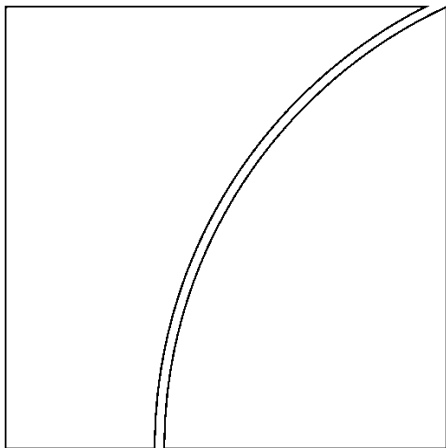


Basel Committee
on Banking Supervision

Consultative document



**Supervisory guidance
for managing risks
associated with the
settlement of foreign
exchange transactions**

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Overview of Guidelines

Guideline 1: Governance

A bank should have strong governance arrangements over its FX settlement-related risks, including a comprehensive risk management process and active engagement by the board of directors.

Guideline 2: Principal risk

A bank should use FMIs that provide PVP settlement to eliminate principal risk when settling FX transactions. Where PVP settlement is not practicable, a bank should properly identify, measure, control and reduce the size and duration of its remaining principal risk.

Guideline 3: Replacement cost risk

A bank should employ prudent risk mitigation regimes to properly identify, measure, monitor and control replacement cost risk for FX transactions until settlement has been confirmed and reconciled.

Guideline 4: Liquidity risk

A bank should properly identify, measure, monitor and control its liquidity needs and risks in each currency when settling FX transactions.

Guideline 5: Operational risk

A bank should properly identify, assess, monitor and control its operational risks. A bank should ensure that its systems support appropriate risk management controls, and have sufficient capacity, scalability and resiliency to handle FX volumes under normal and stressed conditions.

Guideline 6: Legal risk

A bank should ensure that agreements and contracts are legally enforceable for each aspect of its activities in all relevant jurisdictions.

Guideline 7: Capital for FX transactions

When analysing capital needs, a bank should consider all FX settlement-related risks, including principal risk and replacement cost risk. A bank should ensure that sufficient capital is held against these potential exposures, as appropriate.

Abbreviations

BCBS	Basel Committee on Banking Supervision
CCP	Central counterparty
CLS	Continuous linked settlement
CPSS	Committee on Payment and Settlement Systems
CSA	Credit support annex
FMI	Financial market infrastructure
FX	Foreign exchange
ISDA	International Swaps and Derivatives Association, Inc.
NDF	Non-deliverable forward
Non-PVP	Non-payment-versus-payment
PVP	Payment-versus-payment
RTGS	Real-time gross settlement
STP	Straight-through processing

Executive summary

Since the last supervisory guidance was published in 2000, the foreign exchange (FX) market has made significant strides in reducing the risks associated with the settlement of FX transactions. These risks include principal risk, replacement cost risk, liquidity risk, operational risk and legal risk.¹ Such FX settlement-related risks have been mitigated by the implementation of payment-versus-payment (PVP) arrangements and the increasing use of close-out netting and collateralisation. However, substantial FX settlement-related risks remain due to rapid growth in the FX trading market. In addition, many banks underestimate their principal risk² and other associated risks by not taking into full account the duration of exposure between trade execution and final settlement. While such risks may have a relatively low impact during normal market conditions, they may create disproportionately larger concerns during times of market stress.

Therefore, it is crucial that banks and their supervisors continue efforts to reduce or manage the risks arising from FX settlement. In particular, the efforts should concentrate on increasing the scope of currencies, products and counterparties that are eligible for settlement through PVP arrangements.

This guidance expands on, and replaces, the *Supervisory guidance for managing settlement risk in foreign exchange transactions* published in September 2000 by the Basel Committee on Banking Supervision (BCBS). The revised guidance provides a more comprehensive and detailed view on governance arrangements and the management of principal risk, replacement cost risk and all other FX settlement-related risks. In addition, it promotes the use of PVP arrangements, where practicable, to reduce principal risk. The BCBS expects banks and national supervisors to implement the revised guidance in their jurisdictions, taking into consideration the size, nature, complexity and risk profile of their banks' FX activities.

This guidance is organised into seven guidelines that address governance, principal risk, replacement cost risk, liquidity risk, operational risk, legal risk, and capital for FX transactions. The key recommendations emphasise the following:

- A bank should ensure that all FX settlement-related risks are effectively managed and that its practices are consistent with those used for managing other counterparty exposures of similar size and duration.
- A bank should reduce its principal risk as much as practicable by settling FX transactions through the use of FMIs that provide PVP arrangements. Where PVP settlement is not practicable, a bank should properly identify, measure, control and reduce the size and duration of its remaining principal risk.
- A bank should ensure that when analysing capital needs, all FX settlement-related risks should be considered, including principal risk and replacement cost risk and that sufficient capital is held against these potential exposures, as appropriate.

¹ The *Glossary* section contains a definition for each of these risks.

² This guidance uses the term, "principal risk," to mean the risk of outright loss of the full value of a trade resulting from counterparty failure (ie a bank pays away the currency being sold, but fails to receive the currency being bought). Principal risk is sometimes referred to as "Herstatt Risk."

Introduction

Purpose, scope and structure

2.1 The purpose of this document is to provide updated guidance to supervisors and the banks they supervise on approaches to manage the risks associated with the settlement of FX transactions. This guidance expands on, and replaces, the BCBS's *Supervisory guidance for managing settlement risk in foreign exchange transactions* published in September 2000. The BCBS expects banks and national supervisors to implement the revised guidance in their jurisdictions, taking into consideration the size, nature, complexity and risk profile of the bank's FX activities.

2.2 This guidance provides a comprehensive and detailed view of the key risks that arise from a foreign exchange trade during the period between trade execution and final settlement (ie during the pre-settlement and settlement periods). The revised guidance addresses governance, principal risk, replacement cost risk, liquidity risk, operational risk, legal risk and capital for FX transactions. The revised guidance also addresses the use of PVP settlement mechanisms, which were almost non-existent in 2000.

2.3 The guidance is based on the principle that banks should manage FX settlement-related risks in a way that is similar to the management of equivalent risks from their other activities, while taking into account any features that are specific to FX.

2.4 The scope of the guidance only includes FX transactions that consist of two settlement payment flows. This includes FX spot transactions, FX forwards, FX swaps, deliverable FX options and currency swaps involving exchange of principal. It excludes FX instruments that involve one-way settlement payments, such as non-deliverable forwards (NDFs), non-deliverable options and contracts for difference.³

Background

2.5 The risk that arises from the settlement of FX transactions has long been a concern of banking supervisors and central banks. The failure of Bankhaus Herstatt in 1974 highlighted the nature and extent of the systemic risks that can be associated with FX settlement. In 1996, the CPSS published a thorough analysis of principal risk along with a comprehensive strategy to reduce the serious systemic risk implications.⁴ This was followed by a progress report in 1998⁵ and the publication of the BCBS's guidance in 2000.

2.6 Since 2000, substantial progress has been made to mitigate FX settlement-related risks, particularly through the use of FMIs that provide PVP settlement mechanisms, which virtually eliminate principal risk. However, a survey of FX settlement practices conducted by the Committee on Payment and Settlement Systems (CPSS) in 2006⁶ demonstrated that further action is needed by banks, industry groups and central banks. In addition, while FX settlement via PVP methods now accounts for the majority of FX trading by value, many banks do not have a good understanding of the potential residual risks, including

³ Nevertheless, certain parts of the guidance (eg dealing with replacement cost risk) will also be relevant for single-payment instruments.

⁴ See *Settlement risk in foreign exchange transactions*, CPSS, March 1996.

⁵ See *Reducing foreign exchange settlement: a progress report*, CPSS, July 1998.

⁶ See *Progress in reducing foreign exchange settlement risk*, CPSS, May 2008 (which includes the results of the 2006 survey).

replacement costs and liquidity risks. The banks' methods of identifying, measuring, monitoring and controlling FX settlement-related risks are not always acceptably robust. Moreover, growth in the size of the FX market since 2000 suggests that the absolute value settled by potentially riskier gross non-PVP methods may not be less than before PVP methods existed.

Implementation by supervisors

2.7 Banking supervisors should incorporate the guidelines in this document into their supervisory framework for banks under their authority. As part of their on-going supervisory activities, they should assess whether each bank that is engaging in FX trading is meeting the guidelines, taking into consideration the size, nature, complexity and risk profile of its activities.

2.8 In cases where supervisors determine that a bank's management of FX settlement-related risks is not adequate, given its size, nature, complexity and specific risk profile, they should take appropriate action to correct the situation. If needed, supervisors should consider available supervisory enforcement tools that are suitable to the particular circumstances of a bank and its operating environment.

2.9 Supervisors should also assess whether a bank is appropriately applying the use of PVP settlement, pre-settlement netting and other risk-reduction arrangements. For settlement that takes place outside of PVP, supervisors should also place special emphasis on encouraging a bank to minimise the size and duration of its principal risk and to conduct timely reconciliation of payments received.

2.10 Supervisors should assess whether a bank is appropriately incorporating principal risk, replacement cost risk and all other FX settlement-related risks when analysing its capital needs. In cases where supervisors determine that FX settlement-related risks are not appropriately incorporated, they should take appropriate measures, including corrective action.

2.11 To fully address FX settlement-related risks in the industry, the banks' incentives, business practices and infrastructures must be properly aligned. This guidance addresses business practices such as risk management and incentives gained from analysing capital needs. In addition, investment in infrastructures that facilitate PVP settlement across many participants, currencies and products can play a significant role in the elimination of principal risk and other FX settlement-related risks. Since industry participants are critical to endorsing the development and use of such market infrastructures, supervisors should facilitate their efforts, where practicable.

Guideline 1: Governance

A bank should have strong governance arrangements over its FX settlement-related risks, including a comprehensive risk management process and active engagement by the board of directors.⁷

Key considerations

1. A bank should have strong governance arrangements that ensure all FX settlement-related risks are properly identified, measured, monitored and controlled on a firm-wide basis.
2. A bank should have a comprehensive risk management framework to manage FX settlement-related risks commensurate with the size, nature, complexity and risk profile of its FX activities. This framework should cover all material risks including principal risk, replacement cost risk, liquidity risk, operational risk and legal risk. The framework should include policies and procedures, limit structures, management information systems and key risk indicators, fails management, escalation procedures and an internal audit and compliance program.
3. The risk management framework should also ensure that all risks associated with the selection of specific pre-settlement and settlement arrangements used by a bank are properly identified, measured, monitored and controlled.

Strong governance of FX settlement-related risks

3.1.1 The board of directors has ultimate responsibility to ensure that the bank has strong governance arrangements that ensure that all FX settlement-related risks are properly identified, measured, monitored and controlled on a firm-wide basis. This includes approving and overseeing the bank's strategic objectives, risk appetite statement⁸ and corporate governance structure. The board oversees senior management and ensures that management's actions to monitor and control FX settlement-related risks are consistent with the risk appetite, strategy and policies previously approved by the board. These efforts should be supported by appropriate reporting to ensure that the board receives comprehensive and timely information regarding how the bank is managing its FX settlement-related risks. The bank's overarching governance framework should include a comprehensive program of internal controls to measure these risks.

Comprehensive risk management framework

3.1.2 A bank should have a comprehensive risk management framework for all material risks inherent to the life cycle of an FX transaction, including principal risk, replacement cost risk, liquidity risk, operational risk and legal risk. The framework should reflect the size, nature, complexity and risk profile of the bank's FX activities; provide mechanisms that properly identify, measure, monitor and control associated risks; and integrate into the overall risk management process.

⁷ With regard to governance structures, see BCBS *Principles for enhancing corporate governance* (Oct. 2010), para. 12.

⁸ "Risk appetite" reflects the level of aggregate risk that the bank's board of directors is willing to assume and manage in pursuit of its objectives. For the purpose of this document, the terms, "risk appetite" and "risk tolerance," are used synonymously. See *Core principles for effective supervision*, consultative document, BCBS, December 2011.

Policies and procedures

3.1.3 The board should approve and oversee how effectively management implements the bank's risk policies, including policies for managing all of the risks associated with FX settlement. Policies and procedures should be comprehensive, consistent with relevant laws, regulations and supervisory guidance and provide an effective system of internal controls. Policies and procedures should be clearly documented. Once established, policies should be periodically reviewed for adequacy based on changes to financial markets and internal business strategies.

Limit structure

3.1.4 A bank should set formal, meaningful counterparty exposure limits for FX trading and settlement that include limits for principal risk and replacement cost risk. In particular, the size and duration of principal exposures that arise from non-PVP settlements should be recognised and treated equivalently to other counterparty exposures of similar size and duration. Limits consistent with the bank's risk appetite should be established by the credit risk management department, or equivalent, on a counterparty basis. Usage should be controlled throughout the day to prevent trades that would create principal and replacement cost exposures that exceed these limits. Exceptions to established limits should be approved in advance (prior to trading) by the appropriate authority in accordance with established policies and procedures.

Management information systems and key risk indicators

3.1.5 A bank should have sufficiently robust systems to capture, measure and report on FX settlement-related exposures on a bank-wide basis, across business lines and counterparties. The sophistication of systems should reflect the risk profile and complexity of the bank. Timely reports should be provided to the bank's board and senior management and include appropriate key risk indicators and risk issues that could result in a potential loss.

Fails management

3.1.6 A bank should ensure that its framework identifies FX fails and captures the full amount of the resulting FX settlement-related risks as soon as practicable, to allow senior management to make appropriate judgements regarding the nature and severity of the exposure.

Escalation procedures

3.1.7 A bank should clearly define, in its policies, the nature and types of incidents that would constitute issues requiring escalation to, and approval by, senior management or the board. There should be clear and detailed escalation policies and procedures to inform senior management and the board, as appropriate, of potential FX issues and risks in a timely manner, and seek their approval when required. This should include, but not be limited to, exceptions to established limits and fails management.

Internal audit and compliance program

3.1.8 A bank should have an independent and effective internal audit function that can evaluate the effectiveness of management's efforts to control or mitigate the risks associated with settling FX transactions. Internal audit should have an independent reporting line to the bank's board, or audit committee of the board, audit staff with the necessary expertise and experiences on the subject, and sufficient status within the bank to ensure that senior management responds appropriately to findings and recommendations. In addition, a bank should have an effective compliance function that manages compliance-related matters associated with settling FX transactions. The board should exercise oversight of the management of the compliance function.

Selection of appropriate pre-settlement and settlement arrangements for FX transactions

3.1.9 A bank's risk management framework should include procedures to identify the most appropriate settlement method for each type of FX transaction, given the size, nature, complexity and risk-profile of the bank's FX activities. In making this evaluation, a bank should carefully measure the size and duration of its principal exposures. This framework should assess all available settlement methods and their efficacy at reducing or eliminating principal risk and other FX settlement-related risks. These implications need to be identified, assessed and incorporated into the bank's decision-making process. Once an appropriate settlement method is chosen, a bank should properly manage all FX settlement-related risks associated with that method. Where PVP arrangements are available, but a bank has chosen not to use them, it should periodically reassess its decision. (See *Annex: FX settlement-related risks and how they arise*, Section C, for descriptions of available settlement methods and their respective risk implications).

Selection of an FMI

3.1.10 When choosing to use or participate in an FMI, a bank should conduct robust initial due diligence to assess the associated risks. The initial due diligence should include a review of legal, operational, credit and liquidity risks associated with the use of an FMI, its participants and controls. A bank should have a thorough understanding of an FMI's rules and procedures, as well as any responsibilities and FX settlement-related risks that it may assume through its use or participation, directly or indirectly.⁹ A bank must ensure that it has the appropriate policies, procedures and internal control structure to adequately manage its risks and to fulfil its responsibilities to the FMI and its clients. Once a bank chooses to use or participate in an FMI, it should conduct periodic monitoring to determine significant changes to the FMI's processes or controls that may affect its risk exposures. If significant changes occur, the bank should update its risk analysis, as appropriate. To the extent that an FMI is subject to the *Principles for financial market infrastructures*,¹⁰ the bank should refer to publicly available disclosures based on the principles when conducting its own due diligence and periodic monitoring of the FMI.

Selection of a correspondent bank

3.1.11 A bank's risk management framework should include policies and procedures for evaluating the risks and benefits of using one or more correspondent banks to settle its FX transactions in each currency. The framework should consider the potential size, form and maturity of the bank's exposure to its correspondents; and include an evaluation of each correspondent's financial condition. It should also include an assessment of any credit, liquidity, operational and legal risks associated with using correspondent banking services. The framework should provide for periodic reviews of the bank's correspondent banks and have procedures in place to mitigate any FX settlement-related risks that may arise.

Dependence on other institutions

3.1.12 A bank should consider its level of dependence on other institutions for settling its FX transactions. It should assess the potential impact of disruption and mitigate the FX settlement-related risks, as appropriate. Such risk mitigants may include establishing dual or backup correspondent or settlement banks to make payments, or joining an FMI directly. The

⁹ Supervisory approval may be required before membership can be established.

¹⁰ See *Principles for financial market infrastructures*, CPSS/IOSCO, April 2012.

appropriate method should consider costs, testing arrangements, switching time, time to on-board, legal agreements, service fees, etc.

Guideline 2: Principal risk

A bank should use FMIs that provide PVP settlement to eliminate principal risk when settling FX transactions. Where PVP settlement is not practicable, a bank should properly identify, measure, control and reduce the size and duration of its remaining principal risk.

Key considerations

1. A bank should eliminate principal risk by using FMIs that provide PVP settlement, where practicable.
2. Where PVP settlement is not practicable, principal risk should be properly identified, measured, monitored and controlled. In particular, measurement of exposure should not underestimate size and duration and should be subject to binding ex-ante limits and other controls equivalent to other credit exposures of similar size and duration to the same counterparty.
3. A bank should reduce the size and duration of its principal risk as much as practicable.

Eliminating principal risk using PVP settlement

3.2.1 A bank should eliminate principal risk by using FMIs that provide PVP settlement, where practicable. In addition to a number of regional settlement arrangements, there are also mechanisms that provide global PVP settlement. PVP arrangements are designed to eliminate principal risk, but will not eliminate a bank's replacement cost risk and liquidity risks. A bank should identify and manage these risks effectively.

3.2.2 While a bank should maximise its use of PVP, it may still have trades that cannot be settled through a PVP arrangement (eg certain same day trades, or trades in certain currencies or with counterparties not eligible for PVP settlement). To further reduce principal risk, the bank should support initiatives to have such trades become eligible for settlement through available PVP arrangements.

3.2.3 A bank may access the services of a PVP arrangement as a direct participant or as an indirect participant. A bank that is an indirect participant, or third party, should determine whether the settlement processes of the direct participant, or third party service provider (including any "internalised" or "on-us" settlement processes it may use), creates principal risk exposure. Principal risk exposures may occur between the bank and the direct participant, or between the bank and its counterparty (in internalised settlement).¹¹ If principal risk exists, then the bank should manage it accordingly.

Controlling remaining principal risk

Setting and using limits

3.2.4 Where PVP is not practicable, a bank should manage its remaining principal risk. This will involve setting settlement limits that are binding; measuring expected exposures appropriately to prevent those limits from being broken when trades are executed; and

¹¹ Principal exposure occurs where execution or authorisation of the relevant entry in the on-us account denominated in the currency being sold is not conditional upon execution or authorisation of the corresponding entry in the on-us account in the currency being bought (See *Progress in reducing foreign exchange settlement risk*, CPSS, May 2008 – Box 2, Settlement methods).

monitoring the subsequent status of the trades to take prompt action when problems arise. Management of principal risk should be fully integrated into a bank's overall risk management process.

3.2.5 A bank should ensure that principal risk to a counterparty is subject to prudent limits. Principal risk should be subject to an adequate credit control process, including credit evaluation and a determination of maximum exposure to a particular counterparty. Counterparty exposures arising from principal risk should be subject to the same procedures used to set limits on other exposures of similar duration and size to that counterparty.

3.2.6 The trading limits applied by a bank should be binding, namely, usage should be monitored and controlled throughout the day to prevent trades that would create exposures during the settlement process that would exceed the limit.¹² Where a bank is acting as a prime broker, it should have ex-ante processes in place to prevent client trades from creating exposures that would exceed the limit.¹³ When a decision is made to allow a client to exceed a limit, appropriate approval should be obtained. A bank that exceeds its principal risk limit with a particular counterparty should reduce its exposure.

3.2.7 To ensure that the limits are binding, a bank should use an ex-ante process that updates and reports exposure on a timely basis, preferably as each trade is executed. If a bank has limited capability to update and report exposure on a timely basis, then the bank needs to have effective post-trade risk management controls to minimise limit breaches.¹⁴

Measuring expected principal risk

3.2.8 For a bank to estimate the expected principal risk that will arise from a trade during its settlement process and to determine whether the counterparty limit will be exceeded, it needs to accurately measure when that exposure will begin and when that exposure will end. This requires the bank to know the relevant unilateral cancellation deadline for the currency it sold and when the incoming payment for the currency it bought will be received with finality and is reconciled. A bank will also need to determine whether it is appropriate to use approximate, rather than exact, measures of exposure that may arise during a trade's settlement.

(a) Unilateral payment cancellation deadlines

3.2.9 A bank's principal risk exposure to its counterparty begins when a payment order on the currency it sold can no longer be recalled or cancelled with certainty – this is known as the "unilateral payment cancellation deadline."¹⁵ A bank should reduce the duration of its exposures by having the capability to unilaterally cancel payment instructions as late as

¹² Frequent requests by a client for an intra-day limit increase should prompt the bank to assess its approved risk appetite for that client and the additional risk that is being assumed.

¹³ For example, prime brokers typically support high-frequency trading clients by extending credit sponsorship and access to various electronic FX trading platforms. Given the short time frames associated with high-frequency trading activities, risk positions by high-frequency traders can accumulate rapidly under the name of a prime broker; thereby, raising the need for the prime broker to closely monitor and control its clients' activities. For more information about high-frequency trading and FX prime brokerage relationships, see *High-frequency trading in the foreign exchange market*, The Markets Committee of the Bank for International Settlements, September 2011.

¹⁴ For example, if a settlement limit is breached for a particular value date, auto-pricing of trades is prevented from executing further trades for that value date.

¹⁵ Since this deadline may be one or more business days before the settlement date, this risk can last for a significant period of time.

practicable. This might require changes to systems and processes used to process internal payments. The exposure ends when the bank receives the purchased currency with finality. The duration of settlement risk can vary depending on the currency pair being settled and the correspondent banking arrangements used by the bank and its counterparty.

3.2.10 A key factor in determining a unilateral payment cancellation deadline is the latest time a correspondent guarantees to satisfy a cancellation request (the guaranteed cut-off time). Service level agreements should identify this cut-off time. In instances where an agreement may not specify a guaranteed cut-off time or a bank may not have a written agreement, the bank and its correspondent should establish a specific cut-off time as late as practicable.^{16,17}

3.2.11 A bank should be able to identify and halt individual payments up to the cut-off times (regardless of time zone issues) guaranteed by its correspondents or the payment system in which it participates without disrupting the processing of other outgoing payments.¹⁸ Where a bank's internal operational factors limit the bank's ability to do so, its effective unilateral payment cancellation deadline may be earlier than the guaranteed correspondent cut-off time. In some cases, the unilateral payment cancellation deadline may actually be earlier than the time the payment order is normally sent to the correspondent. This could occur, for example, if cancelling an internally queued, but still unsent, payment order requires manual intervention. To ensure effective processing consistent with unilateral payment cancellation deadlines under stress, a bank should periodically test with its branches and payment correspondents.

(b) Reconciling incoming payments

3.2.12 In order to appropriately calculate when the principal exposure of a specific trade will end, a bank should incorporate its process for reconciling incoming payments and the point in time that it will identify the final or failed receipt of the purchased currency. To avoid underestimating exposures, the bank should assume that funds have not been received until it confirms credit to its correspondent bank (nostro) account and has determined which trades have successfully settled and which have failed to settle.

3.2.13 A bank should minimise the period of uncertainty (ie the time between actual final receipt and reconciliation) by arranging to receive timely information on final payment receipt from its correspondent bank.

(c) Use of approximation techniques

3.2.14 When calculating expected principal risk using approximation methods, a bank should not underestimate the risk.¹⁹ This requires that the bank identify the relevant unilateral payment cancellation deadlines and reconciliation process timelines for each currency pair.

¹⁶ Note that unilateral delay in sending payment instructions may increase the correspondent's operational risk (eg incorrect execution of payment instructions).

¹⁷ If a bank acts as its own paying agent (eg if the bank is a direct participant in the payment system for the sold currency), then its unilateral cancellation deadline for that currency reflects its internal payment processing rules and procedures and those of the relevant payment system.

¹⁸ In addition to impacting a universal cancellation deadline, disruption of outgoing payments may impair a bank's ability to make timely payments to its counterparties.

¹⁹ For example, as noted in *Progress in reducing foreign exchange settlement risk* (CPSS, 2008), the most commonly cited estimation method used is the "calendar day" method, where banks measure their daily

(d) *Fails*

3.2.15 Effective monitoring of failed transactions is crucial for measuring and managing principal risk, as unexpected fails cause exposures to be higher than predicted. A bank should have a framework that monitors fails and properly accounts for them in its exposure measures.

Reducing the size of remaining principal risk

3.2.16 Where PVP settlement is not used, a bank should reduce the size of its principal risk as much as practicable. A bank could use obligation netting to reduce the size of its principal risk exposures. Depending on trading patterns, legally binding obligation netting permits a bank to offset trades to a counterparty so that only the net amount in each currency is paid or received. To allow exposures to be measured on a net basis, netting arrangements should be legally sound and enforceable in all relevant jurisdictions.

3.2.17 A bank should put in place a master netting agreement (eg ISDA)²⁰ with all counterparties,²¹ where practicable. The master netting agreement should contain legally enforceable provisions for close-out netting and obligation netting. (See *Annex: FX settlement-related risks and how they arise*, Section C, for descriptions of netting arrangements).

3.2.18 If a counterparty's chosen method of settlement prevents a bank from reducing its principal risk (eg a market participant does not participate in PVP arrangements or does not agree to use obligation netting), then the bank should consider decreasing its exposure limit to the counterparty or creating incentives for the counterparty to modify its FX settlement methods.

settlement exposures as the total receipts coming due on settlement date. Such a method can lead to underestimation of risk.

²⁰ Master netting agreements are not valid in all jurisdictions. If a bank trades in a jurisdiction that does not support master netting agreements, then it should manage FX settlement-related principal risk appropriately (usually gross).

²¹ A bank should understand the implications of not having a master netting agreement with a counterparty (eg where FX trading is restricted to very short tenors) and manage this risk accordingly.

Guideline 3: Replacement cost risk

A bank should employ prudent risk mitigation regimes to properly identify, measure, monitor and control replacement cost risk for FX transactions until settlement has been confirmed and reconciled.

Key considerations

1. Replacement cost risk should be properly identified, measured, monitored and controlled. In order to ensure that the size and duration of exposure are not underestimated, a bank should identify and assess the impact of its assumptions regarding timing of FX settlement.
2. A bank should use legally enforceable netting agreements to reduce its replacement cost risk, where practicable.
3. A bank should use collateralisation (including an explicit policy on eligible collateral, haircuts and margin) to reduce replacement cost risk, where practicable.

Identifying, measuring, monitoring and controlling exposures

3.3.1 A bank should employ effective replacement cost risk management tools to identify, measure, monitor and control collateralised and uncollateralised exposures.

Setting and using limits

3.3.2 Meaningful limits on exposures, including replacement cost risk, are an integral part of an effective risk-management framework. Replacement cost risk limits should be established by maturity buckets to control the potential future exposure.²² A bank typically sets limits on potential exposure, including marked-to-market and changes in potential future exposure over time.²³ Banks should consider other measures to further control the replacement cost risk, such as regularly measuring stress test results against limits.

Duration of replacement cost risk and the timing of settlement

Reconciliation of settlement

3.3.3 Until the final settlement of FX transactions is confirmed and reconciled, a bank cannot be certain that it is no longer exposed to replacement cost risk for those transactions. In order to avoid underestimation of potential replacement cost risk, a bank should assume that the exposure begins at trade execution and continues until final settlement of the transaction has been confirmed and reconciled.

Close-out netting and gross settlement

3.3.4 A bank should identify and assess the impact of its assumptions regarding the timing and nature of settlement when measuring replacement cost risk under a close-out netting agreement. For example, a bank with close-out netting agreements might measure and manage replacement cost risk on a bilateral net basis with the assumption that either all transactions with a single counterparty due to settle on a particular day will settle or none will settle. Since payments to settle FX transactions may be made at any time, from the opening

²² The potential future exposure sets an upper bound on a confidence interval for future credit exposure related to market prices over time.

²³ The methodology used to calculate the FX exposure will depend on whether the bank uses an agreed-upon internal model or the standardised approach. Limits should be assigned accordingly.

of business in the Asia-Pacific region to the close of business in the Americas, this assumption may be faulty.²⁴ Therefore, the bank should manage its replacement cost risk according to actual settlement times to avoid underestimating its risk.

Netting and collateral arrangements

Netting

3.3.5 A bank should, at a minimum, use legally enforceable bilateral netting agreements with all counterparties, and where practicable, master netting agreements with all counterparties. Master netting agreements should include provisions for close-out netting and, where PVP settlement is not used, obligation netting. Close-out netting reduces risk and provides legal clarity regarding a surviving bank's claims on, or obligations to, a defaulted counterparty. It mitigates the risk of being forced to make payments of gross principal, or of gross marked-to-market losses, to the defaulted counterparty, while the defaulted counterparty's obligations become unsecured liabilities in a bankruptcy process.

Collateral arrangements

3.3.6 Where practicable, a bank should use collateral arrangements (eg ISDA credit support annexes) to mitigate its replacement cost risk. Collateral arrangements are particularly relevant for counterparties with which the bank engages in longer-term FX trades, where the duration of replacement cost risk is extended. A bank should consider credit and liquidity risks when considering which assets to accept as collateral and the appropriate haircuts for each asset. Eligible collateral and haircuts should be reviewed on a periodic basis.²⁵ A bank should consider the appropriate frequency for marking collateral to market and for making margin calls (eg daily).²⁶

3.3.7 A bank should have an effective collateral management framework that incorporates the full range of market practices and accounts for the bank's scale of FX activity.

²⁴ For instance, even if a bank is "flat" with a particular counterparty from a bilateral net replacement cost perspective, it is possible that all of its "out-of-the-money" trades could settle, while all of its "in-the-money" trade could fail.

²⁵ Haircuts on collateral should be set at conservative levels at all times (commensurate with those expected in stressed market environments) and should not be relaxed during periods of low volatility.

²⁶ Separate guidance on margining of non-centrally cleared contracts will be published by BCBS and IOSCO in due course.

Guideline 4: Liquidity risk

A bank should properly identify, measure, monitor and control its liquidity needs and risks in each currency when settling FX transactions.

Key considerations

1. A bank should ensure that its liquidity needs and risks are appropriately represented in the bank's liquidity risk management framework.²⁷
2. A bank should identify, measure, monitor and control its liquidity needs in each currency and have sufficient liquidity resources to meet those needs in normal and stressed conditions.
3. A bank's liquidity risk management framework should incorporate the liquidity risks that arise from its use of, and the various roles it may play in, an FMI, as well as from its use of correspondent banks.

Liquidity risk management framework

3.4.1 A bank should appropriately manage its liquidity needs and risks to ensure that it is able to meet its FX payment obligations on time. A bank's failure to meet its FX payment obligations in a timely manner may impair the ability of one, or more, counterparties to complete their own settlement, which can lead to liquidity dislocations and disruptions in the payment and settlement systems.

3.4.2 A bank should manage its overall liquidity needs and risks in accordance with existing international supervisory guidance.²⁸ A bank's liquidity needs and risks should be appropriately represented in a bank's liquidity risk management framework. The framework should address how the bank's liquidity needs and risks in each currency will vary based on the chosen method of settlement. In addition, the framework should incorporate stress tests using various severe, but plausible, scenarios.

Identify and manage liquidity needs

3.4.3 A bank should identify, measure, monitor and control its liquidity needs in each currency, taking into consideration the settlement method and applicable netting arrangements. A bank should be able to prioritise time-specific and other critical payment obligations to meet payment deadlines. This is particularly important for a bank that uses an FMI to settle its FX obligations. While settlement through an FMI can reduce a bank's overall liquidity needs, it can also place high demands on a bank to make time-critical payments to settle its FX transactions. In order to meet its payment obligations in a timely manner, a bank should maintain sufficient available liquidity resources and have the ability to mobilise collateral or other sources of liquidity. A bank should identify and manage the timeframes required to mobilise different forms of collateral, including collateral held on a cross-border basis.

²⁷ This guideline focuses on funding liquidity risk. Funding liquidity risk is the risk that the firm will not be able to efficiently meet expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that a firm cannot easily offset or eliminate a position at the market price due to inadequate market depth or disruption.

²⁸ See *Principles for sound liquidity risk management and supervision*, BCBS, September 2008 and *Basel III: International framework for liquidity risk measurement, standards and monitoring*, BCBS, December 2010.

Impact of FX settlement failure

3.4.4 A bank may face a significant liquidity shortfall if a counterparty fails to deliver a leg of an FX transaction (the purchased currency) on time. This situation may be exacerbated in a non-PVP settlement process, whereby the bank has already paid away the sold currency and cannot use those funds as collateral or to swap outright to obtain the needed counter-currency. A bank should account for these risks in its liquidity risk management framework and develop contingency plans to address possible liquidity shortfalls.

3.4.5 A bank may settle its FX payment obligations based on a bilateral or multilateral net position in each currency (position netting) even though the underlying obligations remain gross from a legal perspective. When this is the case, a bank should understand and address the risk that its liquidity needs could change materially following a settlement disruption. In particular, the failure of a counterparty or a settlement disruption in an FMI could lead to a scenario where a bank's net liquidity needs increase significantly by reverting to gross liquidity needs.

Liquidity risks associated with an FMI

3.4.6 A bank that settles its FX obligations through an FMI should assess the FMI's rules and procedures to identify potential liquidity risks. For example, a bank should understand an FMI's rules for rescinding trades and the associated liquidity impact on the bank. In addition, a bank may use certain liquidity-saving mechanisms to reduce its funding needs and should assess and manage its risk resulting from the absence of such mechanisms.²⁹ Further, as noted above, a participant failure or a disruption to the operations of an FMI may change a bank's liquidity requirements. For example, if a participant fails to make payment or settlement is disrupted, then the remaining participants may be required to make unexpected funding payments to settle their transactions. A bank should incorporate these risk scenarios into its liquidity stress tests and make appropriate adjustments to its liquidity management policies, procedures and contingency funding plans.

3.4.7 A bank may have additional responsibilities associated with being an FMI member that should be considered in its liquidity risk management framework. For example, a bank may provide third party settlement services, correspondent banking services or credit to its customers to facilitate FMI settlement. Further, a bank may also be a liquidity provider to an FX settlement FMI. If an FMI needs to draw on its liquidity facilities, a provider bank may experience significant liquidity stresses resulting from its own FX obligations and the needs of the FMI. As these situations are likely to occur during periods of significant market stress, a bank should incorporate these risk scenarios in its liquidity stress tests. In these scenarios, a bank should consider that normal funding arrangements may not be available.

Liquidity risks associated with the use of a correspondent bank

3.4.8 When choosing to settle FX activities through a correspondent bank (nostro agent), a bank should ensure that the arrangement allows it to meet its FX obligations in each currency on a timely basis under varying circumstances. For example, a bank should assess the impact of a correspondent bank restricting the provision of intraday credit on its ability to meet its FX obligations, particularly if cross-border collateral would need to be mobilised to facilitate settlement. In addition, a bank should recognise the potential for operational or financial disruptions at its correspondent bank to disrupt its own liquidity management. A bank should assess such risks and consider appropriate mitigants, such as establishing

²⁹ In/out swaps (see *Glossary*) are examples of liquidity-saving mechanisms.

alternative settlement arrangements to ensure it can continue to meet its FX obligations on time.³⁰

³⁰ See *Principles for Sound Liquidity Risk Management and Supervision*, BCBS, September 2008 – Principle 8.

Guideline 5: Operational risk

A bank should properly identify, assess, monitor and control its operational risks. A bank should ensure that its systems support appropriate risk management controls, and have sufficient capacity, scalability and resiliency to handle FX volumes under normal and stressed conditions.

Key considerations

1. A bank should ensure that its operational risks are appropriately represented in the bank's operational risk management framework.
2. A bank should maximise the use of straight-through processing (STP) and other effective means to control operational risks.
3. A bank should confirm trades in a timely manner, using electronic methods and standard settlement instructions,³¹ where practicable.
4. A bank should ensure that its systems have sufficient capacity and scalability to handle increasing and high-stress FX trading volumes.
5. A bank should monitor trading volumes in a timely manner to prevent them from reaching a critical level. A bank that engages in high-frequency trading, or has prime brokerage clients that engage in such activity, should monitor trading volumes in real-time and assess the potential for large FX trading spikes.
6. A bank should have robust business resiliency and continuity plans to manage its operational risks and complete its FX settlement obligations.

Operational risk management framework

3.5.1 A bank should manage its operational risks in accordance with current international supervisory guidance.³² A bank should establish an operational risk management framework that identifies, assesses, monitors and controls a bank's operational risks. The framework should address the accuracy, capacity and resiliency of a bank's operational processes and systems for FX settlement. A bank should periodically reassess its operational risks, including risks that stem from changes in its FX portfolio (eg new products).

3.5.2 A bank's operational risks can arise from deficiencies in information systems, internal processes, personnel or disruptions from external events. These risks can lead to inadequacies in the accuracy, capacity and resiliency of a bank's operations and cause delays or errors in trading data or confirmation of FX trades. Further, operational risks can lead to losses resulting from the bank's failure to meet obligations on time, and create or exacerbate other risks (eg principal risk, replacement cost risk, liquidity risk, and reputational risk).

Straight-through processing (STP)

3.5.3 A bank should maximise the use of STP by employing systems that automatically feed transactions, adjustments and cancellations from trade execution systems to other internal systems, such as operations and credit-monitoring systems. STP helps to ensure that data is disseminated quickly, accurately and efficiently throughout the bank, and allows for effective monitoring and control of risks from trade execution to settlement. For example,

³¹ Standard settlement instructions may also be referred to as "standing settlement instructions."

³² See *Principles for the sound management of operational risk*, BCBS, June 2011.

STP can facilitate the timely confirmation of trades with counterparties and eliminate errors from manual processing. Maximising the use of STP, however, does not fully eliminate operational risk. In addition, STP systems require monitoring and sufficient capacity and scalability. In the event that STP systems are disrupted, a bank should have contingency procedures to continue its operations.

Trade confirmation³³

3.5.4 A bank should establish processes and procedures that allow it to confirm, or affirm,³⁴ FX trades as soon as practicable after execution to reduce the potential for losses. Where practicable, a bank should use electronic confirmations and standard settlement instructions to maximise use of STP and allow for prompt confirmation. Trade confirmations should be transmitted in a secure manner to mitigate the possibility of theft or fraudulent correspondence. As the confirmation process is a critical control tool, it should be independent from the trading division.

Capacity

3.5.5 A bank should have a capacity management plan for its FX systems, including trading, credit monitoring, operations, prime brokerage and settlement systems. When assessing capacity needs, a bank should consider the sufficiency of FX systems and operational personnel.

3.5.6 A bank should ensure its FX systems have sufficient capacity and scalability to handle increasing and high-stress FX volumes. A bank's capacity plan should include forecasting of expected and high-stress capacity needs. The forecasts should consider the FX trading behaviour of the bank and its clients. In addition, a bank should also work with relevant FMI when establishing capacity policies and high-stress capacity requirements.

3.5.7 A bank should ensure its FX systems are designed appropriately for the scale of its current and expected FX business activity. For example, a bank that offers FX prime brokerage services should ensure that the operational arrangements supporting its prime brokerage activities integrate seamlessly with the bank's FX systems and do not cause undue operational risk. Further, a bank should design its FX systems to accommodate the potential for large trading spikes in stress situations, as appropriate. Finally, a bank's FX systems should be flexible enough to meet changing operational needs.

3.5.8 The capacity plan should include timely monitoring of trading volumes and capacity utilisation of key systems. Volume monitoring is critical to a bank that engages in high-frequency trading or has prime brokerage clients that engage in such activity, and should be reflected in the robustness of their capacity management plan.³⁵ A bank should monitor trading volumes in a timely manner to prevent them from reaching a critical level and assess the potential for large FX trading spikes.

³³ A trade confirmation is legal evidence of the terms of an FX transaction. A confirmation should include trade details, settlement instructions and other relevant information to allow each counterparty to agree to the trade terms. Trade confirmations can take many forms, eg electronic confirmation messages, paper confirmations, or voice confirmations over a recorded phone line.

³⁴ Trade affirmation involves signing and returning a counterparty trade notification or electronic confirmation.

³⁵ For more details on high-frequency trading, see *High-frequency trading in the foreign exchange market*, The Markets Committee of the Bank for International Settlements, September 2011.

Contingency planning

3.5.9 A bank should develop and test its business resiliency and continuity plans to ensure continued operations following a disruption. A bank should identify and address various plausible events that could lead to disruptions in their FX-related operations and should have appropriate systems, backup procedures and staffing plans to mitigate such disruptions. Business continuity plans should be documented and periodically reviewed, updated and tested.

Guideline 6: Legal risk³⁶

A bank should ensure that agreements and contracts are legally enforceable for each aspect of its activities in all relevant jurisdictions.

Key considerations

1. A bank should ensure that netting and collateral agreements, including provisions for close-out netting and obligation netting, are legally enforceable in all relevant jurisdictions.
2. A bank should identify when settlement finality occurs so that it understands when key financial risks are irrevocably and unconditionally transferred as a matter of law.

Enforceability

3.6.1 Contracts, and actions taken under contracts, should be legally enforceable with a high degree of certainty in all relevant jurisdictions even when a counterparty defaults or becomes insolvent.³⁷ A bank should ensure that there is a high degree of certainty that contracts, and actions taken under such contracts, will not be subject to a stay beyond a *de minimus* period, voided or reversed.

3.6.2 A bank conducting business in multiple jurisdictions should identify, measure, monitor and control for the risks arising from conflicts of laws across jurisdictions. The identification of legal risk in various jurisdictions can be accomplished through (i) legal opinions commissioned by, and addressed to, a trade organisation of which a bank is a member; or (ii) legal opinions provided by the bank's in-house or external counsel who are licensed to practice law in the jurisdictions for which they are providing such opinions. All opinions should be reviewed for legal sufficiency by bank counsel, and be updated, on a regular basis.

3.6.3 Changes in law (eg new or changing legal restrictions on the use of currency) may adversely impact a bank's FX activities by rendering agreements and contracts unenforceable. A bank should have procedures to monitor for, and promptly assess, changes in law relevant to its FX agreements and contracts in jurisdictions in which it is doing business and jurisdictions of the currencies in which it transacts.

3.6.4 If a bank's agreements and contracts are not legally enforceable, a bank may find itself with significant unexpected and/or un-hedged foreign exchange obligations. The financial ramifications for a bank that has actively traded in that currency could be severe.

Settlement finality

3.6.5 A bank should ensure that the legal opinions it obtains with respect to its agreements and contracts address the timing of when settlement finality occurs to identify when key financial risks are transferred. The legal opinions should also take into consideration the impact of relevant bankruptcy and insolvency laws and relevant resolution regimes. A bank needs to know with a high degree of certainty when settlement finality

³⁶ Legal risk is addressed as a separate guideline from operational risk in this guidance. However, under the Basel capital framework, the definition of operational risk includes legal risk, which considers the legal uncertainty or difference across jurisdictions associated with FX settlement.

³⁷ In particular, contracts, and actions taken under contracts, include close-out netting and obligation netting arrangements and collateral agreements.

occurs as a matter of law and plan for actions that may be necessary if settlement finality is not achieved as a matter of law.

3.6.6 A bank should ensure that contracts with correspondent banks (nostro agents) specify the point at which funds are received with finality, and the point at which instructions become irrevocable and unconditional, taking into consideration the impact of relevant bankruptcy and insolvency laws and relevant resolution regimes.

3.6.7 A bank should clearly communicate the legal status of on-us settlements so that their customers and counterparties know when finality of settlement is achieved as a matter of law.

Guideline 7: Capital for FX transactions

When analysing capital needs, a bank should consider all FX settlement-related risks, including principal risk and replacement cost risk. A bank should ensure that sufficient capital is held against these potential exposures, as appropriate.

Key considerations

1. A bank's analysis of its capital needs should complement the guidelines under the current Basel capital framework and address all FX settlement-related risks, including principal risk and replacement cost risk.
2. A bank should estimate the potential exposures associated with an FX transaction from the point of trade execution until it confirms that the trade has settled with finality during the reconciliation process (ie receipt of funds in account). The bank should ensure that sufficient capital is held against these potential exposures, as appropriate.
3. A bank should seek to create proper incentives or mechanisms to reduce risks associated with FX settlement (eg by differentiating and passing on the costs to business units based on the risk profiles of their transactions).

Analysing capital needs for FX transactions

3.7.1 A bank's analysis of its capital needs should complement the current Basel capital framework and address all FX settlement-related risks, including principal risk and replacement cost risk. When incorporating FX settlement-related risks into the analysis, a bank should refer to the Basel capital framework for capitalising risks with similar characteristics. This should apply regardless of whether final determination of overall capital needs is based on jurisdictional regulations, supervisor-defined factors or internal factors.

3.7.2 A bank should estimate the potential exposures associated with FX settlement-related risks and hold sufficient capital against them, as appropriate. The analysis should consider the impact of risk mitigants, internal controls and method of settlement on the size and duration of the risks. This analysis should also include any impact that the choice of settlement method may have on the bank's assumptions regarding the netting of replacement cost risk.

3.7.3 The estimation of potential exposures should consider the time from the point of trade execution until confirmation that the trade has settled with finality (ie reconciled the receipt of funds in the account). When considering the size and duration of FX settlement-related risks, a bank's analysis should not be limited to the assumption that exposures end on the contracted date of settlement.³⁸ Therefore, the bank's analysis should take into account relevant deadlines for unilateral payment cancellation (which may occur prior to settlement date) and timeframes for reconciliation processes (which may occur after settlement date).³⁹

³⁸ Pillar I of the Basel capital framework covers a bank's replacement cost risk exposure from trade execution until the contracted date of settlement.

³⁹ See Guideline 2 for appropriate methods to measure the size and duration of principal risk.

Incentives to reduce principal risk

3.7.4 A bank should create an internal incentive structure, where practicable, that is aligned with its strategy to eliminate and reduce risks arising from FX settlement-related exposures. The cost of such exposures should be reflected in the bank's firm-wide strategy (eg by risk-based capital allocation). One way to establish incentives is by differentiating the costs or capital charges incurred by business units based on the risk profiles of their FX transactions, and passing those costs onto them as a balance sheet charge. For example, a business unit that executes a transaction settled via PVP would incur a lower cost for principal risk than a business unit that executes a transaction settled by traditional gross correspondent banking. Similarly, a business unit would typically incur a lower charge for replacement cost risk on transactions covered under a close-out netting arrangement than on transactions which are not covered by a close-out netting arrangement.

Annex

FX settlement-related risks and how they arise

1. In the period between FX trade execution and final settlement, a bank is exposed to a number of different risks. The risks vary depending on the type of pre-settlement and settlement arrangements. A bank needs to understand the risks associated with FX transactions in order to adequately manage them.

2. Section A describes principal risk, replacement cost risk and liquidity risk. Section B identifies and describes the presence of operational and legal risks between trade execution and final settlement. Finally, Section C discusses the various pre-settlement and settlement arrangements and their impact on risks.

3. For the purposes of exposition, the risks are described from the point of view of "a bank" and a failed FX "counterparty" of that bank. Section A describes the risks relating to a single FX trade between a bank and its counterparty. This is generalised to multiple trades in Sections B and C.

A. Risks relating to counterparty failure to deliver the expected currency

4. The three main risks associated with FX transactions are principal risk, replacement cost risk and liquidity risk, which arise due to the possibility that a counterparty may fail to settle an FX trade. This failure may be temporary (eg operational or liquidity problems of the counterparty) or permanent (eg counterparty's insolvency). A bank may become aware of a potential failure at any time between trading and the completion of settlement, particularly if the problem is due to insolvency. However, sometimes, it may only know that a problem has occurred on or after settlement day when it does not receive the currency that the counterparty was expected to deliver. Initially, a bank may not be able to identify the cause of the failure, nor determine whether the failure is temporary or permanent.

5. A bank is exposed to principal risk, replacement cost risk and liquidity risk until it receives the bought currency with finality.

Principal risk

6. Principal risk is the risk that a bank pays away the currency being sold, but fails to receive the currency being bought. Principal risk can be the most serious risk because the amount at risk is equal to the full value of the trade.⁴⁰

7. Principal risk exists when a bank is no longer guaranteed that it can unilaterally cancel the payment of the currency it sold (the unilateral cancellation deadline). Given that a

⁴⁰ The maximum loss is the principal value of the trade. The actual loss will depend on the outcome of the counterparty's insolvency proceedings.

bank's unilateral payment cancellation deadline may be one or more business days before the settlement date, this risk can last for a significant.⁴¹

Replacement cost risk

8. Replacement cost risk is the risk that an FX counterparty will default before a trade has settled and the bank must replace it with a new trade and a different counterparty at current market prices (potentially less favourable exchange rate). As such, the bank may incur a loss relative to the original trade. Replacement cost risk exists throughout the period between trade execution and final settlement.

Liquidity risk

9. Liquidity risk is the risk that a counterparty will not settle an obligation for full value when due. Liquidity risk does not imply that a counterparty is insolvent since it may be able to settle the required debit obligations at some unspecified later time.

10. Liquidity risk exists in addition to replacement cost risk. Whether a default is just a replacement cost problem or turns into a liquidity shortage depends on whether a bank can replace the failed trade in time to meet its obligations or, at least, to borrow the necessary currency until it can replace the trade. In principle, liquidity risk can exist throughout the period between trade execution and final settlement. In practice, the probability of the problem materialising as a liquidity shortage and a replacement cost depends on many factors, including:

- *The timing of the default.* The closer the default is to the settlement date, the less time a bank has to make other arrangements.
- *Whether a bank has already irrevocably paid away the currency it is selling.* If so, the bank may have fewer liquid assets available to pay for the replacement trade or to use as collateral to borrow the currency it needs.⁴²
- *The nature of the trade.* The less liquid the currency being purchased and/or the larger the value of the trade, the harder it may be to replace.

11. A bank may find it hard to predict the probability of a liquidity shortage, as it cannot make a sound judgment based solely on normal market conditions. However, there is a strong positive correlation between a counterparty default and illiquid markets (ie the default may be the cause of the market illiquidity or an effect of it). In addition, trades that are easy to replace in normal conditions may be impossible to replace when markets are less liquid and experiencing stressed conditions.

B. Operational and legal risks

12. A bank may also face FX settlement-related risks caused by weaknesses in its own operations and weaknesses in the legal enforceability of contractual terms and the governing law applicable to its transactions. If a bank has inadequate operational capabilities or if there are weaknesses in the legal basis for the pre-settlement and settlement arrangements, it can

⁴¹ For more information on how principal risk arises when settling FX trades, see *Progress in reducing foreign exchange settlement risk*, CPSS, May 2008.

⁴² In this case, FX settlement-related principal risk will also exist.

face increased principal risk, replacement cost risk and liquidity risk relating to counterparty failure.

13. Operational risk is the risk of loss due to external events or inadequate or failed internal processes, people and systems. This definition includes legal risk and excludes strategic and reputational risk.

14. Inadequate skills and insufficient processing capacity may increase potential exposures. These weaknesses can cause operational delays, inaccurate confirmation and reconciliation, or an inability to quickly correct or cancel payment instructions.

15. Legal risk occurs when a counterparty's contractual FX obligations are non-binding, unenforceable and subject to loss because (i) the underlying transaction documentation is inadequate; (ii) the counterparty lacks the requisite authority or is subject to legal transaction restrictions; (iii) the underlying transaction or contractual terms are impermissible and/or conflict with applicable law or regulatory policies; or (iv) applicable bankruptcy or insolvency laws limit or alter contractual remedies.

16. Legal problems may affect settlement of a foreign exchange transaction. Legal issues may compromise the legal robustness of netting, the enforceability of unilateral cancellation times or certainty about the finality of the receipt of currency.

C. Impact of pre-settlement and settlement arrangements on risks

17. FX settlement-related risks may be affected by the type of pre-settlement and settlement arrangements used by a bank. Risk implications for the most common arrangements are described below. This section focuses on the implications for the risks related to counterparty failure described in Section A. Different pre-settlement and settlement arrangements can also impact the operational and legal risks described in Section B – some arrangements may be operationally more complex, require more demanding risk management or create different legal risks. However, since these implications can vary from bank to bank and depend on specific circumstances, they are not covered in this section.

Bilateral close-out netting

18. Legally robust and enforceable netting arrangements can be a safe and efficient method for reducing settlement exposures. Bilateral close-out netting is a specific type of netting that establishes a close-out payment based on the net present value of future cash flows between a bank and a defaulting counterparty. This involves two counterparties entering into a formal bilateral agreement stipulating that, if there is a defined "event of default" (eg insolvency of one of the counterparties), the unpaid obligations covered by the netting agreement are netted. The value of those future obligations is calculated to a net present value, usually in a single-base currency. Thus, a series of future dated cash flows is reduced to one single payment due to, or from, the closed-out counterparty.

19. Legally enforceable close-out netting reduces principal risk, replacement cost risk, liquidity risk and operational risk for unsettled future obligations. Without close-out netting, a bank may be required to make principal payments to a defaulted counterparty. This risk is particularly relevant in jurisdictions without statutory provision – or with weak or ineffective provision – for offset of obligations with a defaulted counterparty. Thus, a bank may face gross principal risk, replacement cost risk and liquidity risk on transactions not covered by a legally enforceable netting agreement.

Bilateral obligation netting

20. Under bilateral obligation netting, FX transactions between two counterparties due to settle on a certain date are netted to produce a single obligation to pay in each currency on that date (ie each counterparty has an obligation to pay a single amount in those currencies in which it is a bilateral net seller). Those net amounts are likely to be smaller than the original gross amounts, reducing principal and liquidity risks. Obligation netting can take different forms (eg netting by novation) and may vary by jurisdiction. Their effectiveness depends on the legal soundness of the contractual terms.

Collateral arrangements

21. If netting is accompanied by a collateral arrangement, replacement cost risk can be reduced further. A collateral arrangement is where the counterparty with the negative net position provides financial assets to the other counterparty in order to secure that obligation. Collateral could be taken to cover only price movements that have already occurred. However, in this case, if there is a counterparty default, a bank is still exposed to further movements that may occur between the time collateral was last taken and the time that the bank succeeds in replacing the trade (potential future exposure). Further protection can be achieved if collateral is also taken to cover the potential future exposure. Since the actual size of this exposure cannot be determined until after the event, the degree of additional protection depends on the assumptions made when calculating the collateral amount.⁴³ Note that such collateral arrangements are typically not used to provide protection against liquidity or principal risk.

Settlement via traditional correspondent banking

22. Under this settlement method, each counterparty to an FX trade transfers to the other counterparty the currency it is selling, typically using their correspondent banks for the currencies concerned. Once a payment instruction is irrevocable, the full amount being transferred is subject to principal risk, replacement cost risk and liquidity risk.

On-us settlement

23. On-us settlement is where both legs of an FX transaction are settled across the books of a single institution. The institution provides accounts to both counterparties to an FX transaction in both currencies. The account provider debits one of its customer's accounts and credits the other, while making opposite debits and credits to its own account. Those credits can be made at different times (in which case the account provider may be exposed to principal risk from its customer) or simultaneously (via PVP). Irrespective of whether they face principal risk, the bank and customer still face "normal" credit risk to each other after the return leg has settled.

Payment-versus-payment settlement

24. Payment-versus-payment (PVP) settlement is a mechanism that ensures the final transfer of a payment in one currency if, and only if, a final transfer of a payment in another currency occurs, thereby removing principal risk. There are various forms of PVP settlement

⁴³ As with any collateral arrangement, there is a risk that the value of the collateral may decline. Thus, the degree of protection against both current and potential future exposure also depends on the type of collateral and the haircut applied.

arrangements, including the type offered by CLS Bank International (CLS Bank).⁴⁴ Another form consists of a link between payment systems in the two currencies, where a payment is made in one system if, and only if, payment is made in the other system. PVP arrangements do not guarantee settlement. In a basic PVP arrangement, a trade will settle only if a bank and its counterparty pay in the correct amount. If the counterparty fails to pay in, a bank will receive back the currency it was selling, thus providing protection against principal risk. However, it will still be short on the currency that it was buying and face liquidity risk equal to the full amount of that currency, as well as the replacement cost risk on that amount.

Central clearing

25. A central counterparty (CCP) is an entity that interposes itself between counterparties to trades in a financial market, thus, becoming the buyer to every seller and the seller to every buyer. In this way, a form of multilateral obligation netting is achieved among the original counterparties. Currently, CCPs for FX trades involving an exchange of payments at settlement are rare, but they may become more widespread in the future.

Indirect participation in settlement or CCP arrangements

26. A bank may choose to be an indirect participant of a settlement or CCP arrangement – ie a customer of a direct participant. In this case, the FX settlement-related risks a bank faces will depend, in part, on the exact terms of the service provided by the direct participant. Thus, the risks associated with indirect participation may not be the same as those associated with direct participation.

⁴⁴ For a description of the CLS system, see *Progress in reducing foreign exchange settlement risk*, CPSS, May 2008, Annex 4.

Glossary

Bilateral netting	A general term describing an arrangement to offset the obligations between two parties to a single bilateral obligation. The obligations covered by the arrangement may arise from financial contracts, transfers or both.
Bilateral obligation netting	A form of netting where two counterparties agree (via a legally-enforceable netting agreement) to settle transactions by making or receiving a single payment in each of the currencies (ie each counterparty has an obligation to pay a single amount in those currencies in which it is a bilateral net seller). This reduces the value at risk by replacing multiple gross obligations (that would, otherwise, be settled on a trade-by-trade basis) with one netted obligation.
Capital adequacy	Consideration within the broader risk management infrastructure of the bank's internal analysis of its capital needs, including under adverse scenarios where risks and potential related losses may be amplified.
Central counterparty (CCP)	An entity that interposes itself between counterparties to trades in a financial market, becoming the buyer to every seller and the seller to every buyer.
Close-out netting	A form of netting which occurs following some predefined events, such as default. Close-out netting establishes a close-out payment based on the net present value of future cash flows due between a bank and a defaulting counterparty. Close-out netting is intended to reduce exposures on open contracts with a defaulting counterparty. (Also referred to as "default netting," "open contract netting" or "replacement contract netting").
CLS Bank International (CLS Bank)	Owned by the foreign exchange community, CLS Bank operates a multi-currency PVP cash settlement system to mitigate settlement risk in the foreign exchange market.
Confirmation	The process in which the terms of a trade are verified by market participants or by a central entity. When direct participants execute trades on behalf of indirect market participants, trade confirmation occurs on two separate tracks: verification of the terms of the trade between direct participants and verification of the intended terms between each direct participant and the indirect participant for whom the direct participant is acting (also referred to as "affirmation").
Contingency planning	The development of practical and credible plans to promote resiliency during periods of severe financial distress and to facilitate a rapid resolution. The plans should ensure access to relevant information in a crisis and help evaluate resolution options.

Correspondent banking	An arrangement in which one bank (correspondent) holds deposits owned by other banks (respondents) and provides payment and other services to those respondent banks. Such arrangements may also be known as “agency relationships” in some domestic contexts. In international banking, balances held for a foreign respondent bank may be used to settle FX transactions. Reciprocal correspondent banking relationships may involve the use of nostro and vostro accounts to settle foreign exchange transactions.
Credit support annex (ISDA CSA)	A legal document that regulates credit support (collateral) for derivative transactions. It is one of the four parts that make up an ISDA master agreement, but is not mandatory. A CSA defines the terms or rules under which collateral is posted or transferred between swap counterparties to mitigate the credit risk arising from "in the money" derivative positions. Terms include thresholds, minimum transfer amounts, eligible securities and currencies, haircuts applicable to eligible securities and rules for settling or resolving disputes over valuation of derivative positions.
Currency swap	An agreement between two parties to exchange aspects (namely the principal and/or interest payments) of a loan in one currency for equivalent aspects of a loan in another currency at some point in the future according to a specified formula. Currency swaps are over-the-counter derivatives and are closely related to interest rate swaps. However, unlike interest rate swaps, currency swaps generally involve the exchange of the principal. (Also known as a “cross-currency swap”).
Derivatives	Financial contracts whose values depend on the value of one or more underlying reference assets, rates, currencies or indices.
Enforceable	A legal document, agreement, right or obligation is enforceable if the party obligated can be forced or ordered to comply through a legal process.
Fail	A failure to settle a transaction on the contractual settlement date, usually due to technical or temporary difficulties. Fails typically arise from operational problems, while “defaults” arise from credit or solvency problems. (Also known as a “failed transaction”).
Financial market infrastructure (FMI)	A multilateral system among participating institutions, including the operator of the system, used for purposes of clearing, settling or recording payments, securities, derivatives or other financial transactions.
FX forward	A contract between two parties that agree to buy or sell an amount of currency against a second currency at a specified future date (more than two business days later) and at an agreed-upon rate on the date of the contract.

FX swap	A contract between two parties that simultaneously agree to buy or sell an amount of currency against a second currency at an agreed-upon rate; and to resell or repurchase the same currency at a later date with the same counterparty, also at an agreed-upon rate.
Governance	The set of relationships among a bank's board of directors, management, shareholders and other interested parties or stakeholders. Governance also provides the structure for setting company objectives, the means of attaining those objectives and the framework for monitoring performance.
In/out swap (with regard to CLS Bank only)	An in/out swap comprises two equal and opposite FX transactions that are agreed-upon as an intraday swap between two CLS Bank settlement members. One of the two FX transactions is settled through CLS Bank to reduce each member's net position in the two currencies. The other transaction is settled outside of CLS Bank. The combined effect of these two FX transactions reduces funding requirements of the two members during the CLS Bank settlement session, but leaves the institutions' overall FX positions unchanged.
Informal bilateral payment netting	Counterparties netting settlement payments without an underlying agreement to do so. Depending on the jurisdiction and other netting agreements in place, it may leave counterparties exposed to underlying gross risks.
Initial margin	Collateral that is collected to cover potential changes in the value of each participant's position (also known as "potential future exposure") over the appropriate close-out period in the event the participant defaults.
Legal risk	The risk of an unexpected application of a law or regulation, usually resulting in a loss.
Liquidity risk	The risk that a bank is unable to make payments due to a shortage of liquidity arising from a counterparty (or participant in a settlement system) not settling an obligation for full value when due. Liquidity risk does not imply that a counterparty or participant is insolvent since it may be able to settle the required debit obligations at some unspecified later time.
Margin call	A demand for additional funds or collateral (following the marked-to-market of a margined transaction) if the market value of the underlying collateral falls below margin requirements.
Master netting agreement	A master netting agreement (eg ISDA or IFEMA) sets forth the standard terms and conditions applicable to all, or a defined subset of, transactions that the parties may enter into from time to time. Includes the terms and conditions for close-out and obligation netting.
Multilateral netting	Netting on a multilateral basis is the offsetting of obligations between or among multiple participants to a net position per participant.

Non-deliverable forwards (NDFs)	An outright forward or futures contract in which counterparties settle the difference between the contracted NDF price or rate and the prevailing spot price or rate on an agreed notional amount.
Nostro account	A foreign currency-denominated account (usually at a foreign bank) where a domestic bank keeps reserves to maintain its balance in that currency and to make and receive payments.
On-us settlement	On-us settlement occurs when both legs of an FX transaction are settled across the books of a single institution. The institution provides accounts to both counterparties to an FX transaction in both currencies. The account provider debits one of its customer's accounts and credits the other, while making opposite debits and credits to its own account.
Operational risk	The risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events. This definition includes legal risk and excludes strategic and reputational risk.
Option contract	A contract that gives the option purchaser the right, but not the obligation, to buy or sell an underlying asset or currency by (or on) a specific date for a specific price. The purchaser pays a premium for this right.
Potential future exposure	The most common measure of forward-looking exposure. It is the maximum expected exposure over a specified interval of time calculated at some level of confidence. Potential future exposure is the additional exposure that a counterparty might potentially assume during the life of a contract, or set of contracts, beyond the current replacement cost. It is calculated by evaluating existing trades executed against possible market prices in the future. Both initial margin and variation margin mitigate this future exposure. Variation margin mitigates actual price volatility so that the price protection provided by initial margin is maintained.
Prime brokerage	A service that enables a bank's customer to conduct transactions in the name of the bank (the prime broker). The prime broker sets up an arrangement that permits the customer to trade directly with dealers in the name of the prime broker. These dealers recognise the prime broker (not the customer) as the counterparty in these trades.
Principal risk	The risk of outright loss of the full value of a transaction resulting from the counterparty's failure to settle. This can arise from paying away the currency being sold, but failing to receive the currency being bought. (Also referred to as "Herstatt risk").
Payment-versus-payment (PVP) settlement	A settlement mechanism that ensures the final transfer of a payment in one currency if, and only if, a final transfer of a payment in another currency occurs.

Principal risk duration	The length of time that a bank might be exposed to principal risk from an FX transaction. This length of time extends from the unilateral payment cancellation deadline to the time a bank receives, with finality, the purchased currency. (There may also be additional time needed for a bank to confirm receipt of the expected settlement payment and to reconcile the settlement payment against its outstanding transactions.) Depending on the internal practices, procedures or any legal agreements of a bank and its correspondent bank, the duration of a bank's principal risk may begin as soon as the bank submits its payment order for a sold currency.
Real-time gross settlement (RTGS)	The continuous (real-time) settlement of funds or securities on an order-by-order basis (without netting).
Replacement cost risk	The risk of loss due to unsettled transactions with a counterparty. The resulting exposure is the cost of replacing the original transaction at current market prices.
Risk appetite	A high-level determination of how much risk a bank is willing to accept considering risk/return attributes. Risk appetite is a forward-looking view of risk acceptance.
Risk tolerance	The formal designation of the level of risk the bank is willing to accept in pursuit of business objectives. The board of directors sets the bank's risk tolerance and risk capital.
Settlement finality	The irrevocable and unconditional transfer of an asset or financial instrument, or the discharge of an obligation by the FMI or its participants in accordance with the terms of the underlying contract. Final settlement is a legally defined moment.
Spot FX	A spot FX transaction is the purchase of one currency for another, with immediate delivery according to local market convention (usually two business days) at an agreed-upon price on trade date.
Straight-through processing (STP)	Automated processing that allows data to be entered into technical systems once and is then used for all subsequent processing of transactions.
Stress testing	The estimation of credit and liquidity exposures that would result from extreme price and implied volatility scenarios.
Unilateral payment cancellation deadline	The point in time after which a bank is no longer guaranteed that it can recall, rescind or cancel (with certainty) a previously submitted payment instruction. This deadline varies depending on the currency pair being settled, correspondent payment system practices, and operational, service and legal arrangements.
Variation margin	Variation margin is an amount of collateral posted to cover exposures resulting from actual changes in market prices. (Also known as "mark-to-market margin").

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