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■ Assessment of the Riksbank's Payment System (RIX) 2005

The RIX system is the Swedish settlement system for payments between banks and certain other institutions. This system is important from a systemic perspective and is therefore being assessed by the Riksbank. The assessment is based on the Core Principles for Systemically Important Payment Systems developed by the Bank for International Settlement's Committee on Payment and Settlement Systems (CPSS).

Operational description

RIX consists of two parallel systems, one for Swedish kronor, K-RIX, and one for Euro, E-RIX. Via E-RIX the Riksbank is a member of the European TARGET settlement system (Trans-European Automated Real-time Gross settlement Express Transfer system).

The RIX system is owned and operated by the Swedish central bank, the Riksbank.

The role of RIX in the Swedish payment system

RIX is the central node for settlements in Sweden to which all the other systems are linked¹. In addition to the major banks, a number of clearing organisations are mainly members of RIX.

In Sweden Bankgirocentralen, BGC, is the central agency for mediating retail payments between the banks.

VPC is a clearing and settlement organisation that also has the task of keeping the central securities register.

The Stockholm Stock Exchange has the function of acting as central counterparty and clearing organisation for derivatives and is a central trading point for the market in shares and derivatives in Sweden.

Continuous Linked Settlement (CLS) is a system for clearing and settling currency transactions in Swedish kronor, for instance.

¹ For further information about the Swedish financial market readers are referred to the Riksbank publication *Den svenska finansmarknaden 2005 (The Swedish Financial Market 2005)*.

History

RIX started in 1990 as one of the first systems in the world for gross settlement in real-time. From 1997-1998 the system was further developed so that queuing functions were added and as was SWIFT as a communication system. Since January 1999 settlements involving payments in Euro have also been dealt with in RIX.

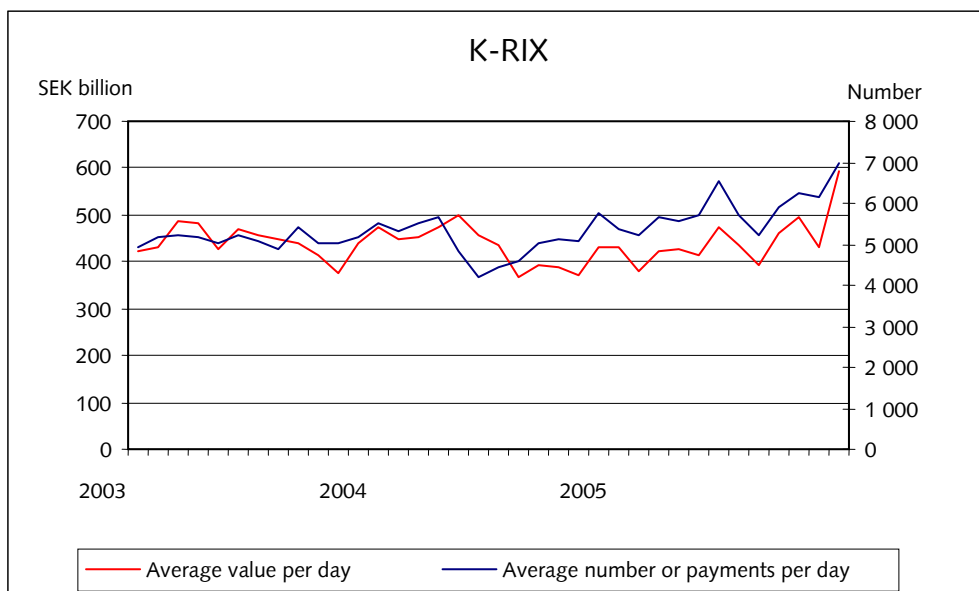
Participants in RIX

K-RIX has 20 participants, of which 14 are credit institutes², 3 clearing organisation, 1 a securities company and 2 government agencies³. In E-RIX there are 13 participants, of which 8 are credit institutes⁴, 3 are clearing organisations and 2 are government agencies.

Volume and value

During the first ten months of 2005 the number of transactions in K-RIX averaged about 5,300 per day. The value of the turnover amounted to SEK 434 billion. About 84 per cent of the turnover in K-RIX consisted of interbank payments while 16 per cent was made up of customer payments. In E-RIX during the same period the number of transactions averaged about 400 per day and the value of the turnover about EUR 8 billion (corresponding to SEK 74 billion). The bulk of the turnover consisted of interbank payments, less than 4 per cent was made up of customer payments. Transactions in E-RIX can also be classified as cross-border payments or domestic payments. On average domestic payments constitute only 4 per cent of the turnover value.

Developments during 2005 show a certain rise in the number of transactions but a reduction in the turnover value for both K-RIX and E-RIX in comparison with the previous year. See the diagram below.



² Of these 13 are banks, of which 6 are subsidiaries of foreign banks and 1 is a foreign bank participating from abroad.

³ The Riksbank is one of the government agencies.

⁴ They are all banks, of which two are subsidiaries of foreign banks.

■ Communication

Communication in RIX takes place through standardised payment messages via SWIFT's messaging service. The RIX system uses SWIFT'S FinCopy service, which stores payment messages and forwards them to the recipient when settlement is completed. The use of standardised payment messages enables participants in the system to send and receive payment instructions directly from and to their own systems.

Participants can keep track of and store their payments and see the status of their RIX accounts via an on-line connection (RIX On-line) through a network. RIX On-line can also be used as a back-up routine in the event of disruption of the normal communication system or if a participant suffers disruption.

Opening hours

RIX is open for payments in Swedish kronor (K-RIX) every Swedish bank day between 7 a.m. and 5 p.m. For payments in Euro (E-RIX) RIX is open on all Swedish bank days, as well as Twelfth Night, May 1, Ascension Day, Sweden's National Day, Midsummer Eve, Christmas Eve and New Year's Eve between 7 a.m. and 6 p.m.

Intraday liquidity

A participant in K-RIX and E-RIX⁵ may be granted an intraday credit facility on each settlement account. Credit institutes⁶ may also have overnight credit in Swedish kronor. Entitlement to intraday credit and overnight credit in SEK is limited only by the collateral the participant can provide the Riksbank. The Riksbank's total intraday credit in Euro is however restricted to EUR 500 million.

Pricing

The fees for using the RIX-system are determined by the principle that all costs should be covered. These fees consist of a transaction fee which is the same for all participants and an annual charge, which is differentiated into four categories depending on the number of payments transmitted during the preceding year. Fees for cross-border payments in E-RIX are governed by the Eurosystem⁷. The fee per transaction is based on a declining three-stage scale depending on the number of payments.

Management – governance, coordination and monitoring

The Riksbank owns and operates the RIX settlement system. The Market Operations Department is responsible for the management and governance of RIX. A system owner has the overall responsibility for the information contained in the system, its security level and management. System administrators and system operators report to the system owner.

The system owner chairs the RIX Management Committee. This is where issues concerning operation and development of the RIX system are dealt with. The group also includes representatives of other departments of the Riksbank that are concerned. Subordinate to the Management Committee is the RIX operational and security group, which has the task of coordinating internal and external requirements. Consultation

⁵ In E-RIX there are restrictions on intraday credit for distance participants (i.e. participants that are not registered in Sweden), clearing organisations and securities companies.

⁶ Not those registered abroad.

⁷ ECB and the central banks in the EU Member States that are affiliated to TARGET.

■ about modifications of the system takes place with RIX participants in the RIX users group.

Settlement in RIX

The settlement of payments in RIX takes place electronically according to the principle of real-time gross settlement (RTGS) through debiting and crediting the participants' settlement accounts. Payments are settled one by one and the funds transferred to the accounts of the RIX participants become immediately available for the participants.

The payments settled include both direct payments between RIX participants as well as payments from customers mediated by one RIX participant to another. On settlement in RIX the claim of the receiving RIX participants is replaced by a claim on the Riksbank. At the same time the paying RIX participant's claim on the Riksbank is reduced or the Riksbank's claim on them is increased. A claim on the Riksbank involves no credit risk.

Future changes in RIX

Ever since it was decided that Sweden would not join the EMU, a project has been under way to acquire without delay a new technical system and a new technical platform for the RIX system. The project is being undertaken in close cooperation with the participants. The Riksbank has signed a contract on delivery of a new RTGS system for payments in Swedish kronor and it is intended to bring this new system on line on February 5, 2007.

In February 2005 the Riksbank decided not to take part in the future settlement system for the Euro, TARGET2. The background to this decision was that the costs for Sweden's participation in the system would bear no reasonable relationship to the limited quantity of payments that could be expected to be settled and that there were adequate alternative solutions for the participants. TARGET2 was originally planned to come on line at the beginning of 2007. When it became clear during the summer of 2005 that TARGET2 would not start until the end of 2007, the Riksbank has proposed that E-RIX should be terminated before the new technical system for RIX starts (no later than December 2006).

Assessment method

This assessment is based on the international standard for the type of settlement system to which RIX belongs, the Core Principles for Systemically Important Payment Systems (CPSIPS) drawn up by the Committee for Payment and Settlement Systems (CPSS)⁸. In conducting the assessment, use has been made of the guidelines produced by the International Monetary Fund and the World Bank in collaboration with CPSS⁹. However the structure of this assessment deviates to some extent from those guidelines.

The assessment comprises no assessment of the Central Bank's responsibilities according to points A-D in CPSIPS. The documents and other sources used during the assessment are presented in the list of references.

⁸ CPSS is a committee for settlement system issues in the G-10. The Bank for International Settlements (BIS) is responsible for the CPSS's secretariat.

⁹ Guidance Note for Assessing Observance of Core Principles for Systemically Important Payment Systems (CPSIPS) and Structure and scope of the Assessment report (August 2001)

- The categories used in this assessment are *observed*, *broadly observed*, *partly observed* and *not applicable*.

Summary of assessment

The Core Principles (CP) are observed in the RIX system as follows:

<u>Assessment</u>	<u>Core Principle with this assessment</u>
Observed	CP I, III, IV, VI, VII, VIII, IX and X
Broadly observed	CP II
Partly observed	-
Not observed	-
Not applicable	CP V

Recommendations

On the basis of this assessment the following recommendations can be made about measures that should be adopted or considered. In some cases a recommendation is made even though the RIX system complies with the principle concerned. All of the recommendations are addressed to the Riksbank in its capacity of owner and operator of the RIX system.

<u>Core Principle</u>	<u>Recommendation</u>
CP II	<p>The RIX regulations should be updated so that functions in the RIX system agree with the RIX regulations.</p> <p>Documentation and publication of decisions made in accordance with the RIX regulations should take place in the same way as for the regulations.</p>
CP VII	The possibility of arranging joint practice with RIX participants of shifting to alternative operational sites should be considered.
CP IX	Continuous monitoring should be implemented of RIX participants' compliance with the requirements for participation in RIX.
CP X	<p>The ongoing process of reviewing the operational goals of RIX is welcomed. Goals should be formulated on the basis of pertinent risk analyses and a reasonable balance between risk and cost.</p> <p>Alternative operational forms should continually be tested in order to achieve more efficient operation.</p> <p>The possibility of publishing the objectives of the RIX system on the Riksbank's website should be considered.</p>

■ Core Principle I

The system should have a well founded legal basis under all relevant jurisdictions

Description

National legislation

The Sveriges Riksbank Act (*Lagen(19988:1385) om Sveriges riksbank*) lays down that one of the goals for the operations of the Riksbank is to promote a secure and efficient payment system. The same act also makes it clear that the Riksbank may provide a system for the settlement of payments and participate in the settlement of payments in other ways. In order to enhance the functionality of a payment system the Riksbank may grant intraday credit to participants in the system against satisfactory collateral. By virtue of these provisions the Riksbank provides settlement facilities in the RIX RTGS system.

The Riksbank is subject to the provisions of the Settlement Systems Act (*lagen(1999:1309) om system för avveckling av förpliktelser på finansmarknaden*). However the Riksbank needs no license from the Swedish Financial Supervisory Authority (*Finansinspektionen*) to operate a settlement system. The Settlement Systems Act is based on Directive 98/26/EG of the European Parliament and Council on final settlement in systems for the transfer of payments and securities (known as the Settlement Finality directive).

Regulating insolvency

The Settlement Systems Act lays down that a payment order to a third party is valid even if joint insolvency proceedings have been initiated against a participant in a notified settlement system provided that the payment order enters into the system before a decision about the proceedings has been published. The act also prohibits revocation of a payment order by a participant in a notified settlement system or by a third party after the time stipulated in the regulations that apply to the system.

According to the regulations for the RIX system (see below) a payment order is considered to have entered into the system as laid down in the Settlement Systems Act when the order has been checked and is to be settled. The same regulations state that when a participant's settlement account has been debited according to the payment order or credited as a result of incoming TARGET payments the payment has been settled finally and cannot be revoked.

The Rights of Priority Act (*Förmånsrättslagen, 1970:979*) stipulate that a pledgee, in this case the Riksbank, has a specific right of priority to pledged property in cases of distraint or bankruptcy. This entitlement means that where payment of a pledge is involved the Riksbank need not rank behind any other creditor.

The Bankruptcy Act (*Konkurslagen, 1987:672*) enables the Riksbank to sell financial instruments which it has taken as collateral without delay in bankruptcy cases, if this is undertaken in a commercially acceptable manner.

RIX regulations

The terms for participation in RIX are laid down in the Rules and regulations for RIX and Monetary Policy Instruments (*Regelverk för RIX och penningpolitiska instrument*). These regulations have been drawn up in accordance with the ECB's TARGET

■ Guideline¹⁰ and the multilateral agreement on TARGET¹¹ executed between the ECB and the national central banks of the EU member states.

The RIX regulations comprise the conditions that apply in the RIX system for the settlement of payments in Swedish kronor (K-RIX) and in Euro (E-RIX). The regulations are in every respect identical for the two parallel systems. Moreover changes in the regulations covering E-RIX have to be approved by the European Central Bank (ECB), which is responsible for TARGET. The RIX regulations constitute the central conditions in the accession agreements that the Riksbank enters into with each participant. The Riksbank also concludes a pledge agreement for credit in RIX with each participant to whom an intraday credit facility is granted.

The RIX regulations are available for the participants and the general public. They are circulated to the participants in RIX every time they are amended or updated and they can also be downloaded from the Riksbank's website.

The RIX regulations stipulate that they are to be interpreted and applied in accordance with Swedish law.

If an institution with a registered office outside Sweden applies to participate in the RIX system, it is required to provide the Riksbank with a "Country opinion", which is a statement about the legal provisions in the country in which it is registered that could be of significance for the validity of the RIX regulations as well as their application and how they can be enforced in the country in question.

Considerations

In the assessment of the Riksbank Swedish legislation and the RIX regulations provide enough support for the operations carried on in the RIX system.

Assessment

Observed

¹⁰ Guideline of the European Central Bank of 26 April 2001 on a Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET Guideline) (ECB/2001/3), as amended.

¹¹ Agreement on a Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET Agreement).

Core Principle II

The system's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks they incur through participation in it.

Description

The rights and obligations of the Riksbank and RIX participants are made clear by the RIX regulations. These regulations contain general terms, such as access criteria for participation in RIX, application procedures, information that has to be provided, credit and credit limits, exclusion and other penalties, the legal situation after termination or exclusion, allocation of responsibilities and liability for compensation as well as the applicable legislation and resolution of disputes. The regulations also contain special conditions for the settlement of payments in RIX, such as the operation of RIX, communication and technical connections, settlement, intraday credit and also charges and specific compensation arrangements for TARGET payments. The K-RIX and E-RIX schedules, i.e. when the systems are open, are also provided in the regulations.

To supplement the regulations there is also *Riksbankens anvisningar för ansökan om att vara motpart* (*The Riksbank's instructions for application to participate in RIX*) which clarifies the requirements for participation in RIX. These directives have been drawn up with the intention of facilitating the application process for institutions that wish to become participants in RIX. New participants are also offered both theoretical and practical training about the RIX system and its functions. After training and before participants are permitted to access the system, practical exercises are carried out in RIX to verify correct use of the system.

The RIX regulations describe the Riksbank's obligations on receipt of a payment order and under what circumstances a payment order can be rejected or postponed.

A description of the operational management of risk in the RIX system can be found in two separate documents, *Instructions for disturbances in K-RIX* and *Instructions for disturbances in E-RIX*. These contain instructions on the actions to be taken by participants in the event of disturbances in their own systems and also disturbances in the RIX system. These documents also contain descriptions of available back-up functions.

Comprehensive user documentation of the system for participants is not provided.

Instructions for system disturbances

The routines described in these documents deal with how a participant can, in the event of system disturbance, register payments singly or in batches. In addition there is a description of the *Stop Receiving* function, which enables participants to request the Riksbank in writing to suspend settlement of payments to be credited the participant's account¹². The instructions also make it clear that in the case of disturbance a participant may send payments with a settlement date earlier than the current one.

¹² To permit the use of this function the Riksbank requires the participant to have experienced severe disturbances in the internal system and to have switched to back-up routines, and also that the disturbances are expected to endure for at least 30 minutes. The halt can apply to specific types of payment (payments concerning other clearing and settlement systems are not normally suspended).

■ Considerations

The RIX regulations are comprehensive and clear and should provide the participants with adequate information about the risks of participating in the RIX system. The regulations are regularly updated, even though in some respects they have not been adapted to other legislation. The Stop Receiving function and the possibility of sending payments with an earlier settlement date conflict, however, with the RIX regulations, which state that participants are both entitled to send payments and required to receive payments via their RIX accounts.¹³

These shortcomings probably involve no risk for either participants or the Riksbank. Alongside the RIX regulations, and with no references to them, there are the instructions for disruptions which provide the participants with further information about the management of operational risks.

The RIX regulations provide scope in certain cases for the introduction into the system of functions for special treatment of certain types of payments.¹⁴ These find application for instance in the inclusion of a function that will, if there is lack of capacity, enable more rapid settlement of payments for which the timing is critical. The decisions that provide the grounds for specifying what types of payments may receive special treatment and the situations in which this may occur are not available to the general public or potential participants.

Assessment

Broadly observed

Recommendations

- The RIX regulations should be updated so that functions in the RIX system agree with the RIX regulations.
- Documentation and publication of decisions made in accordance with the RIX regulations should take place in the same way as for the regulations.

In view of the introduction of the new technical system for RIX announced for February 2007, it is not recommended that resources should be devoted to the production of comprehensive user documentation. However, this should be produced for the new technical system.

¹³ Rules and regulations for RIX and monetary policy instruments (*Regelverket för RIX och penningpolitiska instrument*) C.1.1.1c

¹⁴ RIX regulations C.2.3.1.1(e)

Core Principle III

The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and which provide appropriate incentives to manage and contain those risks.

Description

Management of credit risks

The RIX system settles payments real-time on a gross basis (RTGS). Settled payments are final and irrevocable when the account of a RIX participant has been debited.¹⁵

Management of liquidity risks

There is a potential liquidity risk in a RTGS system. The RIX system makes settlements in gross and lacks any functions to optimise liquidity¹⁶. This means that participants must have liquidity that corresponds to at least the amount to be paid available in their RIX accounts in order for settlement to take place. Lack of adequate liquidity in the system or inappropriate distribution of the liquidity would prevent an even flow of payments during the settlement day. The result could be a bottleneck in the flow of payments (a "gridlock") in which failure to settle payments from one participant would prevent the acceptance and settlement of payments to other participants.

Intraday credit

To avoid a situation in which shortage of liquidity would lead to gridlocks, the participants have access to unlimited credit against adequate collateral.¹⁷ The Riksbank accepts a wide range of assets as collateral for credit in Swedish kronor, such as pledged Swedish bonds or other promissory notes, foreign securities and foreign currencies, provided that there are adequate security arrangements.¹⁸ The Riksbank also has a number of procedures for managing collateral. Special restrictions apply to credit in Euro as a result of the ECB's regulations¹⁹.

An automatic system exists for collateral registered in VPC or received through SCP²⁰ that enables very rapid changes in collateral.

Management of payment queues

The RIX system effectuates settlements in real-time according to the RTGS principle. In certain situations, however, payments may for various reasons be queued in the system, which leads to delays in the settlement process. Queues can arise as a result of lack of

¹⁵ For more information see Core Principle I.

¹⁶ Which means functions to enable gross settlement of several transactions simultaneously (incoming payments finance outgoing payments), either bilaterally or multilaterally. Functions like this can be used to resolve gridlocks or continuously in the form of what are known as hybrid solutions.

¹⁷ Government agencies, like the Swedish National Debt Office (*Riksgäldskontoret*) have access to unlimited intraday credit without having to provide collateral.

¹⁸ Foreign securities require special arrangements, for instance Euroclear can be used for foreign bonds and the Scandinavian Cash Pool (SCP), a cooperation between the Danish, Norwegian and Swedish central banks, for foreign currency.

¹⁹ The Riksbank is not able to grant credit in Euro in excess of EUR 500 million.

²⁰ See footnote 24.

■ capacity in the system, participants' liquidity shortages or the invocation by the central bank or a participant of a *Stop Sending* or *Stop Receiving* function, because of disturbances.

If a queue is caused by the volume of payments exceeding the capacity of the system, incoming transactions are dealt with automatically according to the *FIFO principle*.²¹ During 2004 a priority function was developed for queue management that enables reduction of the delay for special settlements where timing is critical²². Payments queued because a participant does not have enough liquidity or has requested *Stop Receiving* or *Stop Sending* are also settled on a FIFO basis. For liquidity queues, however, the participants themselves have the possibility of giving priority to payments by changing their sequence or removing them. Participants can also reserve liquidity for specific payments in K-RIX via RIX On-line. One decisive difference is, however, that payments queued as a result of *Stop Receiving* and *Stop Sending*, unlike transactions queued because of lack of liquidity, do not tie up liquidity.

Use of liquidity

RIX participants are responsible for their liquidity in the RIX system. The institutions have reached a mutual agreement on the settlement of payments according to specific schedules. Liquidity requirements amount to about 5-10 per cent in K-RIX and 5 per cent in E-RIX. The actual liquidity quota, expressed as the total credit limit as a proportion of turnover in the RIX system, is however substantially higher²³ in K-RIX and has risen in recent years²⁴.

The use of RIX On-line provides participants with continual access to information about the balance of their accounts, queued payments, settled payments and the intraday credit available. The Riksbank informs participants of disturbances at both system and participant level. If a participant is affected by disturbances that may disrupt the flow of payments in RIX, the participant is required by the RIX regulations to notify the Riksbank. The Riksbank is then required to inform all the participants of such circumstances.

Considerations

As the RIX system is a RTGS system with immediate finality and irrevocability, credit risks in the system between members are eliminated.

The liquidity risks for settlements in Swedish kronor are limited by access to intraday credit and the acceptance of a wide range of approved collateral and security arrangements. For settlements in Euro the RIX system can only provide limited liquidity. However, the supply exceeds the demand so that this is not considered to constitute an actual risk.

The system has several queuing functions, which means that liquidity risks are limited, not least for payments for which timing is critical.

Liquidity requirements in RIX are moderate compared to the liquidity that participants themselves opt to maintain in the system. Consequently the functionality of the system

²¹ First-In-First-Out

²² Payments for which timing is critical consist of payments that must be settled at a determined time. These kinds of payments can include payment for settlements in CLS and VPC where Swedish kronor are concerned and in Euro1 for Euro. Euro1 is a settlement system that is operated by EBA (Euro Banking Association).

²³ The liquidity quota in K-RIX is of the magnitude of 25 – 30 %.

²⁴ As the Riksbank only provides credit in Euro to a few participants, calculation of the liquidity quota is not applicable.

- cannot be the sole factor in any explanation of the observed liquidity level. The lack of any functions in the system to optimise liquidity is not therefore likely to have any significant impact on the level of liquidity.

Functions to optimise liquidity can support management of liquidity risks in a system as they can resolve "gridlock" effects. As the level of liquidity in RIX is considerably higher than necessary in a system for continual settlement, there is however only a small risk of gridlock effects. For this reason the lack of liquidity optimisation is not likely to give rise to liquidity risks in the system.

Assessment

Observed

Core Principle IV

The system should provide prompt final settlement on the day of value, preferably during the day and minimum at the end of the day.

Description

Payments are settled in gross in real-time (RTGS). In cases where the payment information is correct and the sender has adequate liquidity in the settlement account, settlement takes place immediately. When settlement is made the sender's account is debited at the same time as the receiver's account is credited and the settlement amount is then available for the receiver. Settlement is final, i.e. unconditional and irrevocable.

The sending banks are responsible for the validity of the information in the payment orders and for ensuring that there is adequate liquidity in their settlement accounts. Payment orders that are not correct are rejected. If a participant does not have sufficient liquidity in a settlement account the payment order is queued. Similarly a payment order that has been stopped because of *Stop Receiving* or *Stop Sending* is queued until the suspension has been lifted.²⁵ SWIFT's FinCopy service confirms that a payment message has been sent to the recipient when settlement is completed.

Payments in Swedish kronor and domestic payments in Euro are settled when the sending participant's settlement account has been debited and the receiving participant's account credited. Settlement is then final and irrevocable.

A cross-border payment in Euro through TARGET is not finally settled until the foreign central bank has sent confirmation that settlement has taken place in its system. The payment is irrevocable when the settlement account in E-RIX has been debited.

The system cancels incorrect payment orders and also payments that are still queued when the system closes.

Considerations

Settlement of domestic payments is final and irrevocable as soon as the paying participant's account has been debited (and the receiving participant's account credited). This takes place continuously during the day. For cross-border payments via TARGET settlement does not become final until payment has been settled in the receiving system.

Assessment

Observed

²⁵ See Core Principle III for more detailed information about these functions.

■ Core Principle V

A system in which multilateral netting takes place should, at minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single settlement obligation.

Description

The RIX system is a gross settlement system in which netting does not take place.

Assessment

Not applicable

■ **Core Principle VI**

Assets used for settlement should preferably be a claim on the central bank; where other assets are used; they should carry little or no credit risk and little or no liquidity risk.

Description

The assets used for settlement in the RIX system are claims on Sweden's central bank.

Assessment

Observed

■ Core Principle VII

The system should ensure a high degree of security and operational reliability and should have contingency arrangements for timely completion of daily processing.

Description

The RIX system is computer-based and communication in RIX takes the form of standardised payment messages using SWIFT's messaging facility. The RIX system uses the FinCopy service provided by SWIFT, which stores messages and forwards them to the recipient when settlement has been made.

Security

The Riksbank's information security complies with the international standard ISO/EIC 177 99:2005 for Information Security Management Systems. The RIX system is classified as a highly critical process in the Riksbank's work on information security. However the Riksbank is not certified according to this standard.

A fundamental element in the security architecture of RIX is the RACF resource access control facility from IBM. RIX has a separate test environment for development of software, testing and system updates.

To ensure that the Riksbank meets security requirements with respect to the system, communication, organisation, routines and continuity, the RIX system is evaluated continuously. Information security is monitored by the internal security division in the Riksbank's Administrative Department at the request of the system owner. RIX is also audited regularly by the Riksbank's internal auditors. External evaluators are also employed to assess security levels and identify potential security shortcomings, which has led to the development of a risk management plan.

During 2003 a security risk analysis was conducted of all central bank systems within TARGET.

Operational reliability

Well-organised documentation exists concerning technical and operational routines in the RIX system. The Riksbank's internal IT division is responsible for complying with the system owner's requirements with regard to security and security management, with the support of the internal security division. The IT system and settlement process is monitored regularly and the Riksbank has thorough documentation of the routines for decision processes and the daily operation of RIX.

There are specific, well documented routines and procedures for system changes in the technical infrastructure of RIX. Demands for modifications of the system to enhance its reliability are mainly generated by the internal IT division. Specific requirements and desirable system changes also come from RIX participants, suppliers and, where E-RIX is concerned, also from the ECB. The decisions on which measures are to be implemented are made by the RIX system owner. The routines for development, testing and approval are formulated officially in specific documents for each change.

Disturbances and disruptions in the RIX system and its communications are reported and investigated continuously. These reports provide the basis for calculation of the availability of the RIX system, i.e. during what proportion of total time it is open it is available to process payments. The target set by the Riksbank for the availability of

■ RIX²⁶ is 99.9 per cent availability on a yearly basis, during ten of the twelve months availability is to be 100 per cent, and during no single month is availability to be less than 99.4 per cent. The 99.9 per cent target corresponds to down-time totalling 152 minutes during one year. Monitoring of K-RIX and E-RIX is undertaken separately.

During 2004 the availability of K-RIX was 99.68 per cent and of E-RIX 99.61 per cent. During the year availability fell below 99.4 per cent in K-RIX during two months and in E-RIX during three months. The reason for most of the disturbances and disruptions included the exchange of the SWIFT interface to SWIFT NetFin.

During the first nine months of 2005, the availability of K-RIX was 99.73 per cent and of E-RIX 99.82 per cent. Several of the disturbances in 2005 have been related to internal operational errors. Other disturbances have been linked to external suppliers and sub-contractors. Measures have been adopted to deal with the shortcomings identified.

The volume of payments in K-RIX has risen steadily during recent years and during 2005 on average about 5,200 payments were settled on any one day. During the year there are a number of days when the volume of payments is particularly high.²⁷ In June 2005 10,300 payments were settled on one and the same day and the trend is for volumes on these days to increase. The very high volumes in K-RIX during these days are concentrated to the time of the day when the RIX system already has most incoming payments. The result is that the system receives more payments than it is capable of processing in real-time, which leads in its turn to queuing and delay in settlements. The capacity levels of the RIX system is the result of an agreement with the RIX participants. The very high volumes in RIX increase the risk of disturbances, so that certain system changes, including the transfer to SWIFT NetFin and improved queue management for payments where timing is critical, have been implemented. In addition operational preparedness has been enhanced. The Riksbank will not implement measures to further enhance the performance of RIX before the transfer to the new technical system and the new platform for RIX at the beginning of 2007.

Contingency planning

Contingency solutions have been drawn up to deal with disturbances that may affect the RIX system. A special incident organisation has been established for RIX²⁸.

If a disturbance occurs in the RIX system there are back-up routines for the settlement of payments. Specific back-up routines exist for settlements where timing is critical, such as payments relating to CLS and EBA and critical liquidity payments.

The Riksbank is able to extend opening hours for K-RIX if, for instance, disturbances occur that may affect the Riksbank's monetary policy. If a disturbance is extremely grave, the Riksbank can switch to back-up computers or manual routines. If the Riksbank is unable to use its normal site, its work and the operation of RIX can be shifted to an alternative site. It must be possible to manage this transfer to the alternative site within two hours of the system owner's decision, and the incident organisation is responsible for the preparations required. However, the RIX contingency plans do not include preparations for a scenario in which the regular staff are no longer available after a catastrophe.

²⁶ Availability refers the total time that RIX is open in minutes divided by the total opening time in minutes minus the period in minutes in which there were disturbances in the system.

²⁷ Above all the day each quarter when settlements relating to standardised interest derivatives are settled, but also days following American public holidays.

²⁸ See Core Principle X for more information

■ RIX participants are required to notify the Riksbank without delay if they become aware of a disturbance that may have effects on the flow of payments in RIX. The Riksbank informs all the participants of disturbances. If a RIX participant has problems that impinge substantially on its flow of payments to the RIX system it can switch to use of the RIX On-line back-up routines. In extreme cases, a RIX participant also has the possibility of using a back-up terminal at the Riksbank to implement payments.

To ensure that the Riksbank and RIX participants are thoroughly prepared to deal with any incidents or crises that may occur, RIX contingency solutions are rehearsed regularly. The Riksbank arranges and takes part in regular training sessions with RIX participants, ECB/TARGET and CLS. The Riksbank also arranges regular practice in shifting operation of the system to an alternative site. On the other hand the Riksbank and the participants have not yet had any practice of a joint shift of operations to an alternative site.

Considerations

The Riksbank complies with an international standard for management systems and information security. Security in the RIX system is monitored by means of continual evaluations. Even though these analyses give rise to some observations, the security has to be considered acceptable as there are explicit plans to remedy identified shortcomings.

The Riksbank has not yet introduced standardised management processes for the delivery of IT services which could involve increased risk of disturbances. Work is however under way on the introduction of ITIL for the supply of IT services. During recent years disturbances in the RIX system have been so extensive that it has been impossible to attain the Riksbank's own target for the availability of RIX. These disturbances have, however, been caused by suppliers other than the Riksbank's internal suppliers of IT services.

Contingency plans exist and are tested regularly, however not together with the participants in every respect. Contingency requirements change with time as do the potential events that could demand contingency solutions. This means that there are good reasons for continual review of demands relating to sites, staffing, deadlines etc.

Assessment

Observed

Recommendations

- The possibility of arranging joint practice with RIX participants of shifting to alternative operational sites should be considered.

Core Principle VIII

The system should provide a means of making payments which is practical for its users and efficient for the economy.

Description

A payment can be registered and then settled at any time the system is open. There are no restrictions about the minimum amount of each individual payment.

The majority of payments consist of bilateral or multilateral aggregated payments settled according to a predetermined schedule. The Swedish Bankers' Association (*Svenska Bankföreningen*) has drawn up what is known as the Settlement Agreement (*Avvecklingsavtalet*)²⁹ that provides a *code of conduct* for the mediation of payments in RIX. This consists among other things of a schedule for the settlement of various forms of payments in RIX. All of the current RIX participants have signed this agreement.

Payment messages in RIX comply with the global standard for messages of this type, the SWIFT standard. This enables participants to rationalise their payment traffic without any hands-on management i.e. *Straight Through Processing* (STP).

The Riksbank has been involved in discussions with the Swedish Bankers' Association on the RIX schedule in the Settlement Agreement. The current schedule means that almost 75 per cent of the volume of payment in K-RIX is settled each day between 9.15 and 10.15 a.m. Other payments are spread out through the day.

The volume of payments concentrated to this period has however undergone changes in recent years. In connection with the decision in 2004 by the Swedish Bankers' Association to reduce the minimum amount for settlement in K-RIX from SEK 50 million to SEK 500,000, the volume of payments rose. This rise is related to the settlement of foreign payments. One outcome of the introduction of trading in Swedish kronor into the CLS currency system was a reduction in the volume of payments for a time. Subsequently the volume has once again increased. The concentration of payment traffic results in heavy loads on the capacity of the system and increased risk of disturbances. Changes in the RIX system have resulted in shorter queuing time, in particular for payments where timing is critical, and reduced risk of disturbance caused by capacity problems.

Costs

During 2004 the costs for K-RIX amounted to SEK 15.7 million and for E-RIX SEK 15.6 million. In calculating these costs a cost-allocation ratio has been used that means that the costs of shared infrastructure and operational activities have been divided more or less equally between K-RIX and E-RIX.

The Executive Board of the Riksbank decided in November 2002 on guidelines for pricing policy for the RIX system. According to these guidelines the costs for settlement in K-RIX should be covered entirely by fees paid by users of the system. For settlements in E-RIX it was decided that pricing should be designed to achieve "*the highest possible coverage of costs bearing in mind that this was not to lead to substantially reduced participation in E-RIX*". The fee structure for E-RIX is a reflection of the view at the time the decision was made that there was justification for the Riksbank to subsidise E-

²⁹ Agreement on domestic settlement and netting between participants in the RIX system (Settlement Agreement), Swedish Bankers' Association, Clearing management group, May 1, 2004.

■ RIX in order to maintain a high level of readiness for the possible introduction of the Euro as currency. To attain the objective of full coverage for the costs of K-RIX and the highest possible cover for E-RIX, fees were raised substantially at the beginning of the operational year 2003.

Pricing in RIX is also to be based on the principle of non-discrimination as well as designed to encourage use of RIX. Fees are divided into a fixed and a variable element. Transaction fees for domestic payments are determined by the Riksbank and fees for cross-border TARGET payments by the ECB.

Since the decision was made in 2002, when RIX reported a substantial loss, the results have improved and in 2004 the reported shortfalls were SEK 0.4 million for K-RIX³⁰ and SEK 11.1 million for E-RIX. The decision on full coverage of costs applies for each specific year. No decision has been made about balancing income over time.

From January 2005 onwards, new fees apply for E-RIX, which have been set to increase the coverage of the costs of E-RIX.³¹ In these new fees the fixed annual charges are differentiated according to the number of transactions participants send each year. Information about the fees can be found on the Riksbank's website.

Customer contacts

To find out what RIX participants feel about the functionality of the RIX system, ease of use and level of service the Riksbank conducts regular customer surveys. The results of the surveys conducted during 2000 and 2003 showed that customer satisfaction exceeded the target figure of 80 per cent satisfied customers. A new customer survey will be undertaken during the autumn of 2005.

Considerations

The RIX system applies international standards for the format of messages and communication. Customer surveys indicate that on the whole the participants are satisfied with the RIX system, its functionality and the service provided, although its ease of use could on the other hand be improved.

The concentration of settlements to a brief period during the day is due to agreements in the participants' own Settlement Agreement. This means that the capacity of the RIX system is not used efficiently and that there is greater risk of disturbances. To counter this, modifications of the system have been made with ensuing costs for the system and for the participants. This outcome is, however, a result of the way in which participants utilise the system and cannot therefore influence any assessment of RIX.

As described in Core Principle III, settlement on a FIFO basis may result in large-value payments creating gridlocks in the payment flow in the system. The system has no sophisticated algorithm for queue management that can optimise the use of liquidity, as in a hybrid system, for instance.

The discussion under Principle III suggests that there are no causal links between the design of the system and the level of liquidity that participants opt for. The lack of a function to optimise liquidity cannot therefore be considered to impair efficiency, nor does the liquidity risk seem to be greater.

³⁰ In 2003 RIX had a surplus of SEK 2.6 million.

³¹ DNR 2004-425 MOP

■ If the targets set for the availability of the RIX system as described under Core Principle VII, accurately reflect the level of security and efficiency genuinely required by the participants and the community at large, the attainment of lower levels is a manifest lack of effectiveness. The availability targets do not, however, seem to have been set on the basis of any trade off between the availability required and the costs associated with its attainment. In view of this, and that the targets set for RIX are higher than those for TARGET, there is reason to assume that the level of availability actually required is lower. The levels of availability attained must therefore be considered to lie within the limits of what is required for a secure and efficient system.

High fixed charges are significant for the pricing system, not least as a result of the high investment costs. The RIX system with its restricted number of participants and small payment volumes offers very limited economies of scale. Its cost efficiency could be inadequate if it can be shown that the Riksbank as owner of the RIX system has not taken advantage of potential scope for achieving lower costs or to enhance economies of scale through alternative technical solutions or arrangements for the operation of the system.

The Riksbank has a monopoly on the settlement of large-value payments in Swedish kronor. The Riksbank therefore has greater opportunities to charge higher fees for K-RIX than for E-RIX without running the risk of a substantial reduction in the number of participants. One important question in this context is how the costs are allocated and how prices are set. Shared infrastructure costs, including the costs of the technical platform, are shared more or less equally by K-RIX and E-RIX. However, E-RIX accounts for less than 10 per cent of the total volume of transactions and has fewer participants than K-RIX.

On the basis of the current allocation of costs during 2003 and 2004 E-RIX has been subsidised with just over SEK 11 million, which corresponds to about $\frac{3}{4}$ of the total costs for E-RIX.³² In principle there is full coverage of the costs of K-RIX. If a somewhat larger share of the joint costs had been allocated to K-RIX, the system that is used more, the costs for K-RIX would rise substantially.

Assessment

Observed.

Recommendation

As a decision has been made that the current technical system and platform for the RIX system is to be replaced by a new system with greater capacity and which will include functions to optimise liquidity and as the Riksbank has decided not to participate in TARGET2, no recommendations will be made on these matters.

³² This subsidy is expected to decline to SEK 9 million for 2005.

■ Core Principle IX

The system should have objective and publicly disclosed criteria for participation, which permit fair and open access.

Description

The criteria for acceptance as a participant in RIX are set out in the RIX regulations and the Instructions on applying to become a RIX participant³³. Applicants must either be credit institutions³⁴, securities companies³⁵, clearing organisations³⁶ or those government agencies in the EU that are responsible for the central government payments and cash management.

The requirements³⁷ that have to be met if an institution is to be accepted as a participant include having adequate financial stability and capital holdings, being subject to satisfactory supervision, possessing a suitable organisation together with the systems and routines required for risk management, reliable technical systems and also being suitable in other respects for participation in RIX. Moreover the institution must have a sound legal status.

For acceptance as a participant in E-RIX an institution must have its registered office or a subsidiary in the EEA.³⁸ There is a corresponding requirement for the acceptance of remote-access participants in K-RIX. All RIX participants have to comply with the requirements relating to technical equipment and communication³⁹. Institutions with registered offices outside Sweden must be prepared to submit a legal opinion on the legal provisions in the applicant's own country that are of significance for the validity and application of the RIX regulations in that country and also on its legal status and capacity to enter into the required agreement⁴⁰.

The Riksbank's appraisal of applications to participate in RIX must abide by the principles of freedom of access and neutrality.

In connection with the accession of a new participant to RIX, information is provided by the Riksbank about the existence of the Swedish Bankers' Association's Settlement Agreement, which is described briefly under Core Principle VIII.

An institution may also opt instead to become the customer of a RIX participant⁴¹. The institution will then have no relationship with the Riksbank. This arrangement is frequent in the Swedish financial market.

³³ *Riksbankens anvisningar för ansökan om att vara motpart (The Riksbank's instructions for application to participate in RIX).*

³⁴ This corresponds to the definition in Article 11.1 of Directive 2000/12/EC of the European Parliament and of the Council of 20 March 2000 relating to the taking up and pursuit of the business of credit institutions.

³⁵ Corresponding to the definition in the first paragraph of Article 1.2 of Council Directive 93/22/EEC of 10 May 1993 on investment services in the securities field. This also requires companies to be permitted to trade in financial instruments on behalf of third parties or in their own name or to provide guarantees in connection with the issue of securities.

³⁶ I.e. companies that are licensed to conduct clearing operations.

³⁷ RIX regulations D 3.2.1

³⁸ RIX regulations D 3.2.2

³⁹ "A RIX participant is to have the technical equipment required for participation in RIX and connection to SWIFT". RIX regulations C 1.2

⁴⁰ Country opinion or Capacity opinion

⁴¹ The term *indirect participant* is not used in the RIX system.

■ Participants' fees

Until the end of the 1990s participants' fees consisted of a uniform annual fee. To offer incentives to divide up large aggregate payments into several smaller ones, the Riksbank then introduced a fee structure based on a fixed annual charge and a degressive variable fee based on the number of payments transmitted.

Pricing in the RIX system has been subject to the review of the Swedish Competition Authority (*Konkurrensverket*). The Authority then made a *non-intervention decision*⁴², even though it expressed the opinion that the pricing in RIX was not optimal from the point of view of competition. The reason for this was that the smaller participants had to pay a higher fee per transaction than the larger ones.

A new pricing model for K-RIX was introduced in January 2003. This involved a higher fee for participants with major volumes of payments than for those with smaller volumes, to reflect their greater use of the system, together with a lower uniform transaction fee. This also applies from 2005 onwards for E-RIX, apart from the fees for cross-border payments which are dependent on volume. The new pricing system for E-RIX was intended to increase coverage of its costs.⁴³

Considerations

The regulations for participation in the RIX system are relatively clear, even-handed and easy to access.

To ensure that participants fulfil the requirements for access regular follow up is needed, as has been pointed out in previous assessments. During the autumn of 2005 follow-up of this kind has begun and its completion is expected during the first quarter of 2006. Participants in RIX are also themselves required to inform the Riksbank of any changes in their circumstances.

The number of participants in RIX is relatively restricted, which means that potential economies of scale cannot be exploited effectively. There are institutions that fulfil the requirements for participation in RIX but which have opted not to join the system. It could therefore be reasonable to undertake a critical review of the technical requirements and whether the pricing policy is most appropriate in every respect. The Riksbank has begun an inquiry to study the possibility of increasing the number of participants in RIX.

The requirements for participation in RIX as well as the entitlements and obligations of the participants are described in the RIX regulations and the instructions accompanying them. No further requirements are made by the Riksbank. The Riksbank should therefore exercise caution about what information to provide concerning the possible wishes of other participants about affiliation to other agreements, such as the Swedish Bankers' Association's Settlement Agreement, for instance.

Assessment

Observed

⁴² DNR 397/1998

⁴³ DNR 2004-425 MOP

■ **Recommendations**

- Continuous monitoring should be implemented of the compliance of RIX participants with the requirements for participation in RIX.

Core Principle X

The system's governance arrangements should be effective, accountable and transparent.

Description

Governance and management

The Riksbank owns and operates the RIX system. The Executive Board of the Riksbank bears the ultimate responsibility for all of the Riksbank's operations. The Executive Board determines the annual budget, the fundamental principles for participation in the system, intraday credits and pricing for the RIX-system. The operation, development and management of RIX is the responsibility of the head of the Market Operations Department pursuant to the instructions issued for the Riksbank.

The head of the department is the officially responsible system owner and, as chairperson of the RIX management committee, makes the decisions that apply to RIX. The system owner has delegated system ownership responsibilities to the head of the Payment System Division, who is also responsible for the day-to-day operation of RIX. At the behest of the system owner, technical management, systems development and maintenance is provided by the Riksbank's internal IT Department. At the moment no Service Level Agreement (SLA) has been drawn up as a basis for the IT Department's undertakings. Work is in progress on the introduction of an agreement of this kind.

Strategic issues concerning the RIX system are discussed in the RIX management committee. This committee consists of representatives from the Market Operations Department, the IT Department and the Security Division. Representatives from the Internal Auditing Department also participate as observers.

Responsibility for the daily operation of RIX lies with the Riksbank's Payment System Division in the Market Operations Department. This division is responsible for the everyday monitoring, contingency management, development and administration of RIX as well for providing support for participants in the system.

A special incident organisation is responsible for acting as a management group to assess the situation in the event of a crisis. If crises are of a more severe nature, the responsibility is shifted upwards to the Riksbank's management group for conventional alternative financial crises.

Management and control of risk

The Riksbank has an internal security organisation that both monitors and provides support for its operations. This organisation checks compliance with the Riksbank's information security regulations and at the same time assists the Market Operations Department in determining the security requirements that are to apply to procedures and the technical operation of RIX. The Internal Auditing Department continually evaluates on-going operations by appraising and assessing internal checks and controls.

There is an external advisory group on issues relating to risk in connection with the provision of intraday credits, in which the legal secretariat and the risk control unit are represented.

■ Operation and oversight

There is a clear separation between the Market Operations Department (including its Payment Systems Division), which bears the operational responsibility for the RIX system, and the Financial Stability Department which is responsible for overseeing of the financial infrastructure.

The objectives of the Payment System Division with regard to RIX

The Riksbank's overall strategic aim for RIX is that it should *provide a safe and efficient system for the settlement of large-value payments*. To attain this aim the RIX system owner and its management group have drawn up a number of goals for RIX

- To provide a system that is technically available for its participants to settle payments. The description under Core Principle VII shows that RIX does not completely attain the availability target set by the system owner.
- To provide a system that is guarded against intrusion. This goal is attained.
- Full cost coverage for K-RIX and the best coverage of costs that is possible for E-RIX. The description under Core Principle VIII shows that by and large this goal is attained.
- Participant satisfaction with the system and the services it provides. According to the survey conducted in 2003 this goal was attained (see description under Core Principle VIII).

Information about these goals and the degree to which they are attained is provided for the participants but is not published on the Riksbank's website. However the Riksbank's website does contain overall information about the RIX system and the RIX regulations as well as some directions and instructions.

Customer contact and participant influence

The Riksbank arranges regular meetings with participants in the RIX system in the forum of the *RIX User Group*. Important decisions about modifications of the system are made after consultation with participants and those overseeing the system, and, when the modifications affect E-RIX, the ECB. A brief newsletter with current information about RIX is circulated to the participants three times each year. In addition the Riksbank sends written information to the participants about specific issues.

The system has a high level of participant influence. According to customer surveys conducted in 2000 and 2003, the majority⁴⁴ of the participants are satisfied with the RIX system.

After completion of the customer surveys, which are arranged roughly every other year, visits are also made to RIX participants. The opinions expressed during these customer visits are compiled and followed up. An assessment is then made of the issues that it is possible to remedy. After internal discussion of these opinions in the Riksbank, the participants are informed of the outcome.

No customer meetings will be arranged during 2004 or up until the introduction of the new technical system and the new platform in 2007. Special arrangements have been in

⁴⁴ In a survey undertaken by TEMO in 2003 83 per cent of the participants said that they were satisfied.

■ place within the framework of the projected introduction of the new system since the autumn of 2005 to deal with contacts with participants.

General information about the organisation of the Riksbank is provided on the Riksbank's website.

Considerations

Decisions about modifications to the system are made by the Riksbank after consultation with the participants. Great weight is attached to the views expressed by the participants. The participants receive adequate information about decisions that affect the system. Generally speaking the participants are satisfied with the services provided. The operational objectives are monitored continuously both in terms of availability and customer satisfaction, as are the financial results.

Overall this means that the general conditions seem to have been provided to enable effective accountability and a clear structuring of ownership and management of the RIX system. Nevertheless a few observations have been made suggesting that simplification, clarification or further considerations may be possible

The targets for the availability of RIX seem do not seem to have been determined on the basis of adequate risk analyses. As these targets govern the direction taken by the operations of RIX and the resources needed, they should be well considered as should the balance between risk and costs. Work has been started on the redefinition of the operational goals for RIX. The strategic aim for RIX is presented on the Riksbank's website, but not however the goals that govern its operations.

The Riksbank has a monopoly of the provision and operation of systems for the settlement of large-value payments in Swedish kronor and the subsidised settlement of large-value payments in Euro. There is therefore a risk that the costs for the operation and technical management of RIX will not be subject to adequate pressure so that the use of resources will not be minimised once the accepted level of risk has been determined.

Shortcomings have been observed in the formal division of responsibilities between the system owner of RIX and the internal supplier of operational management. There is a risk that the internal supplier does not have the appropriate organisation, routines or system support, which could have a negative impact on availability.

Assessment

Observed

Recommendations

- The ongoing process of reviewing the operational goals of RIX is welcomed. Goals should be formulated on the basis of pertinent risk analyses and a reasonable balance between risk and cost.
- Alternative operational forms should continually be tested in order to achieve more efficient operation.
- The possibility of publishing the objectives of the RIX system on the Riksbank's website should be considered.

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