

4

CREDIT RISK MANAGEMENT: TRANSITION TO TWO-WAY COLLATERAL AGREEMENTS

The central government has used swaps in its management of interest rate and exchange rate risks on the debt portfolio since 1983. The credit risk on the swap portfolio has been reduced continuously as a result of improved risk management. The introduction of one-way collateral agreements in 1999 meant that the banks had to pledge collateral to the central government for part of the market value of the swap portfolio.

In 2015 the central government completed negotiations with the swap counterparties on a new basis of agreement with two-way collateral, meaning that the central government will also pledge collateral to the banks when the market value is positive for them. This transition mainly reflects that higher fi-

ancing costs have made it more expensive for the banks not to receive collateral. The transition from one-way to two-way collateral agreements will thus enable the central government to obtain better terms in swap agreements. The two-way collateral agreements entail, that both parties are to pledge collateral in Danish kroner on a daily basis for the full market value of the swap agreements. This has reduced the central government's credit exposure to almost zero.

Overall, the transition to two-way collateral agreements has resulted in better swap prices, lower credit exposure and fewer operational costs and risks for the central government.

THE CENTRAL GOVERNMENT'S USE OF SWAPS

The central government has used swaps for more than 30 years. Two swap types are used: interest rate and currency swaps. An interest rate swap is an agreement to exchange interest payments, e.g. by receiving fixed interest payments in return for paying variable interest. The central government

uses interest rate swaps to adjust the interest rate risk profile of the debt portfolio so that issuance policy can focus more on other objectives, including building up large, liquid bond series and keeping refinancing risk at a low level. Currency swaps are used in connection with the central

government's foreign borrowing. Foreign debt is raised in order to maintain the foreign exchange reserve and is exposed to euro only. Currency swaps give the central government more flexibility in its foreign borrowing.¹ Today the central government uses only plain vanilla interest rate and currency swaps.

The terms of the central government's swaps ensure that when a swap is transacted, its market value is zero, but over time it may become either positive or negative for the central government or the counterparty (bank), depending on the development in interest and exchange rates. The central government typically receives a fixed interest rate and pays a variable interest rate in its interest rate swaps. The fall in interest rates in recent years has increased the value of the fixed interest payments in the central government's interest rate swaps. As a result, the market value of the central government's interest rate swaps is positive.

A swap with a positive market value is an asset for the central government. This entails that the counterparty must compensate the central government if the swap is cancelled, since in that case the central government will lose the value of the outstanding cash flows in the swap. A positive market value thus means that the central government has a credit risk on the counterparty bank. The credit risk depends on the credit exposure to the bank, corresponding to the market value of the swap less any collateral, and on the probability of the bank failing to meet its payment obligations. The central government has suffered no losses on the swap portfolio since the first swaps were concluded in 1983.

HOW IS THE CENTRAL GOVERNMENT'S CREDIT RISK MANAGED?

Until the mid-1990s, the central government contained its credit risk by following relatively simple guidelines, in accordance with the market standard. The focus was on ensuring that a counter

party had a sufficiently high credit standard at the time of transacting the swap, and on diversifying the swap agreements across a large number of banks. This contributed to lowering the credit risk on the central government's total swap portfolio by reducing the probability of loss while also diversifying the credit exposure. In 1994 the central government established a system that set limits to the credit exposure to the individual banks.² At the same time, a requirement was introduced for a rating trigger in all new transactions, which made it possible to terminate swaps if the bank's rating fell below a certain level. This ensured a high credit quality of the banks throughout the lifetime of the swap.

The late 1990s saw growing international interest in further reducing credit exposure on swaps. As a result, the central government in 1999 introduced a requirement for pledging of collateral to the central government for part of the market value of the swap portfolio. Chart 4.1 shows the development in the central government's credit risk management.

PLEDGING OF COLLATERAL TO THE CENTRAL GOVERNMENT REDUCES ITS CREDIT EXPOSURE

Around the turn of the millennium, the market standard for sovereigns with a high credit rating was to transact swaps with a one-way Credit Support Annex³, CSA, while most other market participants used two-way CSAs. The one-way CSA entailed pledging of collateral to the central government when the market value was positive for the central government, while the central government did not pledge collateral when it was positive for the bank.

Under the one-way CSAs, the banks were to pledge collateral if the market value exceeded a threshold value that would depend on the bank's rating. The lower the rating, the lower the threshold value would be. As a result, the credit exposure to a bank would fall if the bank's credit quality declined and the probability of loss was assessed to be higher.

The banks pledged collateral to the Danish central government by means of bonds of high credit

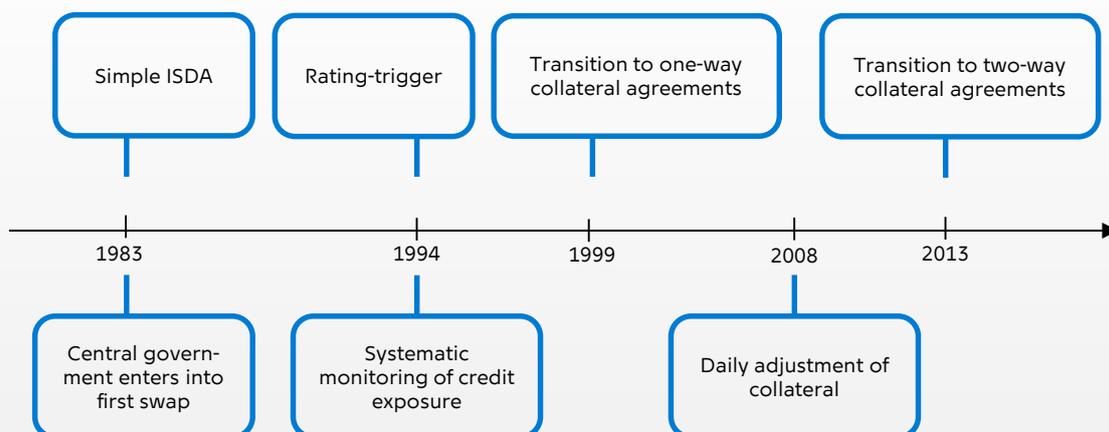
1 For example, a loan can be raised in dollars combined with a currency swap converting the exposure to euro. This enables the central government to expand and diversify its group of investors, while at times also entailing lower financing costs compared with raising euro-denominated loans.

2 Cf. *Danish Government Borrowing and Debt 1994*, Chapter 7. Available in Danish only.

3 The Credit Support Annex regulates the terms of collateralisation of swap agreements.

Central government's credit risk management over time

Chart 4.1



Note: ISDA = International Swaps and Derivatives Association Inc. When entering into a swap, the legal conditions are determined in an ISDA agreement, which is the overall framework for international over-the-counter derivatives.

Government credit exposure since 1997

Chart 4.2



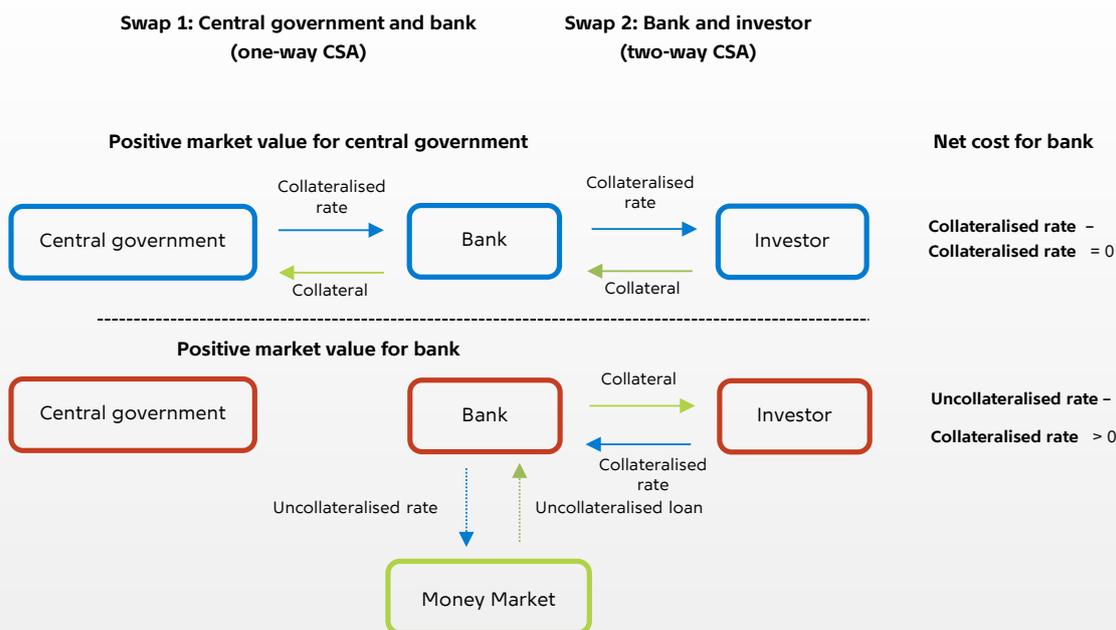
Note: Market value of outstanding swaps less collateral received from banks. Calculated excluding currency swaps with Danmarks Nationalbank. Before 2007, the credit exposure is calculated as the market value minus pledged collateral plus a calculated potential credit exposure, which compensates for the possible increase in the market value of the swap portfolio over a horizon of one month.

quality, initially on a monthly basis.⁴ Since 2008 collateral has been adjusted on a daily basis. The introduction of one-way CSAs contributed to considerably reducing the central government's credit exposure after 1999, cf. Chart 4.2. Since 2009, the decrease also reflects a reduction of the central government's swap portfolio.

HIGHER COSTS OF ONE-WAY CSA

One-way CSAs are still widespread among European debt management offices. However, since the financial crisis several sovereigns have moved towards two-way CSAs or clearing via a central counterparty, CCP. One reason is that it has become more expensive for the banks to finance the lack of collateral in one-way CSAs if they hedge swap transactions. Moreover, banks have increased their focus on credit risk in swap agreements, among other.

⁴ The calculation of collateral took into account the possibility of the market value rising over the month.



Note: The green arrows denote exchange of collateral, while the blue arrows denote remuneration of the collateral. Uncollateralised money market interest rates are typically closely linked to Euribor or Cibur, while collateralised money market interest rates are typically Eonia or the Tomorrow/Next rate.

LACK OF COLLATERAL IMPLIES HIGHER FINANCING COSTS FOR BANKS

Chart 4.3 illustrates how not receiving collateral under a swap agreement may entail higher costs for banks. When the central government transacts a swap with a bank (swap 1), the bank will typically hedge the exposure by transacting a corresponding, but opposite, swap with an investor (swap 2). The agreement between the bank and the investor is generally with two-way CSA.

If the market value is positive for the central government, the bank may pledge the collateral received from the investor as collateral to the central government. Conversely, if the market value is positive for the bank, the central government does not have to pledge collateral under one-way CSAs. This means that it is up to the bank to raise the collateral it needs to pledge to the investor. The price is typically closely linked to an uncollateralised money market interest rate, while the bank only receives a collateralised interest rate as remuneration for pledging collateral to the investor. Hence, the cost of one-way collateral can be approximated by the spread between uncollateralised and collateralised money market interest rates.

Before the financial crisis, the spread between uncollateralised and collateralised money market interest rates was at a very low level both in Denmark and in the euro area, but it has widened since then, cf. Chart 4.4. This has increased the banks' costs of transacting swaps without receiving collateral. The banks seek compensation for this cost by increasing the costs of transacting swaps under one-way CSAs. The size of the compensation demanded varies over time. According to the banks' estimate, their expected net cost of not receiving collateral in a 10-year interest rate swap in euro has varied between 2 and 10 basis points in recent years. For an interest rate swap with a principal of 100 million euro, this corresponds to an increase in the central government's interest costs of 20,000-100,000 euro per year.

Short-term Danish government yields are normally close to the interest rate received on the collateral. So, typically, pledging of collateral does not entail any costs for the central government – as it does for the banks.

INCREASED FOCUS ON CREDIT RISK

Since the financial crisis, the banks have increased their focus on credit risk, including exposures to

Spread between uncollateralised and collateralised money market interest rates

Chart 4.4



Note: Uncollateralised interest rates are Cibur and Euribor, while collateralised interest rates are Cita and Eonia swap rates. All interest rates are 3-month interest rates.

Source: Bloomberg.

sovereigns. In one-way CSAs, banks are exposed to the entire market value of the swap when it is positive for the bank. This means that the bank risks a loss if the central government defaults on its payments obligations. To a larger extent than seen before, banks are seeking compensation for this credit risk by making it more expensive to transact swaps under one-way CSAs. This should be seen in light of the European sovereign debt crisis, which saw a significant rise in the price of hedging sovereign default through credit default swaps (CDS).⁵

TRANSITION TO TWO-WAY CSA

In 2013, the central government commenced negotiations with existing counterparties on new two-way CSAs, with the aim of obtaining better swap terms.⁶ In connection with the transition, it was decided also to renegotiate other parts of the

basis of agreement with a view to further reducing the credit risk on swaps, among other aims. Moreover, system upgrades have enabled the swap parties to internalise the collateralisation without involving a tri-party in the future. Overall, the transition has resulted in better swap prices, lower credit exposure and fewer operational costs and risks for the central government.

RENEGOTIATION OF THE BASIS OF AGREEMENT

The terms of the central government's swap agreements are determined by ISDA agreements and agreements under the Credit Support Annex. The ISDA master agreement is the overall framework for international over-the-counter derivatives, while the Credit Support Annex regulates collateralisation.

Standardised agreements have been concluded with a view to providing a simple administrative setup and a level playing field for the banks. The banks had a great variety of approaches to the basis of agreement, which resulted in a prolonged process for some banks. Typical issues in the negotiations were pledging of collateral in kroner rather than euro and continued application of a one-way rating trigger.⁷

Agreements have been concluded with 13 banks, and the central government will use these agreements for swaps in the future, cf. Table 4.1. Existing swaps with the banks have been transferred to the new basis of agreement.

The highlights of the central government's new and previous basis of agreement are summarised in Table 4.2. The most important changes are outlined below.

Reduction of threshold value and minimum transfer amount (MTA)

In order to reduce the central government's credit risk, the threshold value – which in the one-way CSAs depended on the bank's rating – was lowered to zero. A threshold value of zero is the market standard in two-way CSAs, entailing pledging

5 Cf. *Danish Government Borrowing and Debt 2012*, Chapter 11.

6 The central government could also have opted for CCP clearing of its interest rate swaps. However, at that time, the central government could not obtain the same netting gains, since CCP clearing of currency swaps was not possible, cf. Korsgaard, Central Counterparties in the Derivatives Markets, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2010. At the same time, the terms of sovereign membership were subject to uncertainty.

7 Several underlying factors applied in the few cases where the central government and a bank failed to reach agreement. The key factors were as follows: 1) Collateral in kroner: Some banks have chosen to focus only on major currencies, e.g. US dollars and euro. 2) Cross default clause: A few banks demanded two-way cross default clauses. 3) Rating trigger: A few banks would not accept a rating trigger in connection with full collateralisation.

Swap counterparties with two-way collateral

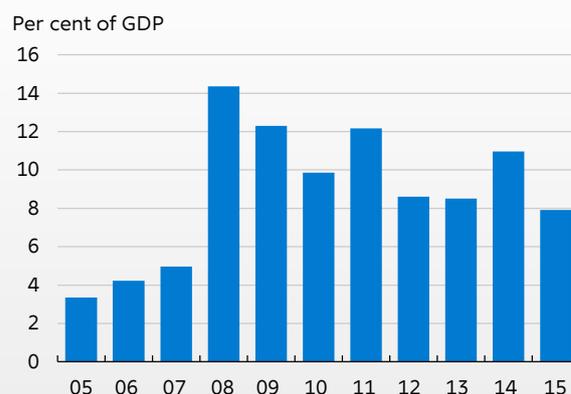
Table 4.1

Counterparty	
Bank of Nova Scotia	JP Morgan
Barclays	Morgan Stanley
BNP Paribas	Natixis
Citibank	Nordea
Crédit Agricole	Royal Bank of Scotland
Danske Bank	Société Générale
HSBC	

Note: One-way collateral will continue to apply to swaps transacted with Goldman Sachs and Deutsche Bank. The central government has a small number of outstandings with these counterparties, which will expire in the near future.

Balance on the central government's account at year-end

Chart 4.5



Highlights of the central government's new and previous basis of agreement

Table 4.2

	Previous basis of agreement: ISDA with one-way CSA	New basis of agreement: ISDA with two-way CSA
ISDA version	1992	2002
Applicable law	US/English law	English law
Rating trigger ¹	A-/A3	BBB-/Baa3
Cross default clause ²	Yes	Yes
Netting	Yes	Yes

Credit Support Annex

	One-way	Two-way
Collateralisation	One-way	Two-way
Collateral type	High-rated bonds in various currencies	Cash deposits in DKK
Remuneration	None	Tomorrow/Next rate
Threshold value	Kr. 0-500 million depending on rating	Kr. 0
Minimum transfer amount, MTA	Up to kr. 10 million	Kr. 0.5 million
Margin call frequency	Daily	Daily

- The rating trigger enables the central government to terminate a swap agreement if the counterparty's rating falls below the level stated.
- A cross default clause enables the central government to terminate swaps in the event of a bank's failure to meet its payment obligations to a third party. The central government's ISDA agreements have a one-way cross default clause, i.e. only the central government is allowed to terminate swaps with a bank

of collateral for the full market value of the swap portfolio.⁸ Moreover, the MTA was reduced to kr. 0.5 million. This amount indicates how much the market value of the swap agreement may change without transfer of collateral.

These changes entail that the credit risk on each counterparty is very limited. However, having a wide range of swap counterparties is still deemed to be expedient, as this intensifies competition in the pricing of swaps. In addition, if a large volume of swaps have been transacted with a failing counterparty, the central government must negotiate a large number of contracts with new counterparties. This may take time, and the market value may fluctuate in the period until new swaps have been transacted. This entails a risk that the collateral pledged by the failing counterparty is not fully adequate. The associated risk is, however, abated by the central government's use of simple, and standardized (plain vanilla) interest rate and currency swaps only.

Cash deposit of kroner as collateral

Under the new CSAs, collateral is pledged and received in Danish kroner. The background is that cash deposits today constitute by far the most frequently used asset to pledge as collateral in the international swap markets.⁹ The central government has a large liquidity reserve that can be used for collateral purposes, cf. Chart 4.5. Moreover, cash collateral makes it simple to determine the value of the collateral pledged or received.

The central government's receipt of cash deposits as collateral increases the EMU debt, as opposed to the previous agreements under which the central government only accepted bonds as collateral. The reason is that receipt of cash is regarded as a loan according to Eurostat, while cash pledged as collateral is not offset in the EMU debt. Due to Denmark's low EMU debt it is assessed to be unproblematic. The central government debt is not affected by the receipt of collateral.

Possibility of negative interest rates on collateral

For cash deposits pledged as collateral, the overnight interest rate is the market standard. For Danish kroner, the relevant interest rate is the Danish Tomorrow/Next (T/N) rate.

It is explicitly stated in the central government's new basis of agreement that no zero lower bound applies to interest rates. The reason is that a zero lower bound may give the banks an incentive to transfer more collateral than necessary if a negative interest rate applies to their alternative options for placement of liquid funds.

The Danish T/N rate has been negative in several periods since 2012. Initially, this caused problems for some banks, whose systems were not yet ready to handle negative interest rates. As negative interest rates spread to the euro area, this problem was remedied.

Rating trigger reduced to BBB-/Baa3

The rating trigger is reduced from A-/A3 to BBB-/Baa3 in the new basis of agreement. The rating trigger allows the central government to terminate a swap agreement if the bank's rating falls below BBB-/Baa3. This enables the central government to avoid the legal and operational risks associated with failure.

The reduction of the trigger level reflects easing, in the wake of the financial crisis, of the central government's requirements for banks' credit rating when concluding new swaps.¹⁰

INTERNALISATION OF THE COLLATERALISATION PROCESS

In connection with the transition to two-way collateral, the collateralisation process was internalised between the swap parties without the involvement of a tri-party agent. A particular background factor is that cash collateral and system upgrades have reduced the costs of own collateral management.¹¹ At the same time, continued efficiency

8 The role of margin requirements and haircuts in procyclicality, *CFGFS papers No. 36*, BIS, 2010.

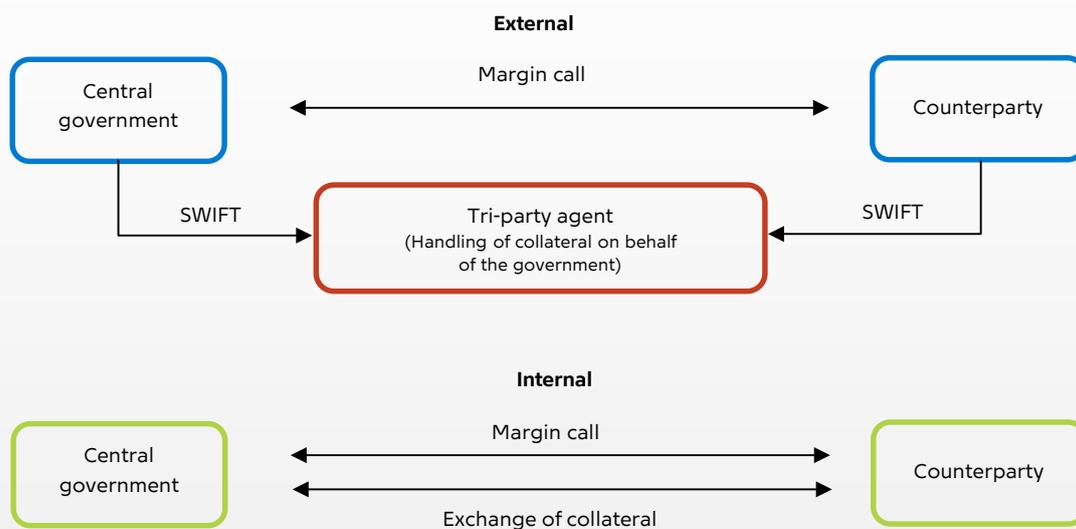
9 ISDA Margin Survey 2015.

10 Since the onset of the financial crisis, the central government's counterparties were downgraded by the rating agencies. As a result, fewer banks met the central government's credit rating requirement for concluding new swaps. In order to be able to diversify the swap agreements on a sufficient number of counterparties, the credit rating requirements for counterparties were eased.

11 According to the ISDA Margin Survey 2015, 87 per cent of the respondent banks had internalised their collateralisation processes.

Illustration of internal and external collateralisation process

Chart 4.6



Note: SWIFT stands for Society for Worldwide Interbank Financial Telecommunication, an international financial network used for sending and receiving payment instructions.

improvements have contributed to reducing the operational risk.

The collateralisation process can be divided into four main steps:

1. Calculation of credit exposure and netting¹²
2. Margin call
3. Reconciliation with counterparty
4. Settlement of collateral

Since the central government's introduction of CSAs in 1999, credit exposures and netting have been calculated in custom-developed systems, and margin calls have taken place via e-mail. Since 2008, the frequency has been gradually increased from monthly to daily statements. Under the previous basis of agreement, with high-rated bonds as collateral, the central government used tri-party agents for administration of the collateral, cf. Chart 4.6.

Collateralisation using bonds makes heavy demands on systems, requiring registration and daily calculation of the market value of many different bonds, ongoing verification of bonds, current switching of securities and coupon payments relating to the pledged collateral.

The new basis of agreement with collateralisation via cash deposits entails a considerably simpler collateralisation process in a system-related and settlement perspective, compared with collateralisation via bonds. The vast majority of settlement processes have been automated in a new portfolio management system. Most margin calls are structured in an electronic messaging system, which has streamlined the process considerably and reduced the operational risk. The aim is a fully automated collateralisation process in future.

¹² Netting: Netting of gains and losses on transacted swaps. Netting allows inclusion of all transacted swaps in the overall claim in the event of a bank's failure.