.

3.3 France

3.3.1 Market repo

"Pension Livrée Agreement" (PLA)

The world's second largest repo market (after the USA) is the French one. This notable rank is reached because of the large domestic repo market, since the European centre of international repo is London. The assistance of the Banque de France together with an appropriate legal environment largely encouraged the development of the repo money market. The general repo contract, which fixed the framework of repo agreement, the so-called "Pension Livrée Agreement" (PLA) was the French equivalent of the British PSA/ISMA, and it also helped the development of the

French domestic repo market. Another important development for the repo industry was the establishment of a system of market makers (Spécialisés en Pension de Valeurs du Trésor – ‘SPVT’). This grouped the 12 most active government bond dealers in the repo market.

The option repo (vente à réméré) is a widespread instrument of the French repo market. Its most important attribute is that the forward leg of repo contains an optional repurchase facility, and not an obligation. Generally the shorter the maturity the bigger the turnover in France, and the share of O/N repo is relatively high.

the option repo is a widespread instrument

The TMP (Taux Moyen Pondéré) index was used earlier in the French repo market as a benchmark for pricing repo, the index being the weighted average of the O/N interest rates. There were repos with fixed maturity indexed directly to the TMP plus a spread. Thus the repo rate came to light only after maturity. However the Banque de France, establishing the system of market makers and obliging them to quote two-way prices for different maturities from T/N to 3 months, encouraged the development of the fixed term repo and reduced the appeal of the variable rate repos.

3.3.2 Central bank repo

The benchmark interest rate of the Banque de France was the repo rate before integration into the EMU. There were two auctions a week with one week maturity. The interest rate movement unit was 5bps. Before the euro was introduced the repo rate was gradually reduced from 4.45% (beginning of 1996) to 3.10% (end of 1997). The typical amount sold at auctions was between FRF 31 billion and FRF 62 billion.

3.4 Switzerland

The Swiss repo market has a very short history. The introduction of repos was initiated by the National Bank of Switzerland (NBS) with its first repo deal on 20 April 1998. The new instrument made it possible for the NBS to widen the spectrum of its counterparties and to directly finance small and medium sized banks. In order to achieve this latter goal, NBS set very low repo limits: the least unit of a repo deal was established at 1 million Swiss francs.

the Swiss repo market has a very short history

The volume of central bank repos then increased significantly, reaching the usual 8–12 billion Swiss francs volume of recent times

the NBS currently uses repos only for expanding liquidity

already in the first few weeks. The BNS intends to foster the significance of this instrument in the future.

Central bank repos are sold either at auctions or in the form of customised agreements. Auctions are not held every day, only when monetary conditions make it necessary. The NBS currently uses repos only for expanding liquidity. At the auctions, which start at 9 am, banks can submit their offers on the amount according to the pre-set interest rate and maturity. After the banks have submitted their offers, the NBS decides whether to fully or partly accept them, or reject them all. The results of the auctions are not published, for the NBS does not consider repo interest rates as its main interest rates, due to the currently underdeveloped Swiss repo market.

During the day, the NBS has the freedom to agree with its counterparts in unique repo deals with any kind of maturity and price. These unique and customised repos are undertaken also only for monetary policy purposes.

The NBS takes securities as collateral for repos only if they meet the following requirements:

1. Denomination and coupon yields only in Swiss francs.
2. Securities are traded on the stock market or on a significant market; settlement through SEGA or INTERSETTLE.
3. Only issues exceeding CHF 100 million are accepted in order to assure sufficient liquidity.
4. Collaterals can only be debt instruments.
5. Issuer of debt instrument can be:
 - state,
 - cantons,
 - other debtors guaranteed by the above mentioned,
 - Swiss towns,
 - Swiss central office of mortgage bonds,
 - foreign states (with appropriate S&P or Moody's rating) or institutions guaranteed by these,
 - foreign banks (by rating).

Repos are traded through the electronic trading system of the stock exchange. Electronic trading has two components: the off-market and the on-market systems.

In the off-market system, the bank wishing to make a repo asks for other banks' offers, and chooses amongst them (or rejects them). The on-market system is a standardised repo trading framework with given maturities and contract sizes. The system receives the banks' offers and matches supply and demand.

one of the most sophisticated settlement systems of the world

The repo settlement system developed by the Swiss central depository and clearing house (SEGA) is one of the most sophisticated settlement systems of the world, and is unique in the sense that after the realisation of the deal there is no need for any kind of manual in-

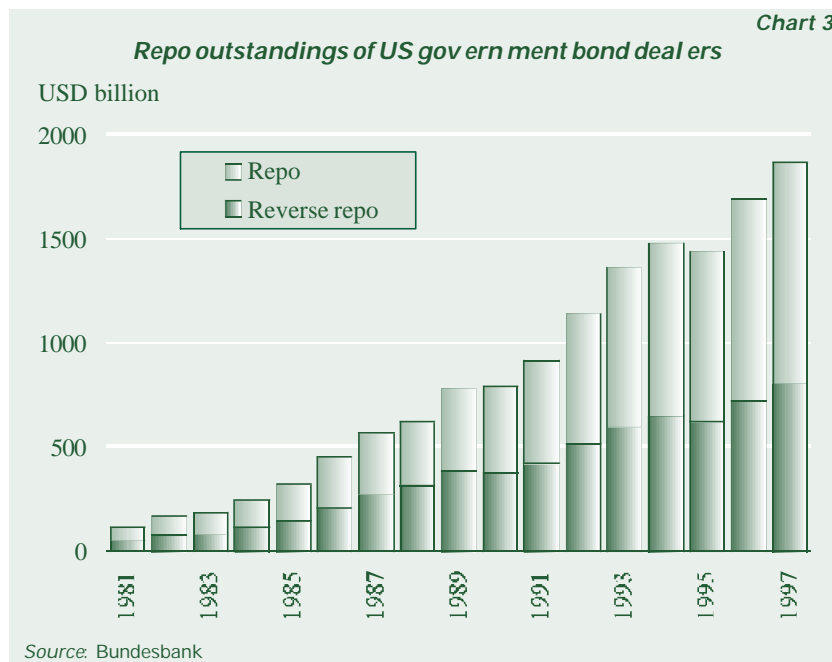
intervention. The system automatically chooses the most adequate collateral amongst the papers deposited in advance, makes daily marking to market, manages substitutions, etc. Since August 1998, the SEGA settlement system has had a facility for the settlement of intra-day repos, which allows dealers to gain liquidity for only a few hours using repos.

3.5 The United States of America

3.5.1 Market repo

Since the roots of the repo were in the USA and this repo market is backed by the largest government bond market on earth, no wonder that the most developed, largest and most liquid repo market has evolved in the USA. The repo collateralised by US T-bonds is in overwhelming majority on the market, but there is also a very liquid market for other paper collateralised (e.g. junk bond or mortgage) repo. The domestic market developed on the traditional form of repo, but because of the advantages of the settlement, tri-party repo also spread widely. The most typical is the on/maturity, with settlement occurring on the same (T) day.

the USA repo market is backed by the largest government bond market



The FED promoted the development of the repo market with a measure that charged the banks for their intra-day negative balance at a rate of 1bp per hour. This was necessary because a number of traders repaid the maturing market repo in the morning and balanced the current account with a new repo contract only at the end of the day. This measure of the FED encouraged the development of the tri-party repo and the open repo, because these forms have a smaller probability of encouraging a fall into intra-day negative balance, since calling back a collateral is not as easy as permanently renewing it.

3.5.2 Central bank repo

the New York FED is responsible for the central bank's open market operations

The New York FED is responsible for the central bank's open market operations in the United States. The central bank repo and reverse repo belong to these operations.

The FED exercises influence over the liquidity of the banking system using US government bond transactions. There are a number of instruments for this purpose and they can be grouped, as they are for prompt or temporary interventions. The prompt government bond sales and purchases are among the most important tools.

As a temporary (forward) transaction, the FED calls for repo or reverse repo (Matched Sale-Purchase Agreement, MSP) tenders from government bond dealers. The maturity of the central bank repo is between 1 and 15 days.

<i>Table 1</i>							
<i>Types of central bank repo</i>							
Number of tenders							
By tenders	Fixed maturity	Open repo	O/N repo	Foreign origin repo	Fixed reverse	O/N reverse repo	Total
1994	44	22	26	54	0	5	151
1995	43	17	25	43	8	9	145
USD billion							
By tenders	Fixed maturity	Open repo	O/N repo	Foreign origin repo	Fixed reverse	O/N reverse repo	Total
1994	175	82	105	113	0	13	488
1995	168	81	120	87	27	21	504

Applying fixed maturity repo the FED makes repo transactions with a discreet, maximum 15 days maturity. The open repo offers the possibility of making the transaction "matured" before the original maturity.

The foreign origin repo is a form of FED transaction coming from the purchases (and keeping for a period) of US government bonds of foreign central banks from the FED as partners, and thus some liquidity could get into or leave the system. As these transactions occur on a daily basis in both edges, its effect is basically neutral. Some times there is a greater deviation from the optimal level on either of the edges, thus the FED uses the foreign originated repo in the domestic market to correct the imbalance.

3.6 Japan

3.6.1 Market repo

Development of the Japanese repo was largely discouraged by regulations concerning transaction tax on domestic government securities. This means that the seller have to pay tax on each sale transaction.

*the seller have to pay
tax on each sale
transaction*

The large volume market participants overcame the difficulties by moving their trade activities to off-shore environments, where registration of the trade was not required. Settlement of transactions outside the stock exchange can be only on the 5th, 10th, 15th, 20th, 25th and 30th of the given month, and this also reduces the possible occasions for repo settlement.

To avoid the tax payment, securities lending spread without collateral, but for a charge. This is called *taishaku*. In this case there is no security sold, thus there is no reason to impose a tax on transfer.

There is also room for the buy-and-sell-back (*gensaki*), but this is motivated mainly by financing need and not by the need to possess a kind of paper (not special, but general collateralisation is typical). Since the *gensaki* comes under the transaction tax requirement, the financing costs are high.

In 1996 a reform of the Japanese money market was initiated, and the repo market was also concerned. The modifications were proposed by the Bank of Japan. The new regulations made it possible to transfer a bond without a change of ownership. On this basis the *genkin tampo tsuki taishaku* transaction developed.

<i>Table 2</i>			
<i>Attributes of the instruments on the Japanese repo market</i>			
Yen repo market	Gensaki	Taishaku	Genkin tampo tsuki taishaku
Legal relation	Sale and purchase	Lending	Lending
Collateral	Cash	Nothing (or bonds)	Cash
Transfer tax	Yes	No	No
Finance cost	Very high (since the tax)	No financing needs	Reasonable
Motivation	Financing	Covering the sale	Covering the sale or the financing

Source : Nomura International

3.6.2 Central bank repo

The Bank of Japan applied *gensaki* primarily for liquidity management or fine tuning purposes. This instrument was in use until the introduction of the new regulations, when the central bank started to apply the *genkin tampo tsuki taishaku* as a more flexible instrument.

3.7 EMU

repos have special importance among the monetary policy instruments of the ESCB

Repos have special importance among the monetary policy instruments of the ESCB (European System of Central Banks). One of the most important tools of the ESCB involves open market operations, which basically consist of repurchase agreements and collateralised loans (these are equal to hold-in-custody repos).

The four main reasons behind ESCB repos are:

1. regular liquidity-providing;
2. longer-term liquidity-providing;
3. fine-tuning operations; and
4. structural operations.

The first two aims are executed only on the basis of repo tenders and the latter two are both on the basis of tenders and outright sales. The maturity and frequency of the tenders in the four cases might be different.

two categories of eligible assets: "Tier one" and "Tier-two"

All ESCB credit operations have to be based on adequate collateral. The ESCB accepts a wide range of assets underlying its operations. A distinction is made between two categories of eligible assets: "Tier one" and "Tier two". Tier one consists of marketable debt

instruments fulfilling uniform Euro area-wide eligibility criteria specified by the ECB. Tier two consists of additional assets, marketable and non-marketable, which are of particular importance for national financial markets and banking systems, and for which eligibility criteria are established by the national central banks, subject to the ECB.

Debt instruments are subject to specific initial margins and valuation haircuts established by ECB as a tool of risk control. National central banks may require additional margining and establish partner limits, etc. on Tier two papers.

4. | Repo market in Hungary

Hungarian repo markets are less developed than those in western Europe and in the US. In the following chapters we discuss the domestic repo markets, both from the point of view of central bank repos and repos of other market participants (repos of the business sector). These two segments of the repo markets show different characteristics in many ways.

4.1 Regulatory framework¹

the notion of repurchase agreement is not defined by either the Civil Code or by Act

from a civil law approach an atypical contract

according to the system of the Securities Act are considered as futures securities contracts

The notion of repurchase agreement as a sort of securities transaction – or in other words, securities sales agreement with repurchase obligation – is not defined by either the Civil Code or by Act CXII of 1997 on Floa ta tion of Se cu ri ties, In vest ment Ser vices and the Stock Exchange (hereinafter: the **Securities Act**).

From a civil law approach, repurchase agreement is an atypical contract where counterparties agree to transfer the ownership of securities and, at the same time, they agree on the repurchase price as well as every other condition of the sale. In terms of contractual rights and duties of the parties, one may distinguish between several types of repurchase agreements. There are basically two types of repurchase agreements applied in domestic practice: in case of delivery repurchase, the transaction is defined as a sale and repurchase, whereas with a hold-in-custody repurchase agreement securities are considered only as collateral securing the deal.

According to the system of the Securities Act, repurchase agreements are considered as futures securities contracts (Section 5 b.), even though *the act does not provide a definition either about securities forward agreements or about repurchase agreements and reverse repurchase agreements.*

In the effective legal norms and regulations, repurchase agreements are defined in secondary legislation (mainly in accounting rules), but not in a uniform way.

¹ The chapter is written with the assistance of Regulatory Debt.

Government Decree No. 18/1997 (II. 4.) on the specific reporting and accounting obligations of the **National Bank of Hungary** defines repurchase agreement in Section 2 as follows: Under the scope of this decree (that is, with respect to the accounting rules concerning the NBH)

the specific reporting and accounting obligations of the National Bank of Hungary defines repurchase agreement

- any agreement is considered as repurchase agreement provided that, upon concluding the agreement, one party transfers the ownership of, or possession of, the securities providing a full statement of guarantees and liabilities for a certified amount of consideration, and undertakes to repurchase or retake them in possession at an agreed time and under specified conditions;
- any repurchase agreement is considered as a hold-in-custody repurchase agreement provided that the securities are held in custody as collateral on the seller's account at the vendor's disposal during the entire time of the agreement;
- any repurchase agreement is considered as delivery repurchase agreement provided that the securities are, upon financial settlement, transferred from the seller's account to the vendor's account and the latter may, during the entire time of the agreement, dispose of the securities.

Government Decree No. 198/1996 (XII. 22.) on the specific reporting and accounting obligations of **credit institutions** defines repurchase agreements with respect to credit institutions, as a specific type of borrowing against security as follows:

a specific type of borrowing against security

- Borrowing against security (or, in the usage of the Decree, "pension placement" or "placement agreement", which is the Hungarian application of an older French expression) means that a credit institution, financial undertaking or client (the lender) transfers assets held in its books (e.g. a bill of exchange, debts or securities) to another credit institution, financial undertaking or client (the borrower) under an agreement to the effect that the same assets should be retransferred to the lender at a later point at an agreed price (see below a. and b.):
 - a) a genuine placement agreement is an agreement whereby the borrower undertakes to retransfer the assets either at a specified time or at a time to be specified by him,
 - b) a not-genuine placement agreement is an agreement whereby the borrower is entitled to retransfer the assets at sales price (or against a consideration agreed in advance) at a specified time or at a time to be specified by him, and the borrower undertakes to take them back. An agreement whereby lender and borrower agree to retransfer and retake the assets at the sales price or at an agreed price upon fulfil-

ment of a specified condition may also be considered to be a not-genuine placement agreement.

investment firms does not have any specific accounting provision with respect to repurchase agreements

Government Decree No. 197/1996 (XII. 22.) on the specific reporting and accounting obligations of **investment firms** does not contain any specific provision with respect to repurchase agreements, neither does it refer to any of the above legal norms.

4.1.1 Problems arising from the lack of sufficient regulation of repurchase agreements

Since repurchase agreements are not uniformly regulated, and there is no generally accepted definition of the notion, this type of transaction is highly susceptible to legal evasion and thus the undermining of the efficiency of legal regulation.

With respect to foreign exchange law, assessment of the legal nature of repurchase agreements varies. According to one opinion, repurchase agreements fall into the category of negotiable investment instrument as defined in Sub-section 3. 28/b. of Act XCV of 1995 on foreign exchange, since

- it is a certificate issued in respect of a right or liability which is not considered as security, nevertheless
- it certifies the receipt of an equity or a debt instrument, and
- it provides full right of disposal until maturity.

The Act on Foreign Exchange does not consider short term capital movements as liberalised, therefore it stipulates that "a resident may transfer to a non-resident any

- bond or other debt instrument or money market instrument which was issued with a maturity of less than 365 days,
- transferable instruments issued by a resident" (Sub-sections 35.5. a-b) of the Foreign Exchange Act).²

The category of transferable instruments includes, among others:

- a certificate issued in respect of money claims,
- a certificate not qualifying as security, certifying the receipt of a debt instrument or security, or indirectly allowing right of disposal of such instruments,
- futures agreements effected with money claims, exchange rate and interest risk swap agreements or any other derivative agreement, regardless of whether or not a document has been issued in respect thereof (Sub-sections 3. 28. b-e) of the Foreign Exchange Act).

² The list is not complete, it only contains the provisions bearing relevance with respect to this paper.

Under the Foreign Exchange Act, repurchase agreements fall under different consideration if one regards them as two separate prompt sale agreements.

For in this case the object of these agreements is regarded as sale of a debt instrument with maturity exceeding 365 days and, consequently, these agreements do not require any permit. (Thus, such agreements are not legally considered as repurchase agreements, therefore the repurchase agreement implies high risk, because it is not backed with collateral.)

Should we consider repurchase agreement as the combination of a prompt sale of securities and a forward agreement, we arrive at yet another conclusion under the Foreign Exchange Act, and in this case, a permit is required not only for the joint agreement but also separately for the forward part.

the combination of a prompt sale of securities...

If we consider repurchase agreement as a credit agreement, its status under foreign exchange law will be again different, since repurchase or other agreements must comply with the definition of credit as set forth in the Foreign Exchange Act (Sub-section 3.30.d).

...or a credit agreement

According to Sub-section 3.30.d of the Foreign Exchange Act, credit shall mean:

- a) money loan,
- b) deferred payment (commercial credit, credit against goods, supplier's credit),
- c) advance and instalment payment,
- d) repurchase agreement not defined in the above sub-sections where repurchase is effected at a price (value) higher than the original sales price (value); in determining whether or not the repurchase price is higher than the original price, all amounts paid with respect to repurchase shall be taken into consideration.

Legal uncertainty with respect to repurchase agreements is further increased by the fact that these agreements may be considered as credit agreements from the viewpoint of economics. Some of the quoted legal norms and regulations confirm such qualification as credit agreements, for example the regulation on placement ("pension") agreements in the Government Decree on the accounting obligations of credit institutions. The Government Decree on the accounting obligations of the NBH explicitly uses the expression "granting credit" with respect to hold-in-custody repurchase agreements.

these agreements might better be considered as credit agreements...

Yet (with some limitations on certain ownership rights), more exactly the combination of a prompt and a forward sales agreement.

...the legal form is securities sales agreement

Investment funds make use of the inconsistencies of legal regulation in order to avoid the restrictions imposed upon them with a view to reduce risk and protect their portfolio

Sub-sections 9.3 and 9.4 of Act LXIII of 1991 on investment funds prohibit fund managers from pledging the capital of the fund under their management or from using it as collateral in any other way, as well as from granting credit (lending) from the investment fund's own funds (with the exception of purchasing debt instruments). Sub-section 36.4 stipulates that the deposit holder may not give the securities forming part of the portfolio of the investment fund into the possession of any body during the entire time of deposit, not even temporarily (with the exception of KELER, the Central Securities Clearing House).

All the above provisions, especially those aiming to avoid unnecessary risking of the own funds of the investment fund (S. 9.3. and 9.4.) may be circumvented by entering into repurchase agreements.

This demonstrates the high level of uncertainty concerning legal regulation on repurchase agreements such that several articles have been published recently by practicing lawyers drawing the conclusion that it might well be possible that a court would declare the validity of repurchase agreements as nullified, based on general principles of civil law, since the sale of securities with repurchase obligation is an agreement hiding a credit agreement, thus it does not indeed exist, does not have any legal validity, and one should instead take into consideration the agreement hidden by the repurchase agreement, that is the credit agreement. The widespread nature of this opinion shows that domestic law firms as well as the legal opinions provided by them to foreign investors stand on an uncertain basis, and it is impossible to predict what ruling an independent court would arrive at, and what kind of expertise it could be based on. Hence is necessary to create unambiguous regulation with respect to foreign investments, especially if we intend to impose sanctions on those violating the rules.

4.1.2 Regulation on repurchase agreement in the EC Directive on capital adequacy

Council Directive 93/6/EEC of 15 March 1993 on the capital adequacy of investment firms and credit institutions contains the following definition on repurchase agreements:

definition on repurchase agreements of the EC...

"Article 2.17. *repurchase agreement* and *reverse repurchase agreement* shall mean any agreement in which an institution or its counterparty transfers securities or guaranteed rights relating to title to securities where that guarantee is issued by a recognised exchange which holds the rights to the securities, and the agreement does not allow an institution to transfer or pledge a particular security to more than one counterparty at one time, subject to a commitment to re-pur-

chase them (or substituted securities of the same description) at a specified price on a future date specified by the transferor, being a *repurchase agreement* for the institution selling the securities and a *reverse repurchase agreement* for the institution buying them.

"A reverse repurchase agreement shall be considered an interprofessional agreement when the counterparty is subject to prudential coordination at Community level or is a Zone A credit institution as defined in Directive 89/647/EEC or is a recognised third country investment firm, or when the agreement is concluded with a clearing house or exchange.

18. Securities lending and securities borrowing shall mean any transaction in which an institution or its counterparty transfers securities against appropriate collateral subject to a commitment that the borrower will return equivalent securities at some future date or when requested to do so by the transferor, being securities lending for the institution transferring the securities and securities borrowing for the institution to which they are transferred.

"Securities borrowing shall be considered an interprofessional transaction when the counterparty is subject to prudential coordination at Community level or is a Zone A credit institution as defined in Directive 89/647/EEC or is a recognised third country investment firm or when the agreement is concluded with a clearing house or exchange."

It should be noted that EC regulation on capital adequacy will be extended to commodities and gold transactions as of June 2000, and the definition of repurchase agreements will also be extended to commodities transactions.

... and on the securities lending and securities borrowing

4.2 Questions of accounting

In international comparison several countries do not specify special rules for repo accounting. However, according to the international accounting principles, all the transactions must be booked as their real economic essence and not as their formal instruments show. In repo accounting this means that they can appear as a prompt sale and a forward purchase, but if they are a collateralised loan in the economic sense, then they should be booked as a collateralised loan.

The EU Bank Accounting Directives states that if the buyer is not a holder of the collateral security (3-party repo, pledged repo) under the term of the repo, the principles are these:

For the buyer :

- The collateral security is not integrated into the balance sheet.

all the transactions must be booked as their real economic essence

EU Bank Accounting Directive

- The cash amount paid for the security is booked as any other loan asset. Possibly with a heading showing that it is originated from repo transaction.

For the seller:

- The security sold remains a part of the seller's balance sheet, but it must be kept in a special account with a notation that it is under repo transaction.
- The cash received for the collateral is booked on the liability side, as in the case of receiving a loan. The possibility is also given for the seller to separate an account for loans received from the money market and loans received from repo.

Some special cases of repo accounting

One of the most important points of the PSA/ISMA agreement concerns repo netting. When two repo counterparties have a number of repo and reverse repo contracts and they cannot deliver either the security or the cash, the opposite positions can be netted. Accounting cannot always handle this financially logical solution. As there are different maturities and different collaterals, the principle of gross settlement is frequently used in such cases. However in some countries repo netting of opposite positions is also possible on balance sheet (it is also feasible in GMRA).

Mainly in the USA the repo has a type, where the buyer gives back not the original sort of securities, but ones which have the same value as the originals. In this case the accounting is basically the same as with repo netting. In this case the important thing is the same, whether it is a loan or a security sale and repurchase.

in Hungary, due to the underdeveloped legal environment of repo there is some confusion

In Hungary, due to the underdeveloped legal environment of repo from the accounting point of view, there is some confusion. Neither the Act on Accountancy nor even the Act on Securities mentions repo transactions. Thus, generally, it is up to the parties to decide whether they book it as a prompt sale and a forward purchase (below the balance sheet), or as lending. Both approaches differ from the basic economic meaning of repo.

There is no unambiguous and general rule for repo accounting in any other act. Thus there have been a number of accounting solutions in practice. Sometimes security lending, sometimes two sale-purchase transactions in different time and sometimes prompt sale and forward repurchase is booked.

the repo can be booked as security lending

Whether the repo is booked as security lending, the seller does not clear the collateral item from the balance sheet, but on the liability side it receives loan (liability) that inducts cash as asset. Repo between banks (or credit institutions) and non-banks is under the statutory reserve requirement levied on banks if booked as security lending, because there is a rise in the liability side of the bank (from the non-banking sector). This regulation discourages the potential

repo counterparties to book their agreements (financially equal to repo) as a security lending sort of repo.

Booking repo as security lending between two bank counterparts is not disadvantageous for either of the parties, since these are interbank transactions and so the compulsory reserve does not apply to them. Thus there is no reason for not booking repo between banks as security lending short of repo, as opposed to, for example, two prompt transactions (sometimes this is not clearly understood by credit institutions).

The other practice of repo accounting is the buy-and-sell-back sort of booking, when the government bond is sold and it reduces the size of the balance sheet. Theoretically, after the first leg of the transaction the second leg should be booked as a future responsibility below the balance sheet. A less prudent bank could engage in unlawful practice when a financially repo transaction with a maturity of less than one year is realised with a non-resident. Such a bank faces serious sanctions if the forex activity supervisors of the central bank can find the forward leg of the transaction in the books. Thus it can happen that the forward leg of the repo transaction is missing in the books until maturity, and it is booked only at the date of maturity as a prompt purchase. Thus the forward leg of the repo could be found only with the certificate of the transaction. This certificate is usually hidden during the end of the transaction and called "drawer contract", since it cannot be found in the books, only in the drawers.

the other practice of repo accounting is the buy-and-sell-back sort of booking

The practice of booking repo as two outright sales/purchases has a number of disadvantages for the counterparties.

disadvantages of BSB accounting for the counterparties

- The profit effect of the repo appears not in the adequate profit centre of the company.
- It can result in some confusion – even loss – in the process of stock valuation.
- It can divert the market yield averages.
- It also can distort the statistics.

In the following four chapters (4.2.1 to 4.2.4) we examine the problems (indicated above) if a financially repo transaction is booked as a prompt sale and later as a prompt resale.

4.2.1 Effect of rearranging the gain in time and among profit centres

Booking the repo as a prompt sale (clearing from the balance sheet) and later as a prompt repurchase can divert the date of the gain appearance and can be confusing for the profit-and-loss statement of the profit centres.

can be confusing for the profit-and-loss statement of the profit centres

The seller of the paper has to sell the collateral security at the market price reduced by the haircut and the interest, thus loss appears in the books. But at the repurchase leg of the transaction, the seller buys it back at a price reduced by the haircut, and this is booked as a prompt sale on that price.

Table 3

Accounting procedure of the repo booked as prompt sale-purchase

	Seller of the paper	Buyer of the paper
Before the transaction	Receives the paper at market price. Booking it at this price.	
At the prompt leg of the transaction	Sells the securities at a price reduced by haircut and interest. Books the loss.	Buys the securities at a cheaper than market price and places to the books at it.
At the forward leg booked also as prompt	Buys back the securities at a lower than market price (by the haircut) and books it at this price as a new acquisition. Comparing to the market price acquisitions the haircut is a loss until the papers are sold.	Sells the papers cheaper than the market, but higher (by the interest), then the price of acquisition. The interest gain appears in the securities trade line and not on the credit finance line.
After the transaction	Sells the securities at market price and books the haircut as a gain.	
The result concerning the profit and loss of the transaction	The "economically" credit interest cost reduces the profit of the securities trade. If the accounting day is during the maturity of the transaction, the overall profit is smaller. It is also smaller after the transaction, but before the outright sale of the paper.	The interest received increases the gains of the security trade instead of the credit financing.

At the first repo sale, (in most cases) government paper is sold much below the market price – the discount factor being the interest and the haircut. Thus if taken in anticipation that there is no market price fluctuation of the paper during the maturity, then the seller bought the securities at a higher (market) price. The seller has to book loss at the first leg of the repo originating from the gap between the acquisition price and the repo sale.

With the forward leg (booked also as a prompt one) the securities are repurchased also not at the market value, but at a price modified by the haircut on the OTC market. The seller is in a disadvantageous situation again, since he bought back the papers below the market price, but to reduce the accountancy loss he suffered at the first repo leg (and get back the price of the haircut), he has to sell the paper on the market.

At the end of the whole transaction the seller in effect pays the interest for the "credit", which unfortunately appeared not on the credit costs line of the institution, but on the securities trade line of the profit-and-loss statement, so reducing the gains of a the securities trade section operating also as a profit centre. That is why the fixed interest bearing instruments division of the treasury is not interested in such transactions, when there is a need to satisfy financing requirements.

the treasury is not interested in such BSB transactions

Example for the accounting of repo as two prompt sales and purchases

Here is an example to present this sort of booking. The seller gives the buyer 100 unit value of government bonds. Suppose that the net value of the securities is fixed during the transaction. The 100 units must fit the amount of the credit, the accrued interest of the transaction and the margin. Assuming that for the whole maturity the interest is 8 units and the margin is 2 units, the buyer receives the papers for 90 units. At this point the accountant places 10 units of loss with the seller, since the securities purchased for 100 units are sold for only 90.

When the seller buys back the collateral, he has to pay 98 units for the securities valued for 100 units in the money market. Thus the accountant can show a 2-unit gain, but only later, when the securities are sold on the market for 100 units. This gain appears later, but again on the securities trade profit line. The economic content of the transaction is closer to a credit. The difference between the two prices – in this case 8 units – equals the charge of the credit (the interest). And the interest appears not in the appropriate line of the books.

In the case of the buyer the opposite happens. This case is more simple, since the acquisition of the securities happens at the first leg of the repo at acquisition price. At the forward leg the gain appears immediately. From that point, the gain of the credit appears immediately in the right time and the haircut is only a neutral transit stock, but the gain raises the value of the securities trade profit and not the credit financing profit.

4.2.2 The anomalies of stock valuation

*the problems with
stock valuation*

Here is an example to show the problems with stock valuation. On Monday a brokerage firm buys 100 government bonds at 100% value. On Tuesday it pledges 100 to be released on Friday. On Wednesday it buys 100 additional ones for 110%. And on Thursday it sells 100. On Friday the Tuesday pledge is over.

The assumption is that the brokerage firm uses the "First out" method of stock valuation.

The question is whether the securities pledged as collateral are out of the stock (typically for a buy-and-sell-back or a delivery repo they are out). If they are out, the securities bought at 100% and KELER accepted at 95% will be booked back at this value. If at the same time of the pledge, the securities are cleared from the stock, a 5% loss arises in the books, since the securities bought at 100% are booked back only at 95%, though financially there were no loss. To solve the problem the securities must be sold on the market.

Thus it is not recommended that the pledge be a stock transaction like buying or selling a security, rather it requires a separation of the pledged stock under the balance sheet or only a separation in the analysis.

The sold securities also have some problems arising from the stock valuation. The sale of the 100 units is made by a "first out" method from the 100% value purchased paper. In contrast the pledge used the same 100% value security. The accountant can decide – by "first out" – that the sale used the 110% value securities, because the 100% value stock is under pledge, so it is impossible to move it.

According to the choice of the accountant, the cost of the securities sold can be 100% or 110%; the price is fixed, so it has an effect on the profit-and-loss statement.

A uniform solution could be to apply "first out" theory as the pledged stock is always moving and formed from the remaining (not sold) part of the portfolio. This is hardly feasible on the level of analysis, when the pledged securities are equipped and booked with a serial number.

4.2.3 The deterioration of market average yields

*different values from
the market price*

Among outright bond sales there are some repo transactions booked as prompt sale-purchase. To make a repo synthetically, the price gap between the two purchases has to be equal to the interest. That is why the two legs of the transaction can present (sometimes

largely) different values from the market price, depending on the maturity, since the buyer receives an under-valued collateral paper.

The hair cut is also built into both transaction legs and is also a part of the security price. Comparing the two legs – unlike the interest payment – the hair cut is built into both, but to ensure the safety of the buyer the prices are shifted down from the market values.

These artificial market values can induce higher average yields in a deep repo market if the transactions are accounted as prompt sales and purchases, and the whole yield-curve can be shifted towards higher yields in place of the real ones.

4.2.4 Statistical problems

Without the adequate regulation of repo and similar instruments problems can arise with aggregate bond statistics. However, in Hungary there is no influential effect of the repo statistics problems, since the OTC statistics show only a small gap between prices of the same security on the secondary market, but there should be preparation against the potential danger of this. Such mistakes can be found with the prices of bonds and their volume.

The secondary market price of the repo collateral can divert from the market price, as also the yield induced if booked as two prompt transactions and reported in the KELER OTC statistics (see previous section for details). One of the solutions could be if the size of the repo transactions could be separated from the bond sales and the repo interest and margin could be uncovered. However, the main advantage of this accounting is that there is not much possibility of telling the difference between the real prompt sales and the legs of a synthetic repo. Without changing the regulations there is no room to filter the false data.

the secondary market price of the repo collateral can divert from the market price, as also the yield induced and reported in the KELER OTC statistics

The volume statistics can be distorted if the two parties of the repo use different accounting. Imagine that the seller clears the security from the books, but the buyer does not take it into the balance sheet, so the security “disappears” between the two institutions. In an opposite case – when both of the parties have the same security in their balance sheet – the security is duplicated.

The accounting of securities lending is also contradictory. If A lends B a security, then the security remains in the balance sheet of A, as he is the owner of the security. But B has a right to sell the paper to C, who will also be an owner. Following a boom in securities lending (unlikely in the near future), the number of securities on the secondary market could statistically be greatly multiplied.

the accounting of securities lending is also contradictory

4.3 Repo in the business sector

4.3.1 Obstacles to the development of repo markets

repos in the business sector are much less transparent than central bank repos

Repos in the business sector are much less transparent than central bank repos. According to the statistics, market participants in Hungary hardly do any repo deals with each other, buy/sell-backs are much more common. This is due to many reasons, but mainly to the regulatory restrictions set by the National Bank.

the Act prohibits foreigners from undertaking any kind of futures or forward derivatives with a maturity of less than one year

The Currency Act of 1995 prohibits foreigners from undertaking any kind of futures or forward derivatives with a maturity of less than one year. Because repos are usually short term (less than one year) forward deals, only domestic investors can deal in them legally, which means that the potential repo volume is only a fragment of what it could be with liberalisation. Another hindrance to the development of repo markets is that repos are subject to compulsory reserve requirement. This makes repos too expensive for banks; it is worthwhile to create synthetic repos by two simultaneous sale and purchase agreements. If the two agreements are signed on the same date, the deal is a buy/sell-back, which is not a subject of reserve requirements, though the economics of the deal is the same as with repo.

there is still an obstacle for foreigners creating synthetic repos this way

Buy/sell-back provides a solution for banks (who are less prudent in this respect) to get round the compulsory reserve requirement, but since B/S is a forward deal (if the term of the deal is longer than 8 days) there is still an obstacle for foreigners creating synthetic repos this way. Changing the date of the forward leg agreement to the maturity date of the B/S makes it appear as if the B/S would be two independent spot purchases – coincidentally with the same amount and type of underlying instrument and with the reverse direction. Foreigners often use this kind of synthetic repo in Hungary, rather than depositing their money with the same conditions with a low-rated Hungarian bank, even if the transaction costs of a bank deposit would be lower.

An other way of “converting” forward deals to spot deals is to involve a third party (not clearing house) in the bilateral deals. In this case the sell and repurchase deals are carried out with two different counterparts, who offset their positions afterwards. It is very hard to prove that these deals cover a synthetic forward agreement. The disadvantage of this kind of transaction is that it involves a double partner risk compared to a normal repo or buy/sell-back. Partner risk can be minimised through clearing houses, but this also increases the cost of the deal.

It is important to note that it is very hard to draw the line between deals aiming to get round the regulations and deals carried out for pure market reasons – hedged positions can look like B/S deals.

Interbank credit limits also hinder the development of repo markets. This problem still exists, though deals are usually settled by DVP – most of the banks do not take the (minimal) risk of default. This might also explain the fact that banks sometimes gain cash by expensive central bank repos rather than by borrowing (cheaper) from other banks. Interbank credit limits are set by the foreign head-offices of the banks, and domestic branches usually cannot influence the extent of these limits. In the short run we cannot expect progress in this respect, because the recent uncertainty of international financial markets has a negative effect on the tightness of these limits.

Interbank limits also mean that it is not cheaper for banks in Hungary to raise liquidity through repos than through (not pledged) interbank loans. This is because risk is not embodied in interest rates, but in the low limits set for each other. Repos are usually considered within the framework of interbank limits. This is irrational, because the two transactions (repos and interbank loans) are very different in terms of risk.

Another factor that does not help to increase the volume of repos is that banks often keep only as much government paper in their portfolio as necessary, so they often do not have sufficient paper to repo with. It is also a problem that when money market liquidity is not balanced, then most market participants either suffer from excess liquidity or from lack of liquidity, which means that the supply and demand for repos is not appearing at the same time. Potential losses derived from the bookkeeping of repos and buy/sell-backs also make it less worthwhile to carry out such operations. The most frequently used bookkeeping is the FIFO based registration, which can cause (non-real) losses for the company undertaking repo transactions (*chapter 4.2.2.*), while this never occurs with interbank loans.

The relatively complicated settlement procedure of repos is also a problem for dealers. Most banks' internal regulations require written contracts, and this involves more administration for a repo than for a simple loan agreement. Administration could be highly reduced if banks put the rules of repos in their general conditions of operations (like the NBH), or if they refer to the relevant regulations of KELER.

Summarising the above, synthetic and special kinds of repo are much more common in Hungary than classic repos. This can be explained above all by the strict regulations. It is conceivable that if reserve requirements for repos were abandoned and foreigners allowed to participate in the Hungarian repo market, the volume of synthetic repos and buy/sell-backs would decrease in favour of an increase in the amount of classic repos – though the extent of possible increase is not easy to estimate. Banks would have the possibility

interbank credit limits also hinder the development of repo markets

another factor that does not help to increase the volume of repos

liberalisation now is not desirable from the point of view of the central bank

of offering repo facility instead of bank deposits for major clients. However, it is doubtful that it would also be worthwhile to offer such a facility for minor clients because of the high transaction costs; they would basically continue this activity with only those few partners with whom they already repo. Cancelling the reserve requirement on repos (while other liabilities remain subject to reserve requirement) would cause most of the banks' liabilities to be registered as repos. This would let banks avoid reserve requirements, which is absolutely not desirable from the point of view of the central bank.

If the income effect of the reserve requirement lessens, the banks' motivation to get round the regulation will lose its importance. The income effect can lessen by decreasing the reserve rate or by increasing the remuneration on reserves. Holding back the costs of sterilisation (up to a rational level) has higher priority from the monetary policy point of view than developing money market instruments (e.g. repos), so increasing the level of remuneration on reserves is not a real choice for the central bank in developing repo markets. The gradual lowering of the reserve rate can be expected when the NBH can permanently implement high-end operations, and that will be possible after the end of the current sterilisation need. This would also cut off the income effect of the compulsory reserves and would lead to the development of the Hungarian repo market.

Pros and cons of exempting repos from reserve requirement

Pros for exempting repos from reserve requirements:

- Some banks get round the reserve requirements by hiding large value deposit deals behind buy/sell-backs. Releasing repos as a subject of reserve requirements would not only transfer money to repos from deposits, but also from outright sales and purchases.

- The limited amount of government papers in banks' portfolios restricts the possibility of lowering the effective reserve rate.

Because of the relatively high face value of government securities and because of the growing administration and transaction costs, it would not be profitable for banks to convert low value deposits to repos.

- The second leg of buy/sell-back agreements is poorly documented by banks. Exempting repos from reserve requirement would allow banks to promote repo as a legal alternative to deposits.

Cons of exempting repos from reserve requirements:

- Exempting repos from reserve requirements would probably make banks convert large value deposits to repos, thus evading the obligation of compulsory reserves

- Deposits formerly registered as buy/sell-backs could legally be promoted as repos by banks, and this would probably cause the number of repos to grow

- Evading the reserve requirement could cause a decrease of effective reserve rate. The long-term goal of the NBH is to decrease the effective reserve rate by lowering the nominal rate of reserves when it is possible.

Allowing foreigners access to the short-term Hungarian forward market would probably make this market segment more transparent by revealing hidden repos. The extent of increase in the volume of repos (above the increase caused by the conversion of hidden repos) is very hard to estimate, but liberalisation would likely result in a significant growth in repo turnover. In order to fulfil prudential requirements, some foreign participants currently do not make repo deals in Hungary; these companies would also step into the repo market given liberalisation. In the current economic situation, excess capital inflow can hinder or make the conduct of monetary policy ineffective. The recent global economic crisis urges central banks of converging countries to be more cautious in taking further steps towards liberalisation. It is not desirable for the withdrawal of speculative foreign capital to cause widespread and fundamentally unjustified capital movements, which in turn could cause the loss of confidence of foreign investors for a longer term. Thus it is likely that the liberalisation of foreign short term capital inflow cannot be implemented in the forthcoming few years, but it has to be done just prior to Hungary's EU membership at the latest.

In order to develop the domestic repo market, it would be very useful if market players learn the differences between repos and interbank loans. In many cases they are not aware of their possibilities or just simply do not feel familiar with repos. Many still forget that interbank repos are not subject to compulsory reserve requirements. Fears of potential losses arising from applying FIFO settlement should not be a problem either; in case of hold-in-custody repos, the papers remain in the seller's property so there is no chance of revaluation losses. It is also not reasonable that repos are considered to fall within interbank loan limits, since the two deals have different risk factors. We think that if these and other basic questions could be clarified for all market participants, the currently 'stuck' repo market could take off.

in order to develop the domestic repo market, it would be very useful if market players learn the differences between repos and interbank loans

4.3.2 Characteristics of Hungarian market repos

On the initiative of ÁKK (Government Debt Management Agency) a wide group of market participants prepared a repo master agreement, which was based on the PSA/ISMA agreement and customised for the Hungarian market. In practice, dealers do not use this master agreement, because it does not provide an answer to many unclarified legal questions, and because, as mentioned earlier, repos are usually settled as some other kind of deal in order to evade regulations. Since the deals are not recorded in regular contracts, they involve very high risk.

repo master agreement

most repos are initiated by foreign speculators

Repos in Hungary are dominantly cash-driven deals, the specifications of the collateral being of secondary importance. Most repos are initiated by foreign speculators hoping to gain profit on exchange rate movements, rather than expecting interest rate gains. These speculative deals are carried out in the form of repos because of the low risk granted by the collateral.

besides speculative deals, banks use repos for liquidity management

The other reason for having mostly cash-driven repos in Hungary is that besides speculative deals, banks use repos for liquidity management. Repos (or buy/sell-backs) are sometimes security-driven, but this happens mostly when unusual market conditions occur. (The spring of 1997 is a good example, when, in contrast to market expectations, the NBH increased its deposit rates, and dealers, expecting a quick readjustment of interest rates, sold large amounts of government papers in the form of repos. In this way they were able to get rid of the papers which would temporarily cause them losses. These repos were definitely security driven and were not motivated by the need for cash lending or borrowing.)

Most recent statistics of the NBH prove that repos are dealt mostly between domestic and foreign dealers, and that the regulations set by the NBH are easily evaded by dealers.

popular maturity

In terms of maturity, the most popular construction has been the one-month repo. This is because banks can borrow money from their partners with one-month repo while investing money in the NBH's one month deposit. This is a risk-free transaction with secure yield. Maturities between O/N and 30 days have also been popular, but there has been hardly any deal with maturity longer than a month. In many cases, original maturity was extended by the counterparts. Shortening of the maturity of the NBH's main instrument from one month to two weeks in March will probably involve a reduction in the duration of business repos.

4.3.3 Collateral management

primitive collateral management

Primitive collateral management applied to repos in Hungary increases the effectiveness of repo markets. Collateral is only evaluated at the beginning of the deal, and the extent of haircut depends on the demand and supply side of the repo: the party who has more interest in making the deal is usually the one who is willing to give a better price. Marking to market is very rarely used, and this increases the risk of repos. The settlement system of KELER is not yet ready for additional margining, so in the case of daily evaluation, marking to market could be implemented by closing the original deal and opening a new repo. Lack of daily marking to market and using debt consolidation government bonds as collateral means that repos usually involve high haircuts.

5. | The repo from central banking point of view

The central banks have a dual function in relation to the repo instrument. Both functions are connected to different subperiods of the monetary transmission mechanism. On the one hand there is a significant function at the beginning of the transmission mechanism when the repo is applied as a main instrument of monetary policy. In this case repo is a tool for the monetary authority to reach its target by implying changes in the real economy through the transmission mechanism. On the other hand repo can function as a feedback for monetary policy at a later period of the transmission. It is also an instrument for interest rate policy and liquidity management for the banks.

*the central banks
have a dual function
in relation to the repo*

The next part of the chapter summarises the differences and advantages of the central banking repo in comparison with other tools of the same functions, and analyses which sort of repo is the most optimal for central banking purposes. The following part gives a short overview on the history of Hungarian repo markets. The third part investigates the role of repo as a tool of central banking operations, identifying the functions and the related Hungarian practice. The final section briefly presents the importance of the development of market repo from the central banking point of view.

5.1 Place of repo within the instruments of monetary policy

Repo was first applied by the USA monetary authority and the practice was later followed by the European central banks. Recently a large number of central banks have used repo as their leading instrument. Because of the very strong innovation of the repo and its associate constructions, the repo market is mushrooming. Repo has spread not only in different forms, but also the volume of financing with repo and the turnover of government bonds and bills had jumped up.

5.1.1 The advantages of repo over outright sale

the repo inherited the positive functions of the outright sale and purchase of government securities

The repo inherited the positive functions of the outright sale and purchase of government securities and introduced some new ones when integrated into the instruments of monetary policy. Using repurchase agreements, the central bank is able to intervene with standing facilities, with auctions, directly on the market or indirectly by quotation, similarly to the security prompt outright sale or purchase. Both of these instruments are useful for an intervention to reduce or increase monetary aggregates on the market, and thus market interest rates.

the primary advantage of the repo is to be able to influence effectively the operative interest rate and/or the monetary aggregate target of the central bank with a smooth, standard and short maturity

The primary advantage of the repo as a tool of the central bank is to be able to influence effectively the operative interest rate and/or the monetary aggregate target of the central bank with a smooth, standard and short maturity. Earlier, when the government bond outright sale and purchase was involved as the main instrument of the central bank, the monetary authority could not avoid being tied to the remaining maturity and the liquidity of the bonds on the occasions of intervening. If the adequate amount of security was not available or its remaining maturity was not adequate, the central bank had to decide whether to intervene – possibly less effectively – with a longer maturity, or try to use other instruments. Government bond sales and purchases were not always well advertised among the wider public, thus the beneficial effects of transparency of the central bank and the sufficient publicity were usually absent. Since only a small segment of the market was aware of the importance of the intervention, the signalling effect of the central bank was less powerful.

Repo transactions are not dependent on the extent of the government bond market and on the maturity of the collateral security, thus they are capable of always being used with fixed maturity. The fixed maturity means that central bank interest rate changes are more comparable and visible. Repo can be applied as a standing facility or as a fixed interest rate tender (it is not easily feasible for outright sales and purchases because of the different maturities).

The risk of price volatility undertaken by the central bank is reduced, since the interest rate of the future “repurchase” is fixed earlier. However, at the prompt intervention the central bank is not insured against the risk of price volatility until the time of an intervention on the inverted side.

Applying asset side instruments, the repo is a well spread tool of central banks. There are advantages of the repo over not only the prompt purchase, but also over the Lombard loan too (even if Lombard falls in the same category as repo in some aspects). Applying marking to market is not typical (albeit possible) for Lombard loan, thus the collateral value is less for the transaction, since mark-

Table 4

Comparison of repo and similar instruments of central banks

Asset side operation	Repo	Outright purchase	Lombard loan
Compability for auction sale	+	+	+
Compability for standing facility	+	+	+
Marked to market	+	–	+ (not typical)
Collateral replacement facility	+ (possible)	–	+ (possible)
Maturities can be defined	+	–	+
Indirect transferability	+	–	+ (possible)

Table 5

Comparison of reverse repo and similar instruments of central banks

Liability side intervention	Reverse repo	Outright sale	Deposit
Potential for auction sale	+	+	+
Potential for standing facility	As long as the gov. bond portfolio lasts	As long as the gov. portfolio lasts	+
Transferability	(indirectly)	+	(directly)
Marking to market	+	–	–
Maturities are open to decision	+	–	+

ing to market is more spread for repo. Using a repo is also more advantageous because collateral substitution is a general practice, thus the central bank is always covered against a price fall of the collateral, and the partner bank is not limited to deciding any time which part of his portfolio can be used for the transactions.¹

The advantages of repo described above are effective only with a longer maturity, since on O/N (or a couple of days) maturity there is no possibility or economic rationality to apply marking to market or collateral substitution. (There can be cases in a very liquid market using real time settlement where it is appropriate to apply intra-day valuations or collateral substitution).

¹ In central banking practice some times there are similar instruments used in parallel. Earlier, Lombard loans were used on O/N maturity and repo on the two-week maturity in Germany.

Among the liability side operations, the reverse repo can be well substituted by deposit since their monetary effects are the same. The only economic difference in their market roles can be found if the comparison is between the delivery repo and either the pledged or the deposit one.

effectively there is no difference between the market performance of the pledged central banking reverse repo and the deposit

Effectively there is no difference between the market performance of the pledged central banking reverse repo and the deposit. The formal difference is that towards the end of the transaction the central bank (or a custodian) keeps an adequate amount of security in custody as collateral for the partner institution, even though neither of the parties can use it for any thing. The partner bank could obtain the collateral only if the central bank would not be able to repay the cash at the forward leg, but in practice this is impossible.

Table 6

Comparison of the pledged, the delivery reverse repo and the deposit

	Pledged reverse repo	Delivery reverse repo	Deposit
Transferability	–	The collateral is transferable during the maturity	–
Potential for standing facility	As long as the portfolio of the central bank lasts	As long as the portfolio of the central bank lasts	Unlimited
Same conditions for each partner	Yes	Hardly feasible	Yes
Potential for sterilisation	As long as the portfolio of the central bank lasts	As long as the portfolio of the central bank lasts	+
Potential for fine tuning	+	+	+
Encourages the development of the money market	+	+	+
Encourages the development of the gov. bond market	–	+	+

In their formal attributes there are very few differences between the pledged central banking reverse repo and the deposit. As regards sterilisation purposes or the potential for applying them as standing facilities, the difference is that the pledged reverse repo can be used only as long as the government bond stock of the central bank lasts, while the deposit is unlimited in this respect.

5.1.2 Delivery and pledged repo among the instruments of the central bank

Financially there is no considerable difference between the delivery and pledged repo instruments on the asset side activities of the central bank, since the central bank does not want to use the government securities during the repo there is no sense in keeping the papers. Pledging the collateral is easier.

financially there is no considerable difference between the delivery and pledged repo instruments

As mentioned above, if there is trust in a central bank it does not make much difference whether it applies reverse repo or deposit – given the same conditions. However, the delivery repo is financially more divergent from the deposit or the pledged repo. Running a delivery repo, market participants get not only the legal ownership, but also the possession of the collateral, thus they can sell it, lend it or use it as collateral for another transaction. Given this potential to use the collateral, the delivery repo must have some liquidity premium over the deposit. So the central bank could reach the same banking system liquidity target with lower interest rates applied to delivery repo. In any case, the external condition for applying reverse delivery repo is a very liquid government bond market.

the delivery repo is financially more divergent from the deposit or the pledged repo

The possibility of applying reverse delivery repo is very restricted, since the amount of securities eligible for reverse repo in the treasury of the central bank is limited (this problem is solved if the central bank is able to issue security and use it as collateral – see later in the chapter). Furthermore, applying reverse delivery repo is impossible, since to be more effective on the market and enjoy the advantages of this tool over the deposit (and set lower interest rates) the central bank has to possess huge amounts of government securities in demand. If a central bank does not consider the types of government bond a counterparty gets, and each counterparty could get different sorts of papers in a reverse delivery repo, this would lead to several problems. How could the central bank decide which counterparty receives which security? If one counterparty obtains a more useful collateral paper than another for the same “price”, it could damage the neutral position of the central bank.

the possibility of applying reverse delivery repo is very restricted

This process could be similar in some ways to gambling, because at the time a counterparty applies for the reverse delivery repo, he is not aware of the type of collateral security he would possess.

Over all, the reverse delivery repo can be a viable instrument of the central bank for fine tuning purposes. The most effective way to use reverse delivery repo involves the limited amount fixed interest rate tender. Thus, selecting the type of security to use as collateral the central bank can avoid running out of its stock of government paper. Of course, the amount of offer cannot exceed the amount of stock of the specified security in the central bank portfolio. The reverse delivery repo can only be used for fine tuning, since the central

available instrument for fine tuning purposes

banks hardly have a large amount of the kind of securities which can be efficiently be used for other than fine tuning purposes (sterilisation, creating structural liquidity shortage).

Table 7

Possible roles of the repo applied by the NBH

	Repo	Reverse repo
Pledged repo	This is the actual practice	No reason to use, since the deposit is a perfect substitute. (Applied by the NBH to October 1997)
Delivery repo	There could have been some reason to use this if the central bank could (and would) use the collateral during maturity.	This could have an important role in developing the money market. Given the small size of the NBH, the use of it is limited. Feasible with BNH bond use as collateral.

NBH-bill collateral behind the reverse delivery repo

In 1997, when the issue of NBH bills was on the planning table, one of the ideas was to issue bills with maturity longer than one year and use them as collateral in one-year reverse delivery repo transactions, thus the bills could be transferred in the money market. One of the benefits of this method could have been to intervene permanently with one year and not between 10 and 12 months. Of course this method is feasible with a shorter repo maturity, e.g. a 6-month NBH bill can be the collateral behind a 2-week reverse delivery repo.

Applying delivery repo with the method described above implies eliminating the problem arising from the restricted amount of government bond stock in the portfolio of a central bank, and in addition the delivery reverse repo can be used not only for fine tuning purposes.

5.1.3 Collateral valuation for central banking repo

As was the practice for market repo, the central bank valued collateral for repo in a very elementary way up to the end of 1998. The central bank considered the market value plus a haircut as adequate for collateral submitted for repo, and during the maturity there was no marking to market. Forunately, there was no need for marking to market, since the stock of repo was generally low, the maturity

ties very short and hair cut discount proved adequate to cover value losses of the collateral security.

At the end of 1998 changes with the asset side instruments were implemented, and developing a reliable and transparent valuation method became necessary. In December 1998 the Monetary Policy Committee of the NBH decided to implement a new method from 1 February 1999 and to value collateral in the same, transparent manner for all the asset side operations. The hair cut discount applied for collateral depends on the maturity; and there are two categories for the O/N and for longer maturities.

*new method from
1 February 1999*

The longer run target for collateral valuation is to change to daily marking to market, but to day this is restricted by the infrastructure of the NBH and also of KELER (settlement house). The system of daily collateral valuation is the most effective and modern system, which ensures the automatic daily monitoring and adjustment of the value of collateral and the transaction, security substitution and collateral pool management. Collateral pool management means that the partner in substitution does not need to satisfy the collateral needs for each transaction one-by-one if over- or under-collateralised, but for all.

daily marking to market target for collateral valuation

At the end of 1998 the NBH accepted a proposal for KELER to initiate the development of a daily collateral valuation system. These developments are encouraging not only the smooth operation of central banking repo, but also the better valuation and the collateral substitution of business repo. Hopefully, the development of NBH collateral valuation will help business sector repo too, since re-evaluating the collateral on a daily basis will lead to smaller hair-cut requirements (less collateral for the same transaction), and to the lowest risk of under-collateralisation.

5.2 The history of central banking repo in Hungary

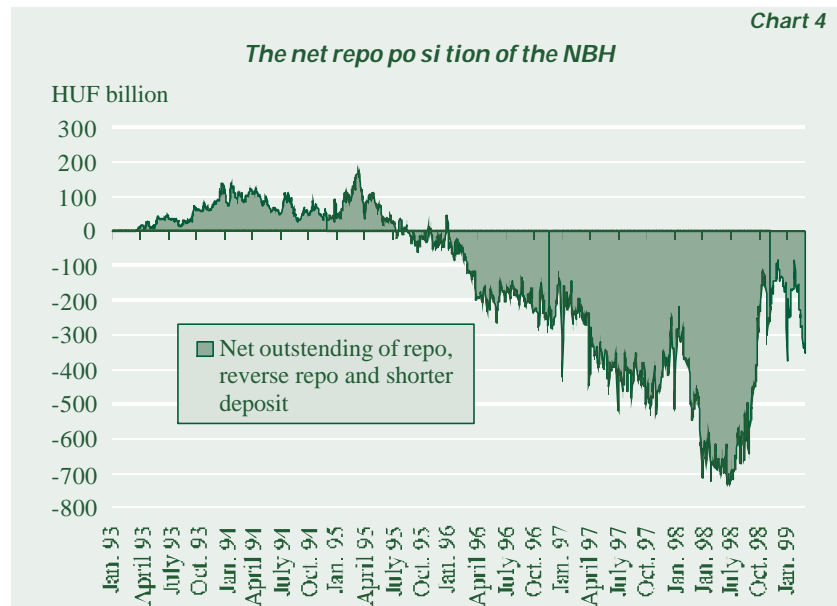
In Hungary the instrument called repo was applied for the first time in 1993. A prerequisite for repo introduction was a relatively well developed government securities market. On the basis of a dynamically developing government securities market the NBH changed its tools of operations from direct refinancing (assisted by interbank loans) to forward government bond repurchase transactions.

*repo was applied for
the first time in 1993*

The central bank introduced reverse repo as a standing facility, meanwhile repo was applied with a quantity limit set for each bank. The NBH fixed the individual limit on the basis of the size of a commercial bank's balance sheet. Initially the repo outstandings were quite substantial, since

*quantity limit set for
each bank*

- there were increased liquidity needs of some banks in trouble before and during bank consolidation and
- the NBH gradually continued the process of changing from central bank budget financing to market financing, thus sometimes there was a clear arbitrage gap between the repo and the T-Bill interest rates.



At that time the banks had to keep "liquidity reserve" and the most optimal instrument for this was government securities. This became an obstacle to the development of a repo market, since these securities were not available for any transactions, thus not for repo. This could be one of the reasons why currency swaps (with the same conditions) became increasingly popular.

the average maturity of repo instruments were gradually shortened

In February 1994 the central bank ceased the two-week, the six-month and the twelve-month repo facility and also the six and the twelve-month reverse repo, and introduced the two-week repo standing facility with fixed interest rate. In May a new technique of repo sale was introduced; two-week reverse repo was auctioned. This technique was viable until June and the maximum volume involved was Ft 14 billion, but from then on the banking system liquidity began to shrink and interest rate expectations rose.

On 5 September 1994 the NBH ceased the three-month repo and reverse repo facility, and in December the one-month repo financing facility was also closed. Thus the longer maturity instruments were gradually running out and they were only partly substi-

tuted by the shorter maturity asset side operations. In addition, from that time the set of maturities of the monetary instruments of the central bank were entirely different from the maturities of the instruments for budget deficit financing.

From the third quarter of 1995 the reverse repo outstandings of the NBH started to increase sharply and the position of the banking system against the central bank turned to the opposite, liability side. From 5 September 1995 the o/n reverse repo was also applied, and the o/n interest rate corridor took shape. From October the two-week reverse repo were applied as a standing facility instead of auctioning.

the o/n interest rate corridor took shape

In May 1996 ceasing the two-week reverse repo facility limited the possibilities of the banks in terms of pledging excess liquidity with the NBH. The "repo gap" was widening, since the o/n reverse interest rates of the NBH were reduced by 4.5 percentage points, while the o/n repo interest rate was lowered only by 2.75 percentage points. The repo proved to be an excellent instrument for sterilising excess liquidity arising from foreign currency inflow.

the "repo gap" was widening

During 1997 the NBH faced a rapidly increasing amount of sterilisation outstanding, while the government securities available to use as collateral in a reverse repo were limited. To avoid the problem emerging from the shortage of collateral securities for repo, the central bank substituted the one-month reverse repo by one month deposit. The deposit differed from the reverse only with one condition, the NBH did not put collateral behind the transaction.

the central bank substituted the reverse repo by the deposit

In 1998, in changing the general conditions for the instruments of the central bank, the repo and the deposit were also concerned. One-week repo ceased, and from the end of the year the system of repo limits – unchanged from 1995 – was revised and made more flexible.

In 1999 there some measures were taken to modify repo conditions, making the instruments more flexible. From 5 January 1999 repo and reverse repo quicktenders became a new available form of instrument for the central bank after the modification of the "General conditions of the NBH money market operations". Application of reverse repo is only a theoretical possibility in the near future, but in the longer run it can be feasible. There was a precedent in January for using repo quicktender (twice), after the operations within the limit proved too small for some banks, and they were not able to manage their liquidity. These repo quicktenders were fixed interest rate tenders with quantity limit, but the "General conditions" allow the NBH to call for each tender form (interest rate tender, quantity tender, unlimited condition tender) and the maturities are also very flexible.

in 1999 repo and reverse repo quicktenders became a new available form of instrument for the central bank

5.3 Functions of central banking repo

5.3.1 Controlling money supply by repo

The central bank is capable of affecting the money in circulation by many means. When the money market or the banking system is short of liquidity the repo is an appropriate tool for placing liquidity. And vice-versa, when there is excess liquidity in the market, central banking reverse repo is a suitable instrument to absorb the quantity of actual money.

Central banking repo can be applied in several ways to affect the monetary aggregates. The most widespread ones are the auctions and the standing facilities. Auctions with pre-fixed (offered) quantity have naturally limited effect on the monetary aggregates. But if the standing facility is used to control the amount of money on the market, it has to be combined with a quantity limit.

open market operations and a strict quantity limit

In Hungary open market operations were first introduced in 1993. From that time to 1995 the central banking repo was very effective, and it had a strict quantity limit (changes of the repo limit can be found in Appendix No. 1.). The NBH developed its repo operations on the basis of direct refinancing. Thus there were many maturities on the standing facilities, and a limit on the daily amount of transactions and later limit on the stock.

At that time the limit had a double function. First, according to the function of "lender of last resort" (see next point) it selected the troubled banks which needed even more liquidity from among the repo partners. Second, from the monetary policy point of view it limited the potential amount of the central banking money flow to the market.

In 1999, as the importance of liquidity management is growing, the effectivity of the limit is also more important; however, the benefits of maintaining such a limit are doubtful. With repo tenders and quick tenders the limit is already not used. The limit refers only to the o/n repo and swap.

5.3.2 "Lender of last resort" function

the accelerated liquidity problems would probably endanger the banking or the settlement system

The central bank fulfils the "Lender of last resort" function if any bank or credit institution has a huge individual and temporary liquidity problem, which is impossible to solve within the normal conditions of the banking industry and which, without central banking intervention, the accelerated liquidity problems would probably endanger the banking or the settlement system.

There are many tools which can be applied to fulfil the “Lender of last resort” function. It could involve an emergency loan, partial or entire exemption from satisfying the reserve requirement, or, as the mildest solution, repo within or over the limit.

Taking advantage of the repo can be done only with the appropriate amount of collateral. Earlier, selling a larger portfolio on a shallow government bond market could be disadvantageous (result in loss), or even impossible in some cases, thus it was an easier solution to turn to the central bank and ask for repo finance. However, the central bank tried to avoid giving funds at close to the market rate to a bank experiencing a major and not merely a temporary liquidity shortage. That was one of the reasons for introducing the emergency repo over the repo limit. This is limited only by the government security stock of the bank, but its interest rate is essentially higher than that for repo within the limit.

taking advantage of the repo

5.3.3 Repo as interest rate policy instrument

The central bank can also apply repo with a fixed interest rate term. Usually this is the most influential (benchmark) interest rate for the money market, since partners of the central bank can always receive short maturity funds at this cost. Changing these repo rates is also a very important signal for the banks, since, if the operations are effective, it has an important influence on the whole money market. One of the main benefits of the central banking repo is that the central bank can induce a great effect with a relatively small actual business operation – it can show the market participants the expected ideal level of interest rate.

the central bank can also apply repo with a fixed interest rate term

In Hungary the three months liability side instrument was associated with the benchmark interest rate. Applying that instrument the NBH was able to influence most effectively the basic unit of the credit market, the three-month credit. On the one hand, the central bank has to influence effectively the basic unit of credit pricing – in Hungary the three months credit (since the fixing period for a flexible interest-bearing credit is three months). On the other hand, a central bank has to intervene on an appropriate and permanently determining maturity.

the repo can function as the instrument for the main rate of the central bank

The larger, more open and more liquid the money market a country possess, the shorter the maturity with which a central bank is able to influence effectively the yield curve by employing determined interest rates. If a longer-term instrument has attractive (or seemingly attractive) conditions and a healthily operating money market has opposite expectations to the central bank, the market participants are able to concentrate huge strength and so the central bank can hardly, or only with high cost, maintain the instrument.

Otherwise, if the conditions of this instrument are not attractive, the direct interest rate determination of the central bank would be ineffective.

From March 1999 the NBH influences the three months credit pricing with a two-week (benchmark) fixed-interest instrument. (However, this is not reverse repo, but deposit today, but the effect would have been the same with the asset side repo). The maturity shortening (from one month) was necessary not only for liquidity management reasons, but also because of the quality and quantity development of the money market.

Repo rates were always important measures for the banking sector, even during the early period of repo – mainly in 1994 – when limits were exceeded and the interbank rates ran above the repo rates.

*the role of the repo in
the interest rate corridor*

The central bank's rates form a corridor for the interbank rates. On the upper edge of the corridor, the interest rate of the emergency repo is the theoretical maximum. In practice, however, the normative repo rate is the higher edge, except when an unforeseen liquidity problem occurs.

5.3.4 Repo for sterilisation

Central bank reverse repo is also useful for soaking up excess liquidity in the money market. Financially, credit institutions place their excess funds and the central bank places collateral behind it. For the partner bank the reverse repo is more beneficial than the deposit if the collateral received is transferable during the repo transaction. In practice, the pledged reverse repo (which the NBH applied until 1997) has no advantage for the market over the deposit.

*sterilisation with
reverse repo*

From July 1995 the NBH sterilised a gradually increasing amount. In the early period of sterilisation, there was only a very small amount of outright government bond sales in addition to the reverse repo. The reverse repo (or the deposit) is perfectly capable of sterilising market liquidity.

In place of the repo and short term deposit, longer term deposits (6 and 12 months) and the NBH Bill were introduced for a period of time to lengthen the duration of the sterilised outstandings.

5.3.5 Liquidity management by repo

A central bank can apply repo on both sides (credit and deposit side), so if necessary it can balance the liquidity shortage as well as the surplus of the market. To be able to intervene effectively on the money market when necessary, the central bank has to have a pre-

cise liquidity forecast, and an instrument which can be applied very quickly. Introducing the flexible repo as an instrument can serve the liquidity management purposes of the central bank in the form of tenders or quicktenders.

The monetary trends of 1998 and the fall of sterilised outstandings in September prepared a good basis for monitoring the movements of market liquidity more effectively, and, when necessary, for intervention. To reduce the volatility of interbank rates and to reduce the effect of a potential shock a large currency exchange outflow can induce, the NBH built several instruments of liquidity management into its operations.

From 1999, the new "General Conditions" introduced the potential instruments for more active liquidity management. They also encourage the central bank to develop the framework of a monetary policy which can actively reduce inflation, even within a modified exchange rate system.

It is possible to offer repo (or deposit) on a normative tender, but in the beginning of 1999 there was no reason for it. However, the (also new) quicktender was applied twice in January.

from 1999 new potential instruments for more active liquidity management became available

5.4 Importance of market repo for the central bank

Considering the more effective monetary transmission mechanism and information about market trends, the central bank considers as one of its targets to assist the development of the money market. Of course, this objective is not more important than the direct targets of monetary policy.

Development of the repo market encourages the formation of a deeper, more liquid money market. The credit limits set between banks for each other define its essence, if the risk is covered by liquid government securities. Trading the security received as collateral is possible during the maturity if delivery transaction is applied. Thus there is a natural need for a liquid government securities market, secure legal infrastructure, and an adequate trading and settlement environment.

trading the security received as collateral is possible during the maturity if delivery transaction is applied

Spreading market repo is important, since it encourages riskless and short-run credit operations. Without a repo market there is no security behind short credit, thus interest rates are higher to cover the excess risk or the costs are higher for the party in need of money, due to the transaction costs of the collateralisation. Credit costs can be made lower by establishing and implementing a repo market, and so the short maturity interest rates can also be shrunk.

spreading market repo is important, since it encourages riskless and short-run credit operations

*the possibility of the
NBH for the develop-
ment of the repo
market*

The NBH is capable of, and intends to encourage the development of the Hungarian repo market by initiating some measures. First, it can examine the regulatory and legal environment, as to whether it is capable of offering an optimal framework for the development of the repo or not. If some complicating factor is discovered, it can propose a measure to deal with it.

Second, the central bank can look at its operations and examine the possible modifications in favour of the development of the repo market (without efficiency loss for monetary policy).

Third, it can assist bond-dealers and liquidity managers to be even more aware of the potential advantages and attributes of repo.

Furthermore, the central bank is ready to assist setting up a general agreement on repo transactions if it is necessary, to make the repo more secure and standardised, thus making it easier to book them. Finally, the NBH can initiate ways to simplify the techniques of settlement, to develop a collateral daily valuation system and the facility for substituting collateral.

Appendix

Appendix No. 1

Changes of central banking repo limit in Hungary

The amount of repo stock a partner bank can have was limited from the beginning. There was a natural limit too, being the amount of the freely transferable government securities in the bank portfolio applicable for collateralisation. The NBH also set up an artificial limit in 1993, since there were some banks with serious liquidity problems and the uncontrolled rise of monetary aggregates was not desirable.

In the early years of central banking repo, the repo had a daily transaction limit. That means that the daily maximum amount of operations per each bank were framed for each maturity. The limit was set on the basis of the balance sheet total of the counterparty banks. This was also important because the central bank had physically limited capacity in the dealing room. Effectively, at that time, this did not function as a limit in practice since the total limit (Ft 472 billion) was much higher than the demand. It was a more theoretical limit, because it could halt any sharp rise of repo outstandings from one day to another. In March 1995 there was a radical cut in these limits, thus making them effective. The repo became unsuitable for the function of "Lender of last resort" in the long run.

The large reductions of the repo limit occurred in 1995. During the early months, maintaining the transaction limit method, the limits were cut twice. In the second half of the year the method itself changed, and a limit directly on the stock was introduced (this is still in use). After the final change of the year, the banking system total limit was reduced to Ft 63.5 billion. However, liquidity shortage on the market started to disappear, thus even this strict limit had little effect.

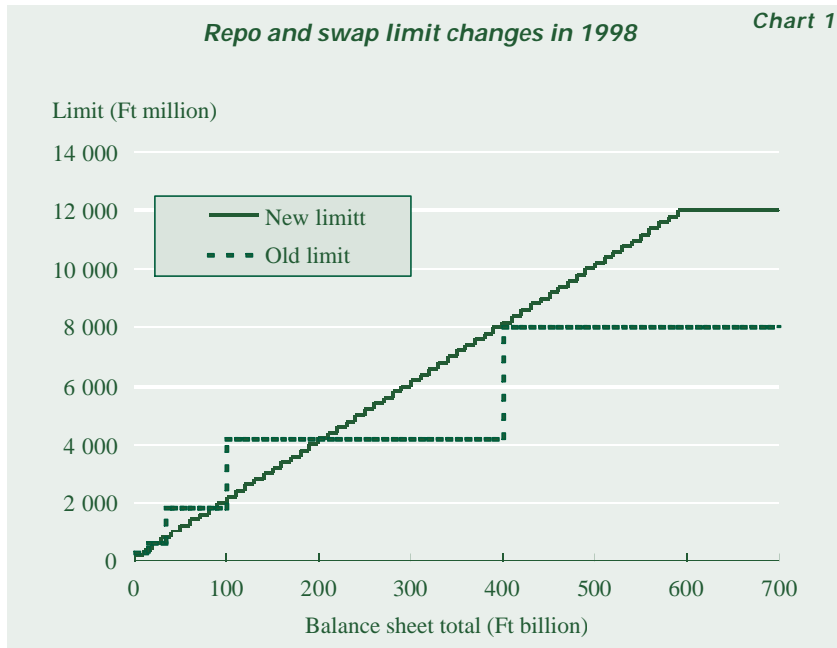
After the 1 September 1995 modification, the limits and categories were unchanged for a lengthy period. Three years later, in 1998, the bank balance sheets were so diverse that the differences

between categories were not appropriate for the differences between banks. And after the international crises the possibility of a longer term liquidity shortage was looming, and it appeared the credit institutions would be more willing to apply for central bank repo. Preparing for that, the NBH made a new system of limit, but still used the stock limit method.

The modification ended the categories and the banks are automatically entitled to the amount in the limit, which is revised once every three months. The new limit regulation gives the banks a close to fixed percentage of their balance sheet total as maximum repo limit. The size of the limit is Ft 200 million, plus Ft 200 million for every Ft 10 billion of the balance sheet total, but it can never be more than Ft 12 billion, or Ft 20 billion from 1 June 1999.

Transaction limit	From 20 March 1995		From 2 May 1995	
Balance sheet total of the bank	Maximum stock a bank can hold utilising the full daily transaction limit every day	How much of the maximum stock can be in one week maturity repo	Maximum stock a bank can hold utilising the full daily transaction limit every day	How much of the maximum stock can be in one week maturity repo
Above 400	-	-	8,00	0,50
100-400	8,00	1,00	5,00	0,50
20-100	2,00	1,00	2,00	0,25
10-20	1,00	0,50	0,60	0,10
Below 10	0,50	0,25	0,18	0,08
Total repo limit of the sector		220,00		130,00

Stock limit system	Maximum daily repo stock	
Balance sheet total of the bank	From the 1 July 1995	From the 1 September 1995
Above 400	10,0	8,0
100-400	7,0	4,2
35-100	3,0	1,8
15-35	1,0	0,6
Below 15	0,5	0,3
Total repo limit of the sector	102,5	63,5



Repo, reverse repo and deposit in the “General Conditions of the Forint Money Market Operations”

From 4 January 1999 a modified version of the “General Conditions” came into operation, involving some changes for central banking repo.

The pledged reverse repo and the deposit are, legally, treated differently in the regulation, but their economic content is basically the same.

Central banking repo can be sold in several forms. The NBH can apply standing facility, periodic standing facility (open only on some days as standing facility), tender and quicktender. Delivery repo can also be applied.

The differences of quicktender in relation to tender are as follows:

- the time for bids is only 30 minutes, as against 3 hours,
- there is 30 minutes for the evaluation of bids, as against 2 hours,
- T-day settlement, as against T+1,
- only banks are allowed to participate, as against banks plus special credit institutions,
- the NBH only accepts bids coming by Reuters Deal ing, not by fax,
- one institution can make only one bid, as against the five.

The tenders can appear in many forms such as fixed quantity tender, fixed interest rate tender, limited quantity fixed interest rate tender or unconditioned tender (no prefixed amount and interest).

The interest rate tender is basically the same as the periodic standing facility. The NBH accepts each bid on the prefixed interest rate. The interest rate tender differs from the periodic standing facility in some formal aspects (making the offer, publishing the result, etc.) and in the regularity of their occasions; the call for a tender is not regular, but refers to a discrete date.

The limited quantity fixed interest rate tender differs from the interest rate tender in the quantity limit. Thus in this case the NBH accepts bids only up to the limit. The NBH maintains the right to change the amount of offer after the bids are submitted. If demand exceeds the offer, the bids are allocated proportionately.

In calling for a quantity tender, only the amount of offer is fixed in advance. The counterparties bid for the interest rate accompanying the amount. The NBH accepts the most beneficial bids in order,

up to the amount of the offer as an upper limit. The NBH also has the right to change the amount of offer after the bids are submitted.

The unconditional tender call contains the date, maturity, subtype, but not the interest rate and the amount. The counterparties give bids for the interest rate associated with an amount, and after all the bids are submitted the NBH arranges them to order and starts to accept them from the most to the least advantageous up to a limit that appears ideal for the NBH.

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