

## Collateral in wholesale financial markets

Over the past few decades, counterparty risks generated by wholesale transactions have increasingly been covered by bilateral collateral agreements. A report by the Committee on the Global Financial System (CGFS), often referred to as the Johnson report,<sup>1</sup> pointed to inadequacies in collateral practices as creating problems in the functioning of markets in autumn 1998. The CGFS followed up by setting up a working group to review trends in collateral use. The report of the Working Group on Collateral was published in March.<sup>2</sup> This article presents some of its main findings.

### Trends in the use of collateral

The use of collateral has expanded rapidly in recent years, spurred by growth in securities and derivatives trading, the development of secured payment and settlement systems, and the expansion of financial activity worldwide. Increased attention to risk management, reinforced by a series of market disturbances in the 1990s, has contributed to the growth of financial transactions in which collateral is used to help manage large credit risks, such as those between dealers, or counterparty risks in complex market risk exposures. Two distinct advantages of collateralisation, compared to other credit risk mitigation techniques, may help to explain its widespread use in trading markets. One is the relatively low transaction costs. Collateral arrangements are largely standardised, which makes them suitable for short-term transactions with a broad range of counterparties. The other advantage is that collateral, in contrast to other risk mitigation techniques such as guarantees or credit derivatives, provides funded protection.

Financial institutions such as banks or securities dealers use collateral mainly in three areas of their wholesale activities. The first is repurchase

Use of collateral  
expanding ...

... in repo  
markets ...

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<sup>1</sup> Committee on the Global Financial System (1999): *A review of financial market events in autumn 1998*, Basel, October.

<sup>2</sup> Committee on the Global Financial System (2001): *Collateral in wholesale financial markets: recent trends, risk management and market dynamics*, Basel, March. URL: <http://www.bis.org/publ/cgfs17.htm>. The Working Group on Collateral was chaired by Christine Cumming, Federal Reserve Bank of New York.

agreements (repos). Improvements in the financial infrastructure, in the legal framework and in risk management techniques have facilitated the use of repos and business has grown rapidly with the general expansion of trading (see Table 1).

A second area where collateralisation is common is derivatives markets. Collateralisation of exposures in derivatives markets allows financial institutions to manage market risk with limited counterparty risk. This facilitates the management and control of overall credit risk in trading operations and leads to a more efficient use of both economic and regulatory capital. In over-the-counter (OTC) derivatives markets, collateralisation has grown significantly, although uncollateralised transactions continue to be the norm. This partly reflects the fact that participants in OTC markets have generally had high credit ratings.

... in derivatives transactions ...

The third field where collateral is increasingly used is payment and settlement systems. In many countries, intraday credit for large-value real-time gross settlement (RTGS) systems is available from central banks on a fully collateralised basis only. Such systems allow prompt finality of payment, while covering debit balances with collateral protects the central bank from losses. The other relevant feature is that there is less need for participants to assess the creditworthiness of individual counterparties. This supports the functioning of payment systems, in which exposures may change rapidly and counterparties may not be known in advance.

... and in payment and settlement systems

Repo market in selected countries <sup>1</sup>										
	Transactions with all counterparties								Transactions with non-MFIs <sup>2</sup> only	
	United States <sup>3</sup> USD	France <sup>4</sup> EUR <sup>10</sup>	United Kingdom <sup>5</sup> GBP	Japan <sup>6</sup> JPY	Italy <sup>7</sup> EUR <sup>10</sup>	Germany <sup>7</sup> EUR <sup>10</sup>	Belgium EUR <sup>10</sup>	Sweden <sup>8</sup> SEK	Euro area <sup>9</sup> EUR <sup>10</sup>	Netherlands <sup>9</sup> EUR <sup>10</sup>
1990	777.8				11.0					
1995	1,520.4	240.3		11,079.8	77.3					
1996	1,649.8	322.8		11,945.5	85.2					
1997	2,194.5	320.2	74.9	9,979.5	87.4				211.0	
1998	2,372.0	296.4	97.1	11,516.5	93.3				183.9	
1999	2,517.1	159.1	102.5	20,798.6	122.5	81.2	111.7		155.3	
2000	2,636.8	149.1	138.2	22,661.0	163.7	137.8	97.7	400.0	186.2	6.2
in US dollars										
2000	2,636.8	240.0 <sup>7</sup>	206.0	197.2	137.8	119.6	90.9	42.2	173.3	5.8

<sup>1</sup> Amounts outstanding at end-year, in billions; for 2000, latest available data; converted at end-year exchange rates. Cross-country comparability of the figures is limited owing to differences in measurement concepts. <sup>2</sup> Monetary financial institutions. <sup>3</sup> Repurchase and reverse repurchase agreements of US government securities dealers. <sup>4</sup> Repurchase agreements of French government securities dealers. <sup>5</sup> Gilt repos and sell/buybacks; data refer to November. <sup>6</sup> Total amount outstanding in the bond repo market. <sup>7</sup> Repurchase agreements of domestic MFIs with other sectors. <sup>8</sup> Repurchase agreements on government bonds and mortgage securities; rough estimates. <sup>9</sup> Domestic repurchase agreements of MFIs. <sup>10</sup> For EUR, euro conversion rate applied also prior to 1999.

Table 1

Broadening range of assets used as collateral

The preferred assets for use as collateral have traditionally been cash and government bonds.<sup>3</sup> With the demand for collateral growing and the available stock of government bonds declining, markets have evidently been forced to adjust. One response has been the broadening of the range of assets accepted as collateral. Equities belonging to major indices have to some extent also become accepted because of their high liquidity. Another way to adjust to changing demand/supply conditions is economising on the use of collateral. Large market participants are actively considering ways to reduce settlement exposures and thus to economise on the liquidity and collateral needed to support payment and settlement mechanisms. In particular, interest has increased in how to expand the role of central counterparty clearing houses in markets that now clear either slowly or on a bilateral basis.

### Exploiting the benefits of collateral: the role of risk management

Low-risk collateral relieves the load on risk management ...

Collateral reduces the need for the collateral receiver to monitor the creditworthiness of a large number of counterparties. Instead, his focus will have to be on the risks of the collateral itself, in particular the creditworthiness of collateral issuers and the liquidity of collateral markets. The use of collateral with low credit and liquidity risk lessens the collateral risk management burden and thus the cost of collateral use. This explains the preference of market participants for government bonds and cash.

... but does not substitute for collateral risk management

But even the use of low-risk assets as collateral does not substitute for proper collateral risk management, as the collateral taker may face uncovered exposure although the value of collateral remains stable. In OTC contracts, the value of the collateralised position will usually change over time. Fluctuations in the market value of derivatives transactions, for example, are essentially random and can be quite substantial. Moreover, uncovered exposure may result from the time required to complete the operational steps of the collateralisation process.

Challenges posed by broadening the range of collateral assets ...

Broadening the range of accepted collateral assets to include bonds of private issuers or equities increases the demand for risk management. Generally, assessing the potential exposure after taking on collateral becomes more difficult. The price volatility of the collateral may be high and variable, and low liquidity may make it difficult to estimate the liquidation value. Moreover, assessing the nature of the correlation between the collateralised position and the asset used as collateral introduces additional complexity. A negative correlation between the two increases exposure and credit risk because the value of collateral falls at the same time as the counterparty risk increases. Such a negative correlation might, for example, occur in a situation

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<sup>3</sup> In theory, cash is the perfect collateral. The assets traditionally used as collateral, such as government bills and bonds, exhibit characteristics that make them close substitutes for cash. In practice, cash collateral is provided in the form of bank deposits and is thus subject to operational risks related to the transfer of these deposits or the risk that the depository institution will fail.

where doubts about the soundness of the banking system are emerging and bank bonds are being used as collateral.

Collateral risk management can address such risks in three basic ways. One is to increase the buffer for higher potential exposures; that is, to apply deeper haircuts. Another approach is to choose collateral that generally moves in line with the value of the collateralised position. However, such protection may be sensitive to changes in market conditions and thus imperfect in consequence. A third method is to reduce the exposure period through adjustments in market conventions and improvements in market infrastructure, in particular recourse to more frequent margin calls. The reliance on increasingly sophisticated collateral management techniques has repercussions on the markets where positions are collateralised and on the markets for instruments used as collateral. For instance, more sophisticated systems tend to increase barriers to entry to collateralised trading markets, especially for dealers.

... and possible adjustments in risk management

### Systemic impact of the use of collateral

The use of collateral enhances the efficiency of the financial system. Signalling creditworthiness by offering collateral reduces the problem of asymmetric information and mitigates credit rationing. As a result, collateralising transactions broadens access to markets. This has further positive effects on the functioning of markets because broader market participation tends to enhance competition and foster deep and liquid markets. Furthermore, the reduction of information costs promotes the development of sound payment and settlement systems as well as clearing mechanisms in markets where counterparties and exposures often change rapidly.

Collateralisation enhances the overall efficiency ...

Reducing individual counterparty risk may also enhance the overall stability of the financial system. Many wholesale financial markets, such as international interbank markets and the OTC derivatives markets, do not discriminate effectively in their pricing between higher- and lower-risk counterparties.<sup>4</sup> These markets are prone to credit rationing and to the abrupt retreat of lenders, particularly in times of market stress. The funded credit protection provided by collateral may moderate somewhat this tendency of credit and liquidity flows in wholesale financial markets to seize up under stress, particularly if such markets are not at the epicentre of the initial shock. For example, repo markets and exchange-traded futures markets are often relatively resilient and subject to limited credit rationing in periods of market turbulence. A core precondition for these benefits to materialise, however, is the appropriate management of collateral risks.

... and stability of the financial system

While these risk-reducing effects are undisputed, there may nevertheless be some undesirable externalities resulting from the widespread use of

Possible negative externalities

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<sup>4</sup> See Henri Bernard and Joseph Bisignano (2000): "Information, liquidity and risk in the international interbank market: implicit guarantees and private credit market failure", *BIS Working Papers*, no 86, March.

collateral in wholesale financial markets. One is a potentially negative impact on unsecured creditors. The other is a potentially destabilising effect on the financial system if collateral is not managed properly.

Impact on  
unsecured creditors

If collateral is pledged to secure existing positions, this has an impact on the collateral provider's unsecured creditors because the pledged assets are no longer available to cover other obligations. Moreover, since in wholesale markets generally only assets of relatively high quality are accepted as collateral, the average quality of the remaining assets will decline. As a result, unsecured creditors' claims are covered by fewer, less liquid and riskier assets. If collateral is used to support an expansion of business activity, the previously existing assets are still available to cover unsecured creditors' claims. Nevertheless, leverage has increased if the business expansion is not backed by an increase in capital, indicating higher risk for unsecured creditors. Generally, how the risk position of unsecured creditors has actually changed can only be assessed in a dynamic analysis that takes into account the effects of collateralisation on the collateral provider's business mix and earning capacity. If collateralisation allows for an expansion of activities into new, profitable areas, the risk exposure of unsecured creditors may even be improved.

Whatever the net effect on unsecured creditors in a dynamic perspective, collateral lowers the monitoring incentive for collateral receivers. If collateralised lenders rely on collateral and reduce their monitoring efforts, both secured and unsecured lenders will be affected if as a result an increase in the provider's default risk goes undetected.

### Collateral in times of stress

The following case studies of market stress events and the failure of an individual institution illustrate how the use of collateral can alter market dynamics.

#### *Financial market events, autumn 1998*

The effective default by Russia on rouble debt resulted in sizeable losses for some investors and triggered a re-examination of credit risk by market participants. The outcome can be characterised as a global flight to liquidity, spurred by a global margin call. As the term suggests, collateral-related dynamics played a key role in this process. Some of the positions affected were leveraged through collateralised financing arrangements such as securities lending, repurchase agreements and margin accounts at futures exchanges, which had to be marked to market daily. In an environment of heightened uncertainty and increased caution, many market participants reduced the scale of their activities and trimmed their risk exposures. At the same time, collateral requirements were increased in many market segments, reflecting heightened concerns about counterparty risk. As a result, liquidity in many markets declined sharply, with bid-ask spreads widening and large transactions becoming more difficult to complete.

The 1998 crisis made clear that substantial unsecured credit risk can result from potential exposures of collateralised positions and the need to liquidate them. It further revealed important linkages between leverage, market risk, funding arrangements, collateral practices and asset market liquidity. Looking more closely at collateralisation, three factors contributed to the severity of the crisis. First, collateral facilitated a degree of leverage that turned out to be excessive in

times of stress. Second, market participants relied too heavily on the protection implied by collateral and daily margining, underestimating the effect of large price changes on exposure levels. Finally, belated recognition of these effects triggered a tightening of collateral standards, which contributed substantially to liquidity pressures.

#### *Failure of the Granite fund, 1994*

The Granite fund pursued a strategy based on arbitrage in mortgage-backed securities (MBSs), which are highly sensitive to interest rate changes as their price also reflects the value of the prepayment option included in the underlying mortgages. In 1994, Granite's position deteriorated sharply in value as a result of a tightening of monetary policy by the Federal Reserve. As the deterioration continued, Granite faced a wave of margin calls. Many of its counterparties had not been monitoring their credit exposure and suddenly realised that they were undercollateralised. Others were overcollateralised, but refused to let Granite liquidate individual excess positions. Granite collapsed when dealers began liquidating its positions to satisfy margin calls. Markets for MBSs turned out to be very illiquid and dealers found that they could not easily unwind trades to get back the securities they themselves had used in repo transactions.

With respect to collateral management, the Granite case highlights three issues. Sharp changes in valuation can occur when securities used as collateral trade in a market with abruptly changing liquidity. Collateral arrangements did not take into account the correlations between the creditworthiness of the counterparty and the value of the collateral. The effects of these two factors were magnified by poor risk management: counterparties valued positions and collateral too carelessly and infrequently. The reaction of counterparties when they became aware of the problem was an abrupt tightening of standards that exacerbated distress.

#### *Aftermath of the US equity market crash, 1987*

The sharp decline in equity prices on 19 October 1987 led to very high demands for liquidity by brokers and investors. The origin of the stock market break was the heavy selling associated with "portfolio insurance". The selling in the cash, futures and options markets triggered dislocations that reflected collateral dynamics. Different margining practices were employed in the cash, futures and options equity markets. In normal market conditions, with price movements of modest size, market participants with offsetting positions in the cash and futures markets could easily manage the mismatch of cash flows arising from daily margin calls in the futures market and the cash market, where only initial margining was required. With the huge drop in prices, intraday and end-of-day margin calls became very large, triggering sizeable, unanticipated cash needs. The inability to liquify gains in one market to meet margin calls in another created enormous liquidity strains. Although collateral was not the origin of the problem, the forced sale of positions to meet margin calls contributed to excessive selling and overshooting of prices while divergent margining conventions proved to be a major source of liquidity strains.

Impact on financial market dynamics ...

A number of episodes of financial market turbulence suggest that collateral practices may have an adverse impact on financial markets in periods of stress (see the box). These episodes have pointed to three shortcomings that may add to market dislocations. First, in the run-up to the crisis, market participants relied too heavily on the effectiveness of collateral and daily margining, overlooking the risk arising from excessive leverage by large counterparties and the potential for sharp movements in exposures when substantial price changes occur. Second, the rush to correct errors and tighten collateral standards exacerbated market turbulence. Raising margins and/or requiring deeper haircuts during market turbulence can add to liquidity pressures both at the financial institutions that have to raise additional collateral and in the markets where participants try to sell assets in order to raise liquidity. Third, differences in collateral practices across different market segments (eg cash, futures and options) may cause liquidity strains even for institutions with hedged positions. The problem is that they may face margin calls in one segment without in practice being able to match them with margins received in another.

... reflecting shortcomings in risk management

Although margin calls and a general tightening of collateral standards are likely to add to liquidity strains in a period of financial stress, some of the destabilising effects of collateral observed during the events described were closely related to deficiencies in the management of collateral and counterparty risk. Whereas margin calls seem to be the inevitable consequence of increased volatility in a collateralised market, excessive leverage and overreaction due to previous risk management deficiencies can, in principle, be addressed by appropriate risk management.

## Future perspectives

Increasing importance of credit risk mitigation

The uses of collateral and the supply of assets that can serve as collateral are likely to continue to evolve over the coming years. Over time, greater competition in both the financial system and the real economy have tended to narrow profit margins and have contributed to a decline in the average creditworthiness of both bank and non-bank counterparties. Shrinking margins in the financial sector create pressure to take more risks. This should favour an increase in collateralised transactions. Another factor affecting the use of collateral is consolidation both among financial institutions and in financial infrastructures, for example a growing reliance on central counterparties. A third factor affecting the use of collateral is the availability and cost of substitutes, such as securitisation or credit derivatives. Overall, greater attention to the mitigation of credit risk, together with broader participation in the financial markets, is likely to increase further the use of collateral.

Higher demand for collateral in payment and settlement systems

One area where continued strong growth in the use of collateral is evident is payment and settlement systems. In these systems, the need to use high-quality collateral to obtain intraday liquidity (particularly in systems where settlement takes place across accounts at a central bank) or to manage credit and liquidity exposures (as in many net settlement systems) imposes costs on

direct and indirect users. Transactions over these systems are large and continuously growing.

Higher demand for collateral in the wholesale financial markets has already begun to be met with a changing pool of collateral in several major countries, and there is scope for a number of further adjustments. As prices for different classes of collateral adjust, incentives could emerge to increase the supply of low-risk collateral by securitising assets and creating other liquid securities with low credit risk. Adjustments with respect to the demand for collateral include accepting a broader range of assets as collateral or improving the efficiency with which the existing stock is used: for example, through greater use of netting and central counterparties.

Changing pool of collateral assets ...

Bearing in mind the potentially destabilising effects of inappropriate collateral management, the changes in the uses and sources of collateral require adjustments to the practices associated with the use of collateral. Broadening the range of assets used as collateral implies that the receiver of collateral faces higher price volatility and possibly also greater correlation with the collateralised position or with the counterparty's creditworthiness, which calls for careful risk management. Sound initial and ongoing evaluation of both collateral and counterparties is vital to risk management. It should include comprehensive stress testing of secured and unsecured exposures, of potential correlations between changes in collateralised exposure and in the value of the collateral itself, and an assessment of how market stress is likely to affect the liquidity and creditworthiness of major counterparties.

... will trigger adjustments in collateral-related practices ...

The outsourcing of collateral risk management to central counterparties may help to overcome some problems: for example, by reducing exposures through netting arrangements or by entrusting a single, better informed, entity with the management and, if necessary, liquidation of collateral. However, heavy reliance on central counterparties may also raise new issues. The concentration of a wide range of risks within a single entity providing a key market service immediately raises the issue of operational risk. Moreover, the potential for contagion across markets as market exposures are combined for settlement could be significantly enhanced. Central counterparties, therefore, should not be seen as a universal remedy against counterparty risk in wholesale markets. Their advantages will only become fully effective if the risks related to their use are fully understood and properly managed.

... for example through the use of central counterparties