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Pension companies will have large liquidity needs if interest rates rise

Liquidity risks from central clearing must be managed

Pension companies must be able to manage, on their own, the liquidity risks associated with margin calls arising from market value fluctuations of derivative contracts.

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Central clearing of derivative contracts will increase

Pension companies' exemption from the requirement for central clearing of derivatives will expire at the latest in 2023. Hence, companies' need for liquidity in the form of cash deposits will grow.

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Liquidity needs may be substantial

In the event of large interest rate increases within a short period of time, the sector will need to post cash deposits of kr. 100 billion as variation margin for open derivative contracts.

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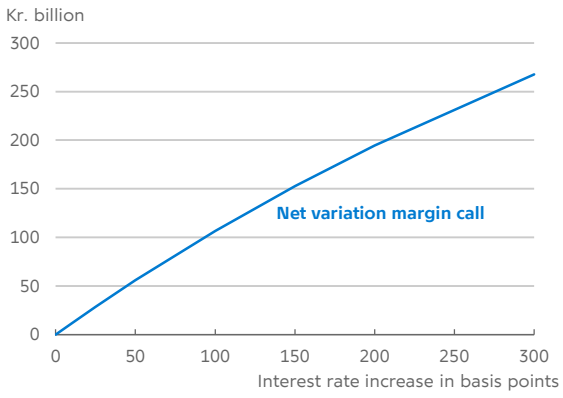
Pension companies'[1] need for liquidity will increase when the sector has to meet the requirement for central clearing of interest rate swaps and other derivatives. Pension companies' exemption from central clearing under the European Market Infrastructure Regulation, EMIR, will expire by 2023. The new rules imply that the sector must be able to manage the liquidity risk – also in a stressed market, where access to liquidity may be limited. Companies' variation margin must be posted mainly in euro followed by Danish kroner. In addition, the need for liquidity requires pension companies to have links to several Danish and international banks and possibly ensure access to centrally cleared repo markets where bonds can be pledged as collateral for short-term loans. A scenario in which interest rates go up by 1 percentage point over a couple of days is not implausible. Therefore, pension companies should be prepared to manage margin requirements at all times. If the sector is unable to obtain adequate access to liquidity, it may be necessary to reduce the use of derivatives.

While this analysis focuses on the evolving practices for the margining of interest rate derivatives, pension companies may face similar margining requirements with regard to derivatives based on other underlying assets such as foreign exchange and equities.

The variation margin call increases when interest rates increase Chart 1



Note: The chart illustrates the change in the market value of open interest rate swaps for selected pension companies due to increasing interest rates.
Source: Danmarks Nationalbank.

Hedging of interest rate risk creates a need for liquidity

Pension companies use derivatives to hedge various risks, including interest rate risk. The posting of variation margin for fluctuations in the value of derivative contracts is normal practice. Pension companies' derivative contracts are increasingly cleared by a central counterparty, CCP. When derivative contracts are centrally cleared, the change in the market value of derivative contracts is netted on a daily basis. Daily margining must be provided as cash deposits, as cash is the most easily negotiable asset.[2] For bilateral derivative contracts, with only two parties, it is easier to make legal agreements that allow for financial assets such as bonds to be pledged as collateral.

Central clearing of derivative contracts thus requires pension companies to be able to access liquidity. If a pension company is unable to manage this liquidity risk, it may result in "technical default"[3] on the derivative contracts, which could ultimately affect the company's solvency.

As pension companies use interest rate derivatives to hedge their long-term liabilities, an increase in interest rates could lead to a decrease in the value of the derivative contracts. Calculating the change in market values based on pension companies' open interest rate derivatives, in the event of a rise in interest rates of 100 basis points, pension companies will need to post variation margin corresponding to kr. 106 billion, see Chart 1.[4] This amounts to 3-4 per cent of the sector's total assets. Since pension companies have practically no bank deposits, this makes heavy demands on companies' ability to access liquidity very quickly. Within the results, there is substantial variation among the individual companies. If interest rates rise by 100 basis points, some companies will

1 In the analysis, *pension companies* cover multi-employer occupational pension funds and life insurance companies.

2 See European Commission, *Baseline report on solutions for the posting of non-cash collateral to central counterparties by pension scheme arrangements, A report for the European Commission prepared by Europe Economics and Bourse Consult,* European Union, 2014 (*link*).

3 Technical default on derivative contracts occurs when the companies fail to meet the variation margin call following a change in the market value of underlying derivative contracts.

4 See Box 2 for a description of approach.

have to post cash deposits of up to 7 per cent of their total assets.

The need for liquidity must be managed by pension companies

Pension companies use interest rate derivatives to hedge pension liabilities

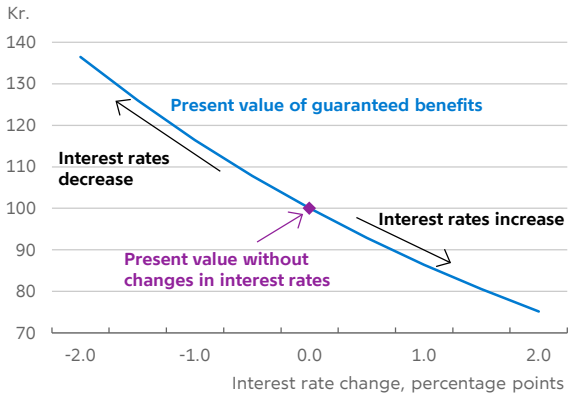
The liabilities of pension companies often extend well into the future, thus giving companies very long investment horizons. Consequently, interest rate changes have a marked impact on the value of both assets and liabilities. Guaranteed benefits account for some of the pension companies' liabilities. The guarantees cover benefits taking effect when the customers retire, so they often fall due many years into the future. The present value of the guaranteed benefits depends on the rate of interest. The higher the rate of interest, the lower the present value of the liabilities and vice versa, see Chart 2.

Interest rate risk is thus one of the most significant risks facing pension companies. Companies may mitigate the risk by purchasing assets with similar interest rate risk characteristics, such as bonds. If the duration – a measure of interest rate risk – of the bond portfolio and of the liabilities is the same, then a company's reserves will not be severely affected by interest rate fluctuations. Interest rate derivatives can also be used to increase the duration of a company's assets. Hence, pension companies use interest rate derivatives, including interest rate swaps, see Box 1.

Liquidity must be raised very quickly

Pension companies must manage the liquidity risk associated with the posting of variation margin in the form of cash deposits when using interest rate derivatives. For centrally cleared derivative contracts the companies receive, at the end of the day, the net margin requirement following from changes in the value of the derivative contracts – the variation margin call.[5] The variation margin call must be paid the next morning and is then transferred from the counterparties who have experienced negative

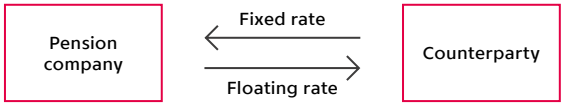
The present value of guaranteed benefits falls when interest rates rise Chart 2



Note: Stylised example of how the present value of guaranteed benefits is affected by changes in interest rates.
Source: Danmarks Nationalbank.

How an interest rate swap works Box 1

A typical interest rate swap is a contract between two parties to exchange future cash flows. An interest rate swap has two legs: a floating and a fixed leg. For the floating leg, one party pays a short-term floating interest rate, depending on market rates. For the fixed leg, the other party pays a fixed rate, determined at the time of execution of the swap contract. Pension companies typically enter into interest rate swaps to receive the fixed rate and pay the floating rate.



The market value of the interest rate swap is usually zero at execution of the contract. If the floating rate and the expected future short-term rates to be paid change over the term of the contract, the value of the contract will change. If the floating rate increases, the value of the contract declines for the fixed-rate recipient and vice versa. This means that the market value becomes negative for the fixed-rate recipient, so that margin must be provided to cover the market value change.

5 In the event of particularly large intraday changes of the value of centrally cleared derivatives, the CCP may also require the pledging of collateral during the day.

revaluations to the counterparties who have experienced positive revaluations. In order to meet the variation margin call, companies must have liquidity in the form of cash deposits. If interest rates rise considerably within one day, and if companies have insufficient liquidity at their disposal, they can use repo markets.

The alternative to raising liquidity through repo markets is to sell assets such as bonds or equities. If other European market participants also have to sell bonds to meet similar margin requirements, pension companies risk suffering large capital losses. However, the liquidity in use to meet the variation margin does not disappear from the system, but is transferred to the counterparties on the other side of the derivative contracts. Therefore, accessing the required liquidity may be eased because the counterparty has to place the liquidity received. This can help the pension companies in two ways: 1) the counterparty later lends the liquidity it has received to pension companies via reverse repo, 2) the counterparty purchases assets held by the pension companies.

It is standard practice for repo transactions and sales of assets to be settled two days after execution (T+2), meaning that overnight liquidity needs cannot be met. Shorter settlement times for asset transactions and repos are technically possible, but likely to be difficult and involve less favourable prices.

Sound liquidity management is needed

In order to avoid the risk of forced sales of liquid assets, pension companies need sound liquidity management to be able to obtain the necessary liquidity. That can, for instance, happen through repo markets which have a large capacity to handle increased demand for liquidity.[6] In order to access liquidity through repo markets, pension companies must have established links to both Danish and international banks and, possibly, have access to centrally cleared repo markets. There may be factors limiting banks' willingness to enter into a repo transaction with a pension company. If a bank acts as a market maker by entering into a repo and an offsetting reverse repo with some counterparty and a pension company, respectively, this will increase the bank's balance sheet and leverage ratio.[7] If these factors impact the bank, it could be reluctant to enter into a repo transaction with a pension company. In recent years, banks have tended to want to limit their repo transactions near year-end, resulting in a steep rise in repo rates.

For some of the pension companies' derivative contracts, the variation margin must be posted in euro. It is generally not possible to meet the need for cash liquidity through the krone market as spot transactions in the foreign exchange market have settlement time of two days and consequently cannot be used to obtain euro as overnight cash deposits. If it is not possible to obtain adequate access to liquidity, it may be necessary to reduce the use of interest rate derivatives. An alternative to interest rate derivatives could be bond purchases, adding duration to companies' asset portfolios and thereby reducing the need for derivatives. However, the supply of bonds with long duration could limit the use of this strategy.

Central clearing reduces the systemic risks of derivatives transactions

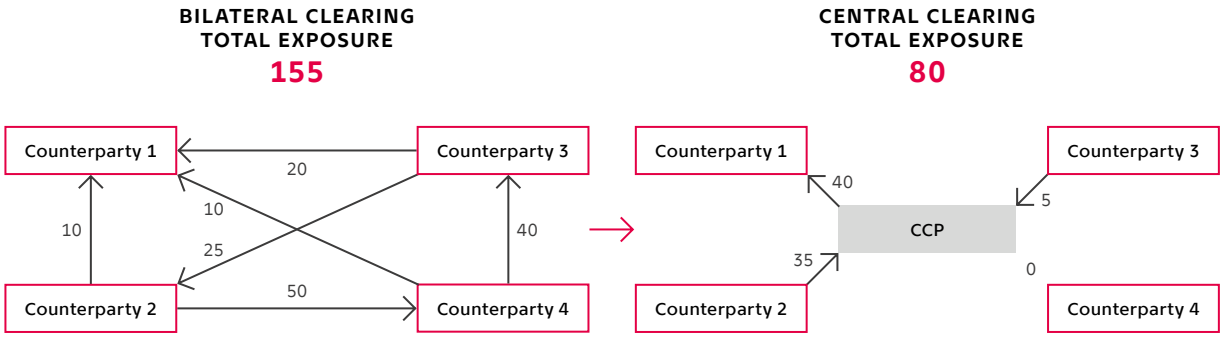
Central clearing gained focus after the financial crisis

During the financial crisis in 2008-09, it became clear that derivative transactions between two parties without a CCP (bilateral transactions), could add to financial market uncertainty in periods of stress. The uncertainty was due to counterparty risk and uncertainty about the interconnectedness of financial institutions in relation to bilateral derivatives. In the wake

6 See Danmarks Nationalbank, Lengthy period of increasing risk appetite in parts of the banking sector, *Danmarks Nationalbank Analysis (Financial Stability – 1st Half 2018),* No. 6, May 2018.

7 If the repo transaction is settled with a government bond, the leverage ratio will not increase on a one-to-one basis with the balance sheet, since government bonds are not weighted with a factor of one in the leverage ratio. A reverse repo for a bank will also affect the bank's net stable funding ratio, NSFR, as 5 per cent of the lending amount must be financed by long-term liabilities. Hence, the leverage ratio and NSFR both set limits for the amount of liquidity a bank will be able to provide to the pension sector through the repo market. The leverage ratio and NSFR are both reporting requirements, but will become binding statutory requirements in 2021.

Central clearing reduces the counterparty risk on derivative contracts Chart 3



of the financial crisis, new regulation was introduced in the form of EMIR, under which all standardised OTC derivatives, including interest rate swaps in euro and dollars, should be centrally cleared by a CCP.[8]

For central clearing purposes, the CCP intermediates between the buyer and seller in a derivative transaction, thus acting as a buyer for the seller and as a seller for the buyer. Rather than a single bilateral transaction, the CCP enters two separate, offsetting transactions with each of the parties. The CCP thus guarantees the contractual obligations between the parties.[9] In central clearing, the margins are netted, thereby reducing the aggregate variation margin and thus the aggregate counterparty exposure, see Chart 3. As contracts are netted on a daily basis, variation margins, which are posted as cash deposits, are transferred from net losers to net winners.

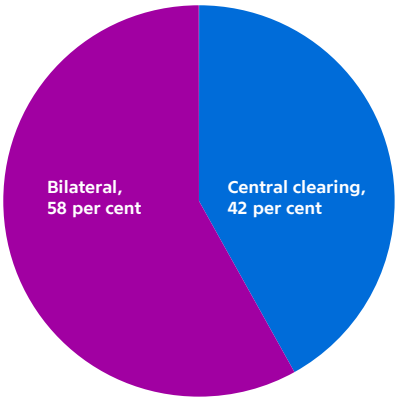
Bilateral derivative contracts do not necessarily lead to the same need for liquidity

In bilateral transactions, the pension company and the counterparty agree on the terms under which the swap is to be executed, including margining requirements for fluctuations in the market value of the swap. According to previous market practice, both cash deposits and secure liquid assets could be posted. As pension companies have relatively large portfolios of secure liquid assets, bilateral margining has not been a problem. However, recent years have seen a trend towards cash deposits as variation margin in bilateral derivative contracts.

Danish pension companies' exemption from the requirement for central clearing will expire by 2023

The requirement for central clearing of standardised OTC derivatives was implemented in European law by EMIR. However, Danish and other European pension companies are currently exempt from the requirement. The exemption will expire by 2023, at the latest. Pension companies are already using central clearing to some extent, see Chart 4. Overall, approximately 42 per cent of their interest rate derivatives are cleared by a CCP, while this share varies considerably across companies.

The majority of pension companies' interest rate derivatives are bilateral contracts Chart 4



Note: Data based on Danish pension companies' interest rate derivatives at end-September 2018.
Source: Danmarks Nationalbank.

8 EMIR also introduced minimum standards for margining of non-standard OTC derivatives which do not have to be centrally cleared.

9 See Danmarks Nationalbank, Clearing via central counterparties in Denmark, *Danmarks Nationalbank Monetary Review,* 3rd Quarter, 2010.

An unmet variation margin call can lead to an unhedged interest rate position

If a company is unable to post variation margin to the CCP, via its clearing member, the company will breach the terms under which the derivatives were executed, and the company will enter technical default. As a result, the contracts with the clearing member will be terminated, and the CCP will attempt to resell the contracts to other counterparties in the market. In the event of technical default, the pension company will also lose part or all of the collateral posted when entering the derivative transaction, i.e. the initial margin, as the initial margin is used to cover potential losses for the CCP. If the company uses derivatives to hedge, e.g. its interest rate risk, the company will lose its hedge and possibly its access to the derivatives market. In periods of market turmoil, when interest rates may fluctuate considerably, the company's risks will not be hedged, and the potential effect on the balance sheet may thus be substantial. Ultimately, a company may breach its solvency requirement if interest rates plummet during a period when the company has not hedged its interest rate risk. Furthermore, derivative contracts include cross-default clauses. This means that if a pension company enters technical default on part of its derivative portfolio, unaffected parts of the derivative portfolio may also enter technical default due to those clauses. In such cases, the pension company may be faced with the termination of its entire derivative portfolio, with possible cross-default effects on other liabilities.

The sector does not have considerable liquid deposits

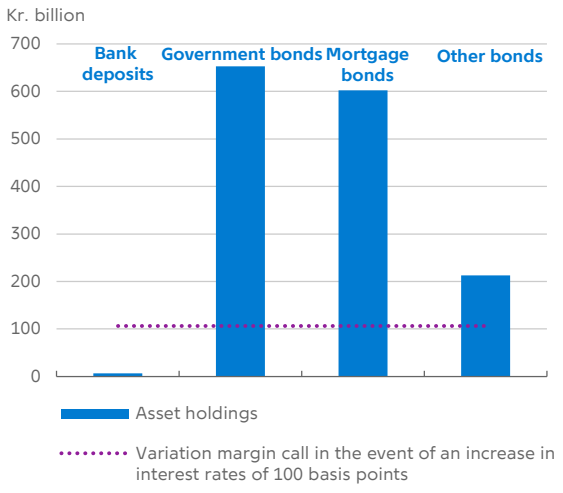
If interest rates rise by 100 basis points, pension companies do not currently have sufficient liquid deposits to meet the variation margin call, see Chart 5. Their liquid resources typically consist of cash deposits, liquid assets that can be sold, and the possibility of raising liquidity through the repo market. Pension companies often have only relatively small cash deposits, as they seek to invest the funds to obtain a long-term positive return. Moreover, larger cash deposits would increase pension companies' counterparty risk to banks.

The need for liquidity can be substantial

Large interest rate changes are not unusual

Historically, there have been substantial daily and weekly increases in the interest rates on which many derivative contracts are based. For example, the largest increase over a five-day period amounted to more than 80 basis points, see Chart 6. Hence, an interest rate scenario of 100 basis points or more is not implausible, and pension companies should be prepared to manage margin requirements in such a scenario.

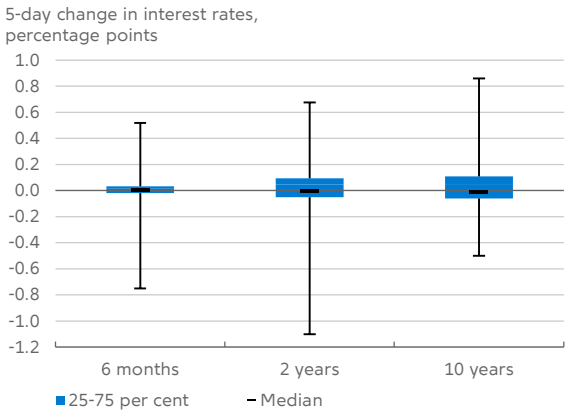
Companies' bank deposits will not cover a 100 bps variation margin call Chart 5



Note: Portfolio of assets for companies included in the analysis.
Source: Danmarks Nationalbank.

Large interest rate changes within one week are not unusual

Chart 6



Note: Distribution of cumulative five-day changes in Euribor on maturities of six months, two years and 10 years. Interest rate changes have been calculated on the basis of data from 1 May 1987. Endpoints indicate the smallest and largest changes over the period.
Source: Thomson Reuters Datastream.

How we proceeded

Box 2

Information on 22 insurance and pension companies' interest rate derivative transactions have been used to calculate the companies' variation margin requirements. The data stems from the companies' Solvency II reporting and is based on all companies' interest rate derivatives at end-September 2018. For all derivative contracts, it has been calculated, based on the principal and the underlying contract type, how much the market value may change as a result of a parallel shift in the yield curve.

Technically, it is assumed that all contracts are centrally cleared by one CCP and that all contracts are netted. All else equal, this assumption will contribute to the underestimation of margin requirements. Conversely, EMIR does not require central clearing of derivative contracts in Danish kroner, which will contribute to the overestimation of cash margin requirements. Most of the companies' interest rate swaps are in euro, however.

ABOUT ANALYSIS

As a consequence of Danmarks Nationalbank's role in society we conduct analyses of economic and financial conditions.

Analyses are published continuously and include e.g. assessments of the current cyclical position and the financial stability.

The analysis consists of a Danish and an English version. In case of doubt regarding the correctness of the translation the Danish version is considered to be binding.

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FINANCIAL STABILITY

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