

**Deloitte Touche
Tohmatsu**



*Technical Assistance for
Ceskosloveska Obchodni
Banka
Workplan for Treasury and
Foreign Exchange Management*

Delivery Order No. 31

*Contract No. EUR-0014-I-00-1056-00
Eastern Europe Enterprise Restructuring and
Privatization Project*



*U.S. Agency for International Development
EUR/ENI*

February 1995

**Deloitte Touche
Tohmatsu
International**



March 6, 1995

Mr. Lawrence Camp
AID/ENI/PER/EP
Room 3206, SA-15
Washington, DC 20523

**Re: Contract No. EUR-0014-I-00-1056-00, Delivery Order No. 31,
Technical Assistance to the CSOB,
Report on Function A: Treasury Management**

Dear Lawrence:

In accordance with Article IV of the above Delivery Order, we are providing you with four copies of the report on Treasury Management fulfilling the deliverables for Function A of the workplan. This report examines treasury and foreign exchange management which includes preparing and presenting a paper on the establishment of improved risk management techniques; and, implementing the proposed risk management techniques.

Additional assistance to CSOB in this area is being provided under an extension to the Delivery Order. Deliverables for work performed under this extension are described in the updated workplan.

If you have any questions regarding this report, please call Adrienne Brombaugh at (202) 879-5650.

Sincerely,

Lizann Prosser
Senior Manager

**Deloitte Touche
Tohmatsu**



Deloitte Touche Tohmatsu
ILA Group Ltd.
1001 Pennsylvania Avenue, N.W.
Suite 350N
Washington, DC 20004-2594, USA

Telephone: (202) 879-5600
Facsimile: (202) 879-5607

October 12, 1994

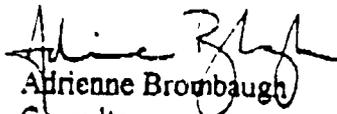
Lawrence Camp
USAID - ENI/PER/EP
320 21st Street, N.W.
Washington, D.C. 20523

Re: Contract No. EUR-0014-I-00-1056-00, Delivery Order No. 31,
Ceskoslovenska Obchodni Banka (CSOB) - Draft Workplans

Dear Lawrence:

As required by Article IV of the above-referenced delivery order, we are submitting for your approval the attached draft workplans for technical assistance to the Treasury Department (Function A) and the Internal Audit Department (Function C) of CSOB. If these workplans are acceptable, please indicate your approval by signing below and returning a copy to us via fax for files. With your approval last week of the workplan for the Problem Loan Department (Function B), the remaining workplan to be submitted is for the revised tasks described in the recent modification to the scope of work. If you have any questions regarding this request, please call me at (202)879-5650.

Sincerely,


Adrienne Brombaugh
Consultant



Lawrence Camp, Concur

11/30/94
Date

**Deloitte Touche
Tohmatsu
International**

TOTAL PAGE

BEST AVAILABLE DOCUMENT

**WORK PLAN FOR TREASURY
AND
FOREIGN EXCHANGE MANAGEMENT**

Short-term technical assistance to the Ceskoslovenska Obchodni Banka AS ["CSOB"] in the area of treasury and foreign exchange management.

The purpose of this paper is to set out revised terms of reference for the provision of technical assistance in the area of treasury and foreign exchange management to CSOB. It is written following discussions in the bank which have focused on CSOB's immediate priorities within the time frame and budget of the current project

Appropriate timings are shown in the attached timetable

Task 1. Develop a risk management techniques paper.

1.1. Review and report on existing foreign exchange and treasury policies and procedures.

The review of the bank's current operating processes will be considered under five categories:

- Credit Risk
- Operations Risk
- Liquidity Risk
- Market Risk
- Human Risk

A report will be submitted which will identify weaknesses and make recommendations on managing the areas stated above more effectively.

1.2. Prepare and present a paper on the establishment of improved risk management techniques.

In addition to the report mentioned in 1.1 above, a paper will be presented that will recommend better methods to be adopted by the bank which will enable the senior management to measure and control the treasury risks of the bank more effectively

The paper will explain the various methods currently used in the market to control risk, with specific references to their strengths and weaknesses and appropriateness to CSOB.

Task 2. Implement proposed risk management techniques.

2.1. Advise on the incorporation of the proposed risk management technique into the MIS.

Advice will be given on the implementation of the proposed risk management techniques into the bank's MIS.

2.2. Provide training to staff relating to the proposed risk management techniques.

Training will be provided on the proposed risk management techniques. This training will consist of on the job training and tutorials / seminars which will be available to all relevant personnel. Time permitting this may be expanded using computer based material.

Task 3. Review Valuta for ability to meet risk management requirements.

An extensive review will be made of the Valuta test system proposed to be installed in CSOB during the pre-contract specification phase of the FEDS project. The review will focus specifically on the capability of the system to meet the needs of senior management over and above the day to day needs of the dealers.

Task 4. Assist with FEDS contract negotiations.

4.1. Assist with preparation of a detailed specification of the exact needs of CSOB in liaison with the preferred supplier.

Detailed advice will be given on the specification requirements for the implementation of the Risk Management techniques to be adopted by CSOB.

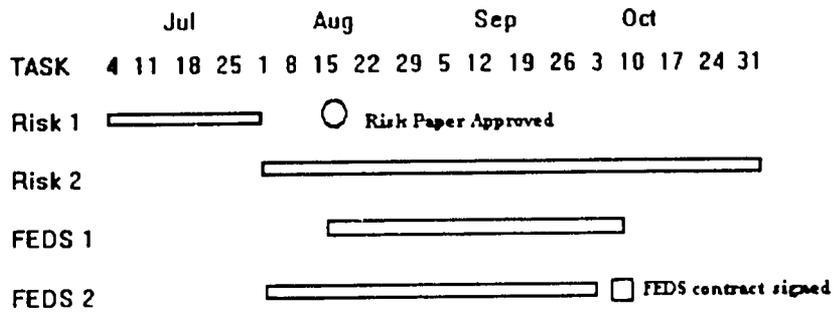
4.2. Assist with preparation of a detailed implementation plan.

Detailed advice will be given on the preparation of a detailed implementation plan to ensure that the requirements of CSOB are capable of being met within the proposed time and budget.

Timetable

TASK

- Risk 1** **Develop Risk Management Techniques Paper**
- Risk 2** **Implement Risk Paper to include training / seminars etc.**
- FEDS 1** **Review Valuta for ability to meet risk management requirements.**
- FEDS 2** **Assist with contract negotiations.**



Short-term technical assistance to the Ceskoslovenska Obchodni Banka AS ["CSOB"] in the area of treasury and foreign exchange management.

The purpose of this paper is to set out revised terms of reference for the provision of technical assistance in the area of treasury and foreign exchange management to CSOB. It is written in the light of unforeseeable delays in the selection process of a front end dealing system [FEDS] for CSOB and the inclusion of an additional requirement by the bank.

Appropriate timings are shown in the attached timetable

Task 1. Review Valuta for ability to meet risk management requirements.

An extensive review will be made of the Valuta test system proposed to be installed in CSOB during the pre-contract specification phase of the FEDS project. The review will focus specifically on the capability of the system to meet the needs of senior management over and above the day to day needs of the dealers.

Task 2. Assist with preparation of a detailed specification of the exact needs of CSOB in liaison with Valuta.

Detailed advice will be given on the specification requirements for the implementation of the Risk Management techniques to be adopted by CSOB.

Task 3. Assist with the FEDS implementation final testing process.

Detailed advice will be given throughout the FEDS implementation final testing process to ensure that the requirements of CSOB are met.

Task 4. To Review the Current Funding Base of CSOB.

A detailed analysis of the funding base of the bank will be carried out and reported.

The analysis will focus on the nature and extent of any dependency on inter-bank market funding by CSOB and the viability of "tapping" retail funding sources as an alternative means of meeting the bank's needs.

**A REVIEW OF CSOB
FOREIGN EXCHANGE AND
TREASURY POLICIES AND PROCEDURES**

Section 1

A Review of CSOB Foreign Exchange and Treasury Policies and Procedures

Executive Summary

Prague - July 28, 1994

Clive Grumball

1. Review format

The review was conducted over the period 1 July to 28 July 1994 and was considered under five categories:

- Credit Risk
- Operations Risk
- Liquidity Risk
- Market Risk
- Human Risk

2. Conclusion.

If CSOB conducted its foreign exchange and treasury business in a market where the Central Bank imposed the full regulatory requirements of member banks of the Basle Committee it would almost certainly face significantly increased reporting requirements than it is currently required to make. This might mean that it would have to seriously curtail its activities, or worse.

In particular there is no limit structure in place which addresses either interest rate risk or liquidity risk and, more importantly, there are serious deficiencies in IBIS and the bank's operating procedures which render the effective management control of the business virtually impossible to achieve.

There seems to be a belief that the introduction of the proposed Front End Dealing System [FEDS] will cure, almost at a stroke, the failure of the IBIS system to address a number of key risk management issues. Unfortunately this belief may be somewhat optimistic.

The truly successful implementation of FEDS depends as much on the integrity of the data in IBIS as on any other factor. A risk business cannot realistically be managed or controlled by relying on a front end system, especially if that system cannot be reconciled to its main back office system.

Unless the bank takes positive steps to address the current reporting and processing deficiencies of IBIS in the foreign exchange and treasury area, there is little chance of avoiding problems in the implementation of FEDS and its subsequent use.

In general, IBIS has the potential to produce what is required but this necessitates immediate and positive action by management and the relevant individuals in the IT, foreign exchange, and treasury areas.

3. Time Scale.

- The above issues should be resolved by 1 October 1994 at the latest. However, to achieve this will require considerable effort and commitment on the part of all concerned..

The nature of the issues raised in this paper are very serious, warranting the most urgent remedial action. In particular the bank is carrying significant risks which could have a material impact on its profitability. It is essential that the bank provides the necessary resources [notably from within the IT area] to address these issues immediately.

4. The Purpose of this Paper.

This paper is not intended to present a list of deficiencies in the current foreign exchange policies and procedures of the bank, many of which are already known by Senior Management. Rather it sets out a series of recommendations which, when implemented, will significantly enhance management's control over the bank's business in the areas of foreign exchange and treasury.

5. Recommendations.

The recommendations are set out under the five headings of the review.

5.1. Credit Risk.

- All approved credit limits for banks and non-banks having a direct dealing relationship with the Treasury area should be entered into IBIS immediately.

In this respect there will need to be close liaison between the key personnel involved concerned with the credit enhancements to IBIS and the splitting of the Prague database.

- The format of all credit utilisation reports currently produced, or available but not produced, should be reviewed. Where there are deficiencies in the reports, a detailed specification of the dealing room requirements should be drawn up and implemented.

This will ensure that IBIS actually produces reports which do meet the needs of ALCO, the Treasurer, and the Chief Dealer to measure, monitor, and control counterparty risk.

- A detailed specification of the dealing room requirements should be drawn up and implemented to ensure FEDS produces appropriate reports that meet the needs of ALCO, the Treasurer and the Chief Dealer to measure, monitor, and control counterparty risk.
- Procedures should be introduced to ensure effective reporting of all breaches of credit limits by the dealers. This should also set out appropriate disciplinary measures to be taken against offenders.

5.2. Operations Risk.

- Procedures should be introduced to report losses which result from administrative errors by the dealers or the back office [e.g. incorrect completion of deal tickets; incorrect settlement of deals; etc]. This should also set out appropriate disciplinary measures to be taken against persistent offenders.

5.3. Liquidity Risk.

- There should be a review by the relevant personnel of the format of all IBIS liquidity analysis reports currently produced, or available but not produced [reports 20R; 20T etc]. Where there are deficiencies over and above the requirements currently being addressed in the bank, a detailed specification of the dealing room requirements should be drawn up and implemented.

This will ensure that IBIS and the Central Database actually produces reports which do meet the needs of ALCO, the Treasurer, and the Chief Dealer to measure, monitor, and control liquidity risk.

- A detailed specification of the dealing room requirements should be drawn up and implemented to ensure FEDS produces appropriate reports that meet the needs of ALCO, the Treasurer and the Chief Dealer to measure, monitor, and control liquidity risk.
- Procedures should be introduced to cover all breaches of liquidity limits by the dealers. This should also set out appropriate disciplinary measures to be taken against offenders.
- A contingency plan should be established which addresses all perceived criteria in the event of a full scale liquidity crisis. For example it should detail the frequency of reporting; the availability of Senior Management etc.
- An exercise should be carried out to establish the cost of maintaining liquidity in accordance with the bank's liquidity policy.

5.4. Market Risk.

- Limits for the control of all market risk should be introduced immediately. This includes:
 - Setting more appropriate foreign exchange open position limits both inter-day and intra-day.
 - Setting limits to control interest rate risk
 - Setting limits to control liquidity risk.

- ALCO should not approve the introduction of any new trading activity unless there is documentary evidence that the requested activity can be fully supported by the back office and accounting departments. This must confirm that detailed systems and reporting procedures were in place.
- There should be a review by the relevant personnel of the format of all reports currently produced, or available but not produced which address market risk.
- Where there are deficiencies in the reports, a detailed specification of the dealing room requirements should be drawn up and implemented.

This will ensure that IBIS actually produces reports which do meet the needs of ALCO, the Treasurer, and the Chief Dealer to measure, monitor, and control market risk.

- A detailed specification of the dealing room requirements should be drawn up and implemented to ensure FEDS produces appropriate reports that meet the needs of ALCO, the Treasurer and the Chief Dealer to measure, monitor, and control market risk.
- Procedures should be introduced to cover all breaches of trading limits by the dealers. This should also set out appropriate disciplinary measures to be taken against offenders.

5.5. Human Risk.

- An intensive on-going training programme should be introduced to provide detailed training in all aspects of trading and risk management.

Senior management can draw considerable comfort from the fact that the current members of Treasury and the Dealing Room are extremely professional, dedicated, and capable individuals. However, they lack in-depth experience.

Under normal circumstances this might not present too serious a problem to the bank. However, when this is combined with the existence of totally ineffective management systems in place to record and report all risks carried, and a limit structure which is random, illogical, and fails to address the real issues, then potentially the problem becomes very serious.

- A Trainee Dealer programme should be introduced.

The dealing team headcount is considered to be at, or below, the minimum critical level for a bank with CSOB's market profile. The bank has already lost a number of its experienced traders and, as the market in Prague develops, there will be a continuing major risk of further defections. A trainee dealer scheme should at least provide some cover in this eventuality.

Section 2

A Review of CSOB Foreign Exchange and Treasury Policies and Procedures

Review of Existing Foreign Exchange and Treasury Policies and Procedures

Prague - July 28, 1994

Clive Grumball

1. Review format

The review was conducted over the period 1 July to 28 July, 1994 and was considered under five categories:

- Credit Risk
- Operations Risk
- Liquidity Risk
- Market Risk
- Human Risk

Each of these categories are covered below and are based upon trying to answer a series of questions.

2. Credit Risk:

2.1. Establishment of limits for foreign bank counterparties.

CSOB uses a matrix to place a counterparty into one of 6 categories.

The matrix takes into account:

- *The Moody's Credit Rating for each counterparty.*
- *The country risk indicator from the International Country Risk Guide.*
- *The most recently published figures for capital and reserves of the counterparty.*

A credit limit amount is allocated to each of the 6 risk categories on a sliding scale which is based on CSOB's own capital and reserves.

The credit limit amount is sub-allocated by activity e.g. clean deposit line; fx line etc.

2.2. Establishment of limits for domestic bank counterparties.

CSOB uses a similar matrix to place a counterparty into one of the 6 categories of counterparty risk, although the process has to be slightly more subjective since Moody's Ratings are not available for domestic banks.

The matrix takes into account:

- *Local knowledge of each counterparty.*
- *The most recently published figures for capital and reserves of the counterparty.*

As with foreign bank counterparties a credit limit amount is allocated to each of the 6 risk categories, and sub-allocated by activity.

2.3. Maintaining Limits

Limits are reviewed annually.

No effective Limit Limit Exception Reports are currently produced by IBIS.

IBIS Reports L79 and 067 are available. However:

- *Department 28 appears to be the only area of the bank which receives IBIS report L79 - and then only on a monthly basis.*
- *In their current format neither report is "user friendly". As such, they require re-specifying to meet the needs of the dealers. Alternatively a separate report should be produced.*

2.4. Observing Limits

Limit observation currently involves the use of IBIS terminals in the dealing room and / or telephone contact with Department 28 to check limits.

This process can take a little time and in a fast moving market environment there may be occasions where a dealer will trust in his knowledge of outstandings for a major counterparty and deal without checking. This can easily result in breaches of limits.

In general, the dealers appear to be aware of the need to observe credit limits. However, on one visit to the dealing room I saw a number of deals transacted, but limits were not checked at any stage.

This should highlight to management that:

- *The limits for counterparties may be too large. [i.e. the dealer concerned knew he really did not have to bother to check].*
- *There are no meaningful consequences of limit breaches.*
- *In some instances relevant limits are not entered on IBIS and can therefore be ignored on the basis that:*

either

- *there is no point in checking.*

or

- *that limit breaches will never come to light.*

In particular, FX Settlement limits - to limit "Herstatt type" risk; and Country Limits are not recorded.

The introduction of FEDS should ensure total limit observance, but measures should be put in place long before this system is installed. In particular, all relevant limits should be entered onto IBIS.

2.5. Temporary Suspension of Limits by Dealing Room

The procedures for identifying and reporting any changes in the market's perception of the credit standing of any given counterparty immediately it becomes apparent to the dealers.

No formal procedures appear to exist.

2.6 The procedures when the Chief Dealer takes a unilateral decision to cease trading with a given counterparty if deemed necessary.

The dealers recognise that they are the first line of defence for a bank's credit committee and a conscious decision is made to suspend trading with a counterparty.

2.7. Procedures for breaches of limits.

Procedures exist for breaches of limits. This apparently involves a verbal report by Department 28 to the dealers and to Mr. Tauber although this could not be verified. In addition, no written record is, therefore, available for checking by auditors [either external or internal].

The bank should formalise this process as follows:

- *A log should be maintained in the dealing room for all breaches of credit limits.*
- *The log should detail the nature and extent of the breach.*
- *The dealer responsible for the breach should a reason for the breach and sign the log.*
- *The Chief Dealer should countersign the dealer's log entry.*
- *Copies of the log should be forwarded to the credit department and ALCO members weekly for immediate reaction. Subsequently a written report should be presented to the monthly ALCO meeting by the Treasurer for formal discussion and sign off.*

3. Operations Risk:

3.1. Existing procedures in place to ensure undue losses are avoided which result from dealers failing to complete deal tickets / input deals accurately etc.

Losses resulting from human error [as opposed to dealing error] are recorded and reported to the dealing room but no formal procedures appear to be in place.

It is obviously very difficult to devise procedures to eliminate all undue losses other than introduce a procedure along the following lines:

- *A log should be maintained in the dealing room for all losses arising from dealer or back office administration errors.*
- *The log should detail the nature and extent of the loss.*
- *The person responsible for the error should provide a reason for the error and sign the log.*
- *The Chief Dealer and Back Office Manager should countersign the log entry.*
- *Copies of the log should be forwarded to ALCO weekly for immediate reaction. Subsequently a written report should be presented to the monthly ALCO meeting by the Treasurer/ Head of Settlements for formal discussion and sign off. Nil reports should also be sent to ALCO.*

- 3.2. Existing procedures for sub allocation of losses resulting from dealer or back office administration errors.

No formal procedures appear to exist. It is difficult to see how any can be introduced until effective allocation of departmental costs is achieved.

4. Liquidity Risk.

- 4.1. Existence of a clear funding strategy

It is a stated policy of the bank to obtain longer term funding, particularly in the domestic market. The bank recognises that it can readily access only short term funding with which to support its long term assets, which leaves it exposed to significant and unwanted liquidity risk.

- 4.2. Analysis of the deposit structure broken down by depositor category [Inter bank; Other Institutional; Call and Time; Deposits; and Currencies.]

Any meaningful analysis would be impossible to achieve at present. In general IBIS is capable of producing the necessary information however considerable user input would be required to ensure production of reports which were effective.

- 4.3. Existence of any dependency on a few depositors to provide the bulk of funding needs and steps to be taken to avoid such situations.

The CNB requires CSOB to concentrate its deposit taking activities on the diversification of funding sources from the viewpoint of maturity, banking instruments and clientele. However, the domestic market is dominated by the Ceska Sporitelna which makes diversification locally virtually impossible at present.

I understand the bank has relatively little involvement in the non-domestic money markets but is currently negotiating with foreign banks with a view to taking longer term foreign currency floating rate funding.

- 4.4. Availability of sufficient and timely information on the deposit base to the Treasurer and Management. Extent of detail for the specific purposes of the Treasurer.

In general, the required information should be available on the IBIS system but the relevant reports are currently presented in a format which is of no meaningful value to the Treasurer or Chief Dealer.

- 4.5. Existence of any deposit placing strategy within CSOB.

Surplus funds are placed with bank approved commercial customers or banks on a "best rate" basis.

From experience a deposit placing strategy is used to encourage the setting of lines by the targeted counterparty. CSOB obviously has a strong presence in the international FX markets and therefore has no real need to place funds specifically to obtain lines from other banks.

However, I feel that the bank should engage in a concerted programme of visiting banks. Based on my own experience this effort must come from the dealers themselves, and not Correspondent Banking Department. The only exception to this would be if CSOB employed an individual outside the dealing room with sufficient market credibility to represent its needs in this area.

- 4.6. Existence of any concentration of deposit placement on any one counterparty or counterparty group exists (i.e. is there a policy to diversify risk).

Reports seen indicate no evidence of any concentration.

- 4.7. Existence of a policy on holding a stock of high quality liquid assets.

There is a requirement to maintain a holding of Treasury Bills for liquidity purposes. This is currently in the region of CZK 30 billion.

The Central Bank also requires the bank to deposit with it a minimum level of cash reserves.

The minimum reserve requirements are as follows:

- *12% of time deposits with the CNB [increased from 9% with effect from August 1994].*
- *3% of demand deposits.*

Banks are required to submit a liquidity report to the CNB on a quarterly basis.

4.8. Central Bank support for the domestic market.

The Central Bank is strongly supportive of the market.

Banks are able to use a variety of facilities provided by the CNB to manage their daily liquidity positions. These include:

- *Refinancing credits.*
- *Lombard credits.*
- *Discounting bills of exchange*
- *Overdrafts*

4.9. Extent of any implications resulting from providing commitments (i.e. stand-by facilities) and guarantees to customers.

These are controlled under the limit allocation process.

4.10. Extent to which holdings of marketable securities emanate from volatile or thinly traded sectors (i.e. Extent of exposure to forced sale risk).

None is evident. Only domestic instruments are currently traded but the objective is to extend this to foreign currency government bonds.

4.11. Existence of a policy to limiting any inter group or inter branch lending.

It is sometimes necessary to implement a policy which is designed to ensure that a subsidiary, in particular, is not totally dependent on its parent for its funding . As a matter of policy, therefore, the subsidiary, is actively encouraged to seek its own funding sources.

Similarly, a branch specialising in a particular financial centre may be encouraged by policy to fund its specialised activity in its own right rather than be totally dependant on its parent, which may also be operating in a different time zone.

From this point of view, the nature of CSOB at present does not require such a policy for fundamental liquidity risk management purposes. However, there are other critical administrative reasons why all funding requirements must be controlled by Global Treasury not the least of which are the current reporting deficiencies.

- 4.12. Existence of a realistic assessment of the cash flows resulting from the loan book.

In general IBIS is capable of producing reports which would enable such an exercise to be conducted but these would need to be properly specified to be of value. In addition I understand that the customer loan data in IBIS may not be of a quality suitable to enable a recipient to have faith in any report produced.

- 4.13. Availability of standby lines to CSOB, both in normal market conditions and in a disaster scenario with specific reference to any adverse change clauses contained within a facility agreement.

None exist.

- 4.14. Availability of funding from within the CSOB group and existence of any constraints.

Not currently applicable to CSOB, however if the situation changes these must be controlled by Global Treasury.

- 4.15. Administrative procedures in the event of a crisis. i.e. Availability of senior management; increased management information; increased monitoring and reporting.

None appears to exist at present.

- 4.16. The type and frequency of management reports.

In general IBIS is capable of producing the requisite reports subject to specification to meet the bank's specific needs, but considerable effort will be required to obtain reports which have any material benefit to the bank.

In addition, a new report has been specified for MIS. This report will provide guidance to management, however there appears to have been a totally unwarranted delay in its production.

This report will be used in the strategic liquidity risk management process of the bank. In the meantime the bank must try to operate with reports which are inappropriate and which fail to address the key issues.

Control and reporting of liquidity risk is critical: a bank may not necessarily fail simply because it fails to control credit or market risk absolutely, but it will do so if it fails to control liquidity risk - as is regularly evidenced throughout the world's financial centres.

- 4.17. The nature and extent of reporting by the branches and the frequency and level of automation of reporting.

There is no automatic consolidation of the bank's overall position. Considerable effort is required to enable the Treasurer to produce the necessary information.

- 4.18. The suitability of CSOB's systems to report liquidity risk on a basis which is consistent with policy.

In its present format IBIS is totally incapable of meeting the bank's needs without considerable manual intervention.

5. Market Risk

Broadly speaking, this falls into three categories:-

- **Position Risk**

This is described as being an institution's exposure to loss, measured in base currency, due to adverse movements in rates. Position risk can take the form of interest rate or exchange rate risk.

- **Basis Risk**

Basis risk arises in many forms and is present to the extent that changes in rates are not constant across all instruments. Essentially it represents the idiosyncratic risks associated with one product related to another / others when utilised in a given market scenario. E.g. A commercial loan which is priced against (say) US Prime Rate but funded in the Eurodollar market and priced against LIBOR presents a basis risk.

- **Volume Risk**

This risk is related to the total business volume or activity in a particular product area. The risk arises because the various trading desks may acquire a large number of positions, the cumulative effect of which under adverse conditions could result in a strain on liquidity or mounting losses due to unexpected changes in rates.

- 5.1. Existence of appropriate limit structures which address each of the above risk categories and capability of existing systems to adequately report risks undertaken by CSOB.

The current limit structure is little more than a statement of individual responsibility. It allows authorised individuals to take positions which are controlled in amount by the status of the individual within the hierarchy of the bank, subject to a "stop loss" requirement.

With the exception of the "stop loss" policy it would appear that there is little logic to the limit structure.

It is difficult to see how the limit structure controls market risk or basis risk and, taken to its extreme, it could actively encourage volume risk since there is no overall bank constraint on total amounts dealt other than by head count.

No attempt is made to control the overall position of the bank except in the area of the open foreign exchange exposure of the bank which is subject to a separate limit imposed by the Central Bank.

5.2. CSOB's tolerance to risk.

Senior management's attitude to risk is consistent with maintaining the bank's position in the market. The bank has been at the leading edge of the domestic trading markets, and has been continuously at the forefront of trading in the international markets.

Management recognises that this can only be achieved through active, but controlled, risk taking.

5.3. Existence of any primary risk objectives defined by Senior Management.

It follows from 5.2. above that the primary objective is to take an aggressive, but properly controlled, attitude to risk taking.

5.4. Existence of any secondary risk objectives which might address such things as basis risk; liquidity risk; credit exposure.

Senior management are fully conscious of the need to control liquidity risk, particularly in the domestic markets. Here the objectives are:

- To put in place an appropriate limit structure*
- To obtain longer term funding*
- To diversify funding sources.*

5.5. Existence of any tertiary risk objectives set in line with the historical behaviour patterns of the markets.

The immediate priority is to address the primary and secondary risk objectives outlined above. Tertiary risk objectives will flow automatically upon implementation of the proposed limit structure.

5.6. The method(s) by which CSOB's exposure is indicated and controlled.

None is currently used except in the control of the bank's open foreign exchange exposure which rests with Department 27 operating under limits imposed by the Central Bank.

As an interim measure, the bank should consider using IBIS report 06C - "Consolidated MM & FX CZK Month" Report to control interest rate risk.

It is recommended that this report is used in conjunction with the interim risk reporting measures recommended in "Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS - Section 1 - Executive Summary".

IBIS Report 6C provides, by currency, a method of measuring the interest rate in CSOB's money market and forward foreign exchange dealing.

The report is produced in two parts. One part provides a consolidated break down of the money book and forward ladder by currency, split by month ahead, whilst the other provides a summary currency total.

A detailed explanation of the methodology of the report is contained in "Risk Measurement and Control in Ceskoslovenska Obchodni Banka AS - Section 7 - Duration Analysis" under the category "Milli-months" paragraph 2.1.

However, it is recognised that considerable effort may be required to ensure the integrity of Report 6C.

5.7. Procedures for breaches of limits.

None appear to exist, or if they did none would be viable since it is virtually impossible to monitor any breach of limits.

Positions are unconsolidated and no IBIS reports are used. In general the only data immediately available is recorded on individual spreadsheets which rely entirely on the integrity of the dealers.

6. Human Risk

6.1. Risk arising from general level of inexperience of relevant personnel.

Senior management can draw considerable comfort from the fact that the members of Treasury and the Dealing room are extremely professional, dedicated, and capable individuals. However, they are extremely inexperienced.

Under normal circumstances this might not present too serious a problem. However, when this is combined with:

- the existence of totally ineffective management systems in place to record and report risks run - both obvious and obscure*
- a limit structure which is random, illogical, and inappropriate*

then the problem becomes potentially very serious.

6.2. Risk of loss of key personnel.

The trading room has already lost a large number of experienced personnel and, as the market in Prague develops, there will be a continuing major risk of loss of further personnel. NB Some losses of key personnel are self-inflicted - see comments under 6.3 below.

6.3. Availability of training.

The bank is supportive of Training generally, however, training programmes are unstructured. Management should ensure that training is cost effective and forms part of the career path of the individual.

The present process seems to allow individuals to select and attend courses, almost at will, without going through any formal justification process.

For example, the Chief Dealer has organised a 4 week trip for himself to attend a Futures and Options Training Course in Chicago / Toronto. His absence coincides with the main holiday period, and will be further extended by his own holiday arrangements.

To all intents and purposes, therefore, CSOB must operate for a period extending to 6 weeks without its key dealing room member.

Futures and Options Dealing is not a particularly difficult or detailed subject and training could easily have been provided:

- *much closer to Prague*
- *within a more realistic timetable*
- *at a fraction of the cost.*

The bank should introduce a proper training system which ensures that all aspects concerned with the cost effectiveness of training are considered within the context of department and bankwide training budgets.

6.4. Existence of Trainee Dealer programme.

None currently exists. The lack of any such programme exacerbates the risk to the bank from any defections of the current dealing team or manpower shortages which arise when senior dealing room members go on extended leave of absence.

6.5. Existence of a Dealing Room Procedures Manual

None appears to exist. The only formality which is evident is the requirement of dealers to acknowledge in writing their position taking limits and "stop loss" requirement.

6.6. Use of telephone recording machines in the dealing room or settlement areas.

The bank does not use these. Experience suggests that it will only be a matter of time before the bank suffers significant losses which might otherwise have been avoided.

The cost effectiveness of recording machines has been regularly demonstrated in other financial centres.

Tape machines are a general standard requirement by many Central Banks. Undoubtedly, the CNB will ultimately require these as well.

6.7. Physical layout of the Dealing Room.

The physical layout of the dealing area is unsatisfactory and could easily result in avoidable errors which impact overall profitability.

Management is strongly recommended to co-locate all trading activities if at all possible and in larger premises to allow for the expansion of the dealing team which I understand is currently proposed.

If it is not possible to locate the dealers and treasury personnel in appropriate accommodation the bank should consider installing a microphone intercom system between the various areas.

Section 3

A Review of CSOB Foreign Exchange and Treasury Policies and Procedures

Review of Selected IBIS Reports Considered Necessary for Effective Risk Management.

Prague - July 28, 1994

Clive Grumball

1. Introduction

This paper considers a selection of IBIS reports that are currently available and could be used to assist Treasury to carry out its responsibilities. However, before relying on these - particularly those that are not produced currently:

- Significant amounts of system testing would be necessary.
- The bank must ensure that consolidated data is collected, preferably using the Central Database where appropriate.

2. IBIS Reports Reviewed

It should be noted that not every report capable of being produced has been reviewed in this instance e.g. reports which relate more to the general administration of the dealing areas e.g. Brokerage Statements [Report L11] ;etc.

In addition some reports which are used to good effect are not commented upon in this report on the basis that they do provide the necessary information to the Treasurer e.g. Foreign Exchange Position [Report 13].

<i>Report Ref</i>	<i>Function of report</i>	<i>Dept Using</i>	<i>Freq Taken</i>
-------------------	---------------------------	-------------------	-------------------

06 B	Analysis of Sales and Purchases		Not Produced
-------------	--	--	---------------------

This report provides a summary of forward and spot currency movements.

This report should be produced daily and taken by the Chief Dealer and Treasurer.

06 C	Consolidated MM and FX CZK/Month Report		Not Produced
-------------	--	--	---------------------

This report provides, by currency, a method of measuring the interest rate in CSOB's money market and forward foreign exchange dealing.

The report is produced in two parts. One part provides a consolidated break down of the money book and forward ladder by currency, split by month ahead, whilst the other provides a summary currency total.

It is essential that this report is produced daily and taken by the Chief Dealer and Treasurer. It is the only report currently capable of production which can indicate the extent of the bank's exposure to interest rate risk.

This report could be used in both Prague and Bratislava and the risk totals quickly combined to give a consolidated risk exposure.

06 D Daily Average Rates 27 W

This ladder details the daily average rates on outstanding loans and deposits. It includes investment swap positions.

This report should be produced daily and taken by the Chief Dealer.

13 A Currency Positions 27 D

This report shows the positions for all currencies as of close of business on the previous day. It also shows currency limits that have been exceeded.

This report should be received by the Chief Dealer.

20 R Analysis of Exposure on Deposits [Summary] 11 M
20 RA Back - up 11 M

These reports provide an analysis of exposure on commercial deposits by immediate geographic category.

Report 20R should be taken at least weekly by the Chief Dealer and Treasurer. It will assist strategic funding policies. It could also form the basis of a report to ALCO.

A modified version of the back-up report [20 RA] should be available on a request basis.

Report 20 RA is currently 1,750 [approx] pages long and contains a degree of detail which devalues its potential worth.

It is suggested that the report data of 20RA is modified for Treasury.

It should be filtered by maturity date and reported such that full details of marketable amounts only [say CZK 10,000,000 plus] are specified individually, leaving the balance to be reported as single totals for money on and money off under the heading of [say] "Private Client's etc". The weighted average rate of these totals would also be reported.

Entries relating to loros could also be netted out where appropriate.

20 T Maturity Analysis Assets and Liabilities 11 D

This report provides a summary maturity analysis of assets and liabilities in base currency.

This report should also be taken by the Chief Dealer and Treasurer.

051 Ladder Details Report Not Produced

This report provides a detailed backup report in support of the dealing ladder [061].

This report should be produced daily and taken by the Chief Dealer but not in its current form. It should be possible to filter all non-marketable amount transactions into a single total amount per day reported. These would enable the Chief Dealer to focus on the data specific to his department.

061 Dealing Ladder

27 W

This report provides the dealers with a daily report of the positions of loans and deposits, interest, and purchases and sales in each currency over a complete time profile. Investment swaps are included in this report but the bank does not use this element of the system..

This report should be produced daily and taken by the Chief Dealer.

061 F Consolidated Ladder with Futures

27 W

This report shows the effect of open futures on the net position of the forward and deposit books at each future *delivery* date.

This report should be produced daily and should also be taken by the Chief Dealer.

062 Currency Flow

Not Produced

This ladder shows positions of all loans / deposits, interest, and foreign exchange in each currency from now and forward for any day for which a movement occurs in that currency. The positions shown closely reflect those portrayed in the dealing ladder, and differ only in that the masking effect of investment swap matching deals is omitted from this ladder.

It is intended for use by senior management to control and review positions taken by the dealers.

This report should be produced daily and taken by the Treasurer.

067 Limits Exceeded Report

28 M

This report shows details of all clients where a specified limit has been exceeded, or where a limit review date has been passed.

A similar report should be produced daily and taken by the Chief Dealer and Treasurer. A filter should be introduced such that only excesses relating to the dealing areas are reported.

Limit excesses should be reported by the Chief Dealer weekly to ALCO members together with an explanation of why the excesses exist and what subsequent action taken where appropriate. A formal sign off of the excesses by ALCO should be made at its monthly meeting.

073 Forward Exchange Position Analysis **Not Produced**

This report provides a forward exchange position analysis showing all fx deals with a forward value date.

This report should be produced daily and taken by the Chief Dealer.

075 Settlement Limit Exceeded **Not Produced**

This report shows those forward foreign exchange settlements for which the total settlement that day exceeds the settlement limit for that counterparty.

No limits are input as yet! This should be rectified immediately and the report should be produced daily and taken by the Chief Dealer and Treasurer. The problems which resulted from the collapse of Herstatt in 1973 should not be forgotten!

Limit excesses should be reported by the Chief Dealer weekly to ALCO together with an explanation of why the excesses exist and what subsequent action taken where appropriate. A formal sign off of the excesses by ALCO should be made at its monthly meeting.

L 79 Client Limits Report **28 M**

This report shows all client limits currently in force. An "out of order" column indicates a limit exceeded or a review date passed.

A similar report should be specified to meet the dealer's needs and produced daily. It should be taken by the Chief Dealer. For example counterparties should be listed by full name alphabetically etc.

113 Out-of-Order [Today] **Not Produced**

This report details any out-of-order accounts for that day.

A similar report relating to Dealing Room counterparties should be specified and produced daily and taken by the Chief Dealer and Treasurer.

113 A Full Out-of-Order Report **Not Produced**

This report lists all out-of-order accounts and give the reason why they are out-of-order.

A similar report should be specified and produced daily. It should be taken by the Chief Dealer and Treasurer. This will show excesses per comments re 113 above.

113 B Out-of-Order [Weekly] **Not Produced**

This report is similar to 113, except that it is for the week up to and including the date the report is run.

A similar report should be specified and produced weekly. It should be taken by the Chief Dealer and Treasurer. This will show excesses specific to the dealers per 113 above. It should also be used in conjunction with the Chief Dealer's weekly "Out-of-Order report to ALCO.

177 Bank Counterparty Information Not Produced

This report provides an overview of the worth of a business relationship.

A report should be specified and produced monthly. It should be taken monthly by the Chief Dealer and Treasurer. It would be specific to banks and corporates with a Treasury relationship.

GMHA/B Country Limit Reports Not Produced

These reports show limit, utilisation, and the next limit review date for each limit category and country.

No limits or review dates have been input, which should be rectified immediately.

This report should be produced daily and taken by the Chief Dealer and Treasurer.

GMIA/B Industry Limit Reports Not Produced

These reports show limit, utilisation, and the next limit review date for each limit category and industry. Any limits exceeded are flagged.

No limits or review dates have yet been input, which should be rectified immediately.

This report should be produced daily and taken by the Treasurer.

D	=	Report produced daily.
W	=	Report produced weekly.
M	=	Report produced monthly.
11	=	Economics Department
21	=	Dealing Room
27	=	Risk and Liquidity Department
28	=	Correspondent Banking Department

**RISK MEASUREMENT
AND
THE CONTROL OF RISK**

Section 1

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

Executive Summary

Prague - July 28 1994

Clive Grumball

1. Background.

C SOB management have recognised that the anticipated increase in the complexity of the bank's balance sheet, coupled with the recent increase in the regulatory focus on market value, demands a new approach to measuring, monitoring, and controlling risk in the bank

This approach should reflect the likely requirements of the Czech National Bank, which is in the process of incorporating the best practices of Europe into its own regulations to ensure the establishment of a secure and healthy domestic banking system in the longer term.

2. Purpose of this Paper.

This purpose of this paper is to set out solutions to management's requirements

3. The Structure of this Paper.

The structure of this paper is follows:

- **Section 2 - Overview**

This section provides a background to the developments in the measurement and control of risk in the world's financial markets during the past two decades and their implications to the asset and liability management function of CSOB. It also provides an overview of the proposed methods for the measurement and control of market risk and liquidity risk.

- **Section 3 - The Recommended Measurement of Market Risk.**

This section recommends a method which will enable management to measure, monitor and control market risk resulting from the activities of the dealing room.

This method is broadly consistent with the attitude of the Basle Committee and, as such, is likely to be the method of risk control that will be imposed on CSOB by the CNB. As such it should be considered as forming the basis for control of CSOB's overall process of managing market risk in the medium term.

- **Section 4 - Liquidity Risk.**

This section recommends a method which will enable management to measure, monitor and control liquidity risk effectively.

- **Section 5 - Gap Analysis.**

This section defines gap analysis and recommends the role it will play in the overall asset and management liability function of the CSOB.

- **Section 6 - Simulation Analysis.**

This section defines simulation analysis and recommends the role it will play in the overall asset and management liability function of the CSOB

- **Section 7 - Duration Analysis.**

This section defines duration analysis and recommends the role it will play in the overall asset and management liability function of the CSOB.

4. Control of Market Risk.

The control of risk is considered on two levels:

- Risk resulting from positions taken in the Dealing Room.
- Risk resulting from bank wide [consolidated] positions.

4.1. Dealing Room Activities.

Market risk resulting from the dealing room activities of CSOB is to be measured and reported daily in a way that will enable management to readily translate risks being run into a measure of the direct impact on the bank's overall profitability

Risk will be expressed as Trading Risk Units ["TRU"s] where 1 TRU will represent a pre-defined cash value impact on the bank's overall profitability for a given instrument or portfolio. Further discussions would need to occur - initially within ALCO - to define the cash value impact that is appropriate and acceptable for the bank.

The TRU method of risk control should be introduced to coincide with the implementation of the Front End Dealing System ["FEDS"] which will be specified to report risk in this way.

4.2. Global Treasury.

Whilst it is important that the bank adopts a uniform measure of risk it will not be possible at the outset to extend the concept of the TRU method of risk control to the activities of CSOB as a whole. This results from difficulties with the current processing capability of IBIS [e.g. It is not possible to position FRAs in risk management reports]

For this reason it is recommended that, initially, the control of the consolidated risk position of the bank is to be based on the more traditional methods, and in particular Gap Analysis.

A new consolidated Interest Rate Sensitivity [GAP] report has been specified as part of MIS. When this is available it is recommended that it is used as a controlling factor in managing market risk in CSOB by forming a basis for ALCO to:

- allocate an appropriate level of TRUs to the dealing room.
- formulate appropriate hedge or risk position strategies for the bank.

5. Control of Liquidity Risk.

Liquidity risk in CSOB is to be measured and reported **daily** as described in *Section 4 - Liquidity Risk*.

There are some systems implications which will delay the immediate implementation of this methodology. In particular, better reporting will be required from the Central Database.

However, the information required already forms part of the CNB reporting process required by the bank which should reduce the implementation lead time.

Introduction of the proposed limit structure should be targeted for 1 Oct 1994. However, this will only be a realistic target if there is the necessary degree of commitment and effort on the part of all concerned.

6. Possible Immediate Market Risk Management Capability.

Potentially, interest rate risk for both Prague and Bratislava could be individually measured and reported **daily** in terms of "Milli-months" as described in *Section 7 - Duration Analysis*. This would at least cover the dealing room activities in both offices.

The functional specification of IBIS includes the reporting of risk in this format. [*Report 60 - Consolidated MM & FX CZK M* described on page 8/1-1 *IBIS AS Foreign Exchange and Money Market Reports Manual*]. However, the report will almost certainly need to undergo considerable testing and validation before it could be used in a live environment.

It is difficult to predict the time scale necessary to complete this task but management should consider giving priority to its production to ensure that there is at least some means of quantifying the majority of the interest rate risk being run in CSOB whilst the FEDS is being implemented

7. MIS

CSOB has a Central Database which can be useful to the Treasury area for reporting and managing the bank's consolidated risk positions. However, to date no reports have been completed. This lack of MIS increases the risk of:

- Significant opportunity costs.

The dealers will be inhibited from trading on the basis that they cannot do so without the ability to reconcile their positions and performance.

- Greater risks as defined throughout this paper.

Two excellent recent case studies of the potential dangers of ineffective MIS are.

- The failure to adequately report foreign exchange option risk positions carried by Allied Lyons, a major UK company. This failure cost the company in the region of GBP 140,000,000.
- The failure to control risk positions in oil futures which resulted in the heavy losses incurred by Metalgesellschaft.

Section 2

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

Overview

Prague 28 July, 1994

Clive Grumball

1. Overview.

During the past thirty years or so, the world's financial markets have undergone a staggering evolution which has accelerated since the early 1970's. During this time we have seen the rapid growth of the Eurocurrency markets and the increase in the numbers of banks becoming involved in international banking.

As part of this evolution, banks, and their regulators, have been forced to focus their attention on a number of key issues in the area of overall risk management. These include:

- **Credit risk** - as banks were faced with the prospect of wholesale counterparty failure in a number of areas of lending hitherto considered to be capital certain [e.g. loans made to governments].
- **Counterparty delivery risk** - in the foreign exchange markets [post the failure of Bank Herstatt in 1973]. This further extended the concept of credit risk.
- **Liquidity risk** - [evidenced by the secondary banking crisis in the UK and the Savings and Loans industry in the USA].
- **Market risk** - especially post 1971 when the Bretton Woods Agreement on exchange rates was ended. This, together with an increased reliance on narrow monetary policy targets by governments in attempts to control the ravages of inflation prevalent over this period, fuelled interest and foreign exchange rate uncertainties [and hence volatilities] in a way hitherto unknown by the market.

This background of major upheaval has resulted in considerable changes in the business patterns of market users who have found themselves facing a far greater degree of difficulty in efficiently performing their functions than their predecessors.

In particular the objective of asset / liability management has shifted from providing a reaction to specific risks to providing an overall pro-active plan for risk.

Traditionally, asset / liability management involved forecasting future interest rates and then positioning the balance sheet, within broadly defined limits, to maximise net interest income. Nowadays, by contrast, it involves the management of the sensitivities of earnings, capital, liquidity, and market value to both anticipated and unanticipated fluctuations in interest rates.

This widening of the scope of asset and liability management reflects three factors:

- The radical changes that have occurred in the market environment.
- The change of attitudes of the industry regulators.
- The advances in technology.

1.1. Changes in the market environment.

Since the late 1970's, the market has shown a greater willingness to take market risk rather than credit risk. This follows the lessons learned from poor credit decisions taken throughout the early 1970's, and the belief that trading losses, generally speaking, are lower than lending losses.

This has led to a greater focus on trading rooms and, post the lessons learned during the early 1980's, the measurement and control of interest rate risk. In turn, this has resulted in:

- The proliferation and use of the techniques by which market participants could operate
- The regular development, use, and marketing of derivatives.

1.2. The change of attitudes of the regulators.

Regulatory changes have also contributed to the growing influence of asset and liability management within financial institutions. In particular, bank regulators have focused increasingly on how interest rate fluctuations affect bank capital.

1.3. Advances in technology.

Technology has also influenced the evolution of modern balance sheet management.

Increasingly complex balance sheets have forced banks to develop more sophisticated risk management capabilities. This has been facilitated by a combination of advances in pricing methods and increased computer processing power.

Technology has migrated from the derivative dealing rooms, where its use often enabled the development of advanced risk management techniques, to the offices of the asset and liability managers. As a consequence the asset and liability management process has evolved beyond being the reactive manipulation of a particular part of the balance sheet into a proactive, strategic management of the entire balance sheet.

2. Targeting a Risk Measure.

Asset and liability management in CSOB should have three functions:

- Control of the risk / return profile of the bank.
- Measurement of the efficiency of capital deployment.
- Measurement of how well credit lines are being used.

2.1. Control of the risk / return profile.

The management of the risk / return profile requires a performance measure target. This may be earnings, capital, or market value. Senior management are responsible for identifying target measures of risk and for setting parameters to limit the risk position to acceptable levels.

Traditionally, banks have focused on managing short-term earnings and liquidity risk. However, any bank with positive equity will introduce market value risk if it stabilises earnings risk; conversely, if it maintains market value, earnings will fluctuate. As such, short-term earnings risk is not an adequate measure of risk for a bank striving to maximise shareholder value. The situation has been complicated somewhat by the attitudes of bank regulators.

Bank regulators currently support the recognition in regulatory capital of any unrealised gains and losses on investment securities that are marked to market. Where applicable, the consequence of this is that regulatory capital will fluctuate alongside interest rates, even if earnings remain stable.

2.2. Measurement of capital deployment and credit line utilisation.

In modern balance sheet management the use of risk-adjusted returns on capital is emerging both as a measurement of performance and as a benchmark for business decisions.

3. Classification of risk.

Total risk to a financial institution can be classified under the following headings:

- **Credit Risk**

The risk of loss due to the failure of a counterparty to honour an obligation.

- **Liquidity Risk**

The risk of the inability to meet liabilities as they fall due.

- **Operations Risk**

The risk of loss due to front office or back office failures.

- **Market Risk**

The risk of loss to incorrect position taking.

This classification includes the three topics mentioned at the beginning of this section, together with operations risk - which, regrettably, always seems to have existed to a greater or lesser degree!

4. Traditional Methods for the Measurement and Control of Market Risk.

At present there are three established methods to report market risk.

- Gap Analysis
- Simulation Analysis
- Duration Analysis

During the 1970s and early 1980s, when banks focused almost exclusively on short-term earnings risk, gap analysis emerged as the most popular method by which to measure interest rate risk. More recently, as banks have begun to assess the effects of longer-term interest rate risk, gap analysis has been complemented by the two other measurement tools [duration and simulation]. Each of these methods has its advantages and disadvantages.

The potential uses of these methods by CSOB are discussed in individual sections of this paper.

6. Proposed Method for the Measurement and Control of Market Risk.

6.1. Overview.

Interest rate risk is measured in terms of the sensitivity of a target variable to interest rate changes. With gap analysis and simulation the target variable is net interest income, while duration focuses on changes in market value following [small] interest rate changes.

In their search for an accurate and pertinent measure of interest rate risk, banks and regulators are turning increasingly to measures of market value. The market value of a portfolio is simply the sum of the market values of all assets and liabilities based on the discounted value of all future cash flows.

The increasing complexity of banks' balance sheets, coupled with the recent regulatory focus on market value, demands a new approach to measuring, monitoring, and controlling balance sheet risk.

Ideally this approach should enable banks to express the risk exposure of complex balance sheets accurately in a single measure. It should also allow management to add value by anticipating and planning for interest rate risk.

6.2. The proposed method.

Section 3 of this paper proposes a method for measuring and reporting risk. This method offers a number of advantages.

- It is a relatively simple, uncomplicated process.
- It clearly measures cash at risk.
- It takes into account current market conditions and their relationship to historic circumstances.
- It can be applied to all risk instruments.
- It can be used to limit risk by instrument and by portfolio.
- It can be used to construct optimal hedges for open positions.
- It is broadly in line with the current methodology favoured by the Basle Committee.

Following on from this, portfolio limits which are based on this methodology will be dynamic, will relate to a single simple - yet comprehensive - benchmark, will be symmetrical, will be risk related, and can be adjusted readily according to risk tolerance.

7. Proposed Method for the Measurement and Control of Liquidity Risk.

Section 4 of this paper proposes a method for the measurement and control of liquidity risk in CSOB. The proposals are additional / complimentary to the requirements of the Ceska Narodni Banka under its Provision on Liquidity Rules for Banks pursuant to Article 15 of the Act on Banks of February 1992.

The proposed method is broadly similar to the reporting requirements of the CNB and is consistent with the specification of the liquidity report for MIS. In addition to this the method has the advantage that:

- It is a relatively simple, uncomplicated process.
- It can be used to construct a cost effective liquidity strategy.

Section 3

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

The Recommended Measurement of Market Risk

Prague 28 July, 1994

Clive Grumball

Trading Risk Units

1. Overview.

The ideal measure of interest rate risk would enable management to simultaneously manage earnings risk and the market value of equity. Regrettably, no appropriate methodology has yet been devised which can meet this requirement for all organisations in all situations.

The measurement of earnings risk is based on accrual accounting, whilst the market value of equity is the measure of economic value. As such, against the background of currently operating accounting standards, the management of banks have sought to achieve a sensible balance between managing earnings and market value - as far as it is possible.

However, the concerns remain. Scrutiny of published financial statements by both the public and shareholders may affect the value of the bank since the equity market focuses on earnings and earnings-related ratios.

Increased earnings volatility may cause shareholders to demand an increased premium represented by a lower stock price. At the same time reported earnings results may also affect regulatory capital.

The growing complexity of banks' balance sheets, together with a greater degree of sophistication in modern risk management instruments now requires management to even the balance between the control of earnings and market value and look at long term interest rate risk rather than merely focus on income results.

However, whilst banks have accepted that they are unable to hedge the value of equity fully without incurring unacceptable levels of earnings volatility, senior management has been able to consciously decide on the level of risk to which they will expose themselves. In so doing asset and liability management decisions have been able to reflect some element of rational choice.

1.1. The Scope of Limits.

Limits, whether for individual products or for entire portfolios, are based on the premise that they represent the maximum affordable losses by an institution over a given period of time in a pre-defined market disaster scenario.

1.2. Defining Limits.

Ideally limits should be expressed:

- In a form which is common to individual products as well as to portfolios, no matter how complex or diverse.

- In a way that can conform to a range of different market levels and conditions.
- In a way that can reflect changes in the circumstances of the institution itself.

1.3. Measurement of risk.

The starting point for a measurement of interest rate risk is to determine the market value of equity. Unlike the more traditional measures of interest rate risk, a mark-to-market valuation can meet the necessary criteria and can be applied to a variety of positions and markets.

Once the market value is known, management can then set in place a measure of the amount of the equity value they are prepared to put at risk to movements in market rates. This amount is referred to as the "value at risk", and is defined as the expected loss from an adverse market movement with a specified probability over a given period of time.

"Value at Risk" forms the basis of the proposed methodology for the measurement and control of risk within CSOB.

2. Value at Risk.

2.1. Methodology.

The calculation of "value at risk" is a relatively straightforward process which involves relating current market conditions to historic market conditions. It operates as follows:

- Calculate the basis point / tick / pip value for each instrument, irrespective of type or maturity.
- Calculate the volatility of that instrument expressed as its equivalent movement in the relevant market rates.
- Establish an adjusting factor - a safety net - which will enable management to adjust maximum risk exposure with the minimum of systems implications in the minimum amount of time, and causing minimum alarm to the dealers. This can be achieved by applying a multiplier to the volatility of the instrument/portfolio.
- Combine these three factors to compute the potential loss resulting from that position expressed as a cash value.
- Convert each cash value into Trading Risk Units [TRUs]
- Aggregate TRUs by currency by maturity time band by instrument.

Long positions by instrument are offset against short positions within each maturity time band by currency subject to a weighting which reflects basis risk.

- Aggregate instrument net TRU amounts by currency by maturity time band.

Long and short positions in individual instruments are offset against one another subject to a weighting to allow for basis risk.

- Aggregate the absolute amount of currency positions to arrive at total TRU value and relate to the current limit in place.

Examples of each of the above processes are given in Para 8 below.

3. Basis Risk

One of the principal problems with the use of benchmarks to express trading risk is that it is not always readily possible to articulate risks which may still exist even when one instrument apparently hedges out a position in a different instrument [i.e. basis risk]. To overcome this CSOB could track the correlation between the different portfolio instruments and use it as an adjusting factor when calculating the net risk position.

However, this may well become impractical in the case of a more complex and diversified portfolio. For this reason the use of standard weightings within instruments and across the portfolio as a whole is considered to be the best approach to take.

4. Advantages of the proposed methodology.

There are a number of advantages for using a TRU based method for measuring and reporting risk.

- It is a relatively simple, uncomplicated process.
- It clearly measures cash at risk.
- It takes into account current market conditions and their relationship to historic circumstances.
- It can be applied to all risk instruments.
- It can be used to limit risk by instrument and by portfolio.
- It can be used to construct optimal hedges for open positions.
- It is broadly in line with the current methodology favoured by the Basle Committee.

Following on from this portfolio limits themselves which are based on this methodology will be dynamic, will relate to a single simple - yet comprehensive - benchmark, will be symmetrical, will be risk related, and can be adjusted readily according to risk tolerance.

5. Systems Implications.

There are systems implications in incorporating such a method in CSOB. In Section 1 - Executive Summary it was stated that it will not be possible at the outset to extend the concept of the TRU method of risk control to the activities of CSOB as a whole. This resulted from the difficulties with the current processing capability of IBIS. However there should be no such problems for implementation of the method within Valuta.

- Valuta already calculates the basis point value of fixed income securities, which is a far more complicated process than calculating the basis point value of a short term asset or liability.
- Tracking and calculating volatility is also a relatively simple statistical analysis exercise, which should present few difficulties to Valuta.
- Once these factors are determined the TRU calculation process is extremely basic.

6. Management Issues.

CSOB Senior Management is responsible for setting parameters to limit risk positions to acceptable levels.

CSOB Management must, therefore, decide:

- How much it is prepared to risk losing through its trading operations in any given activity and in total across all activities.
- The time frame over which an anticipated loss might materialise
- How they will adapt the limit structure under different market scenarios.

Experience suggests that very few institutions actually do this effectively. In general it seems that a bank's management is able to come to terms with setting in place limit structures which can translate back to the value at risk. However, such limit structures are usually set with little [or no] regard to actual market conditions.

For example, a management will tolerate running "short" positions which are as large when interest rates are at (say) a 20 year historic high as they are when rates are at a 20 year historic low.

It is conceivable that limits could be set automatically by referring the risk position to a given range which was driven by relating current market conditions to historic conditions.

For example, in the event interest rates are at an historic high the volatility of a short position in a bond would be automatically subjected to a significantly increased multiplier.

If it is not possible to automate in this way then procedures should be introduced to ensure the pro-active participation of management in the control of limits.

An example of setting TRU limits for overall and individual activity risk positions is given in Para 9 below

7. Recommendations for TRU calculation factors at inception.

7.1. Formula.

It is recommended that CSOB uses the following formula to determine the TRU value of a given instrument:

$$\bullet \text{ Instrument TRU} = \frac{\text{BPV} * v * m}{\text{TRV}}$$

where:

- BPV = Basis Point Value - The change in value of the mark to market of an instrument brought about by a 1 basis point/tick/pip change in its yield/price.
- v = Volatility of the instrument expressed in basis points / price
- m = Multiple of volatility
- TRV = Value attributable to one risk unit

7.2. Volatility [v].

It is recommended that CSOB uses a movement in the relevant market rate which is equivalent to 2 standard deviation movements around the average market rate for that instrument based on a 250 day price history.

Two standard deviation movements translates into a 97.5% probability that the one-day change following an adverse market movement will not exceed a given amount; conversely, there is also a 2.5% probability that the change to the portfolio value will exceed that amount.

It is accepted that it may be more difficult to focus on a relevant benchmark on which to calculate the precise volatility factors for the domestic market since rate moves in certain areas of the market may not always appear rational when compared to non-domestic markets.

This is seen as an obstacle to implementing the TRU methodology generally within the

bank as a whole at this stage. However, it should be possible to track volatilities which are relevant to the dealing room, and incorporate these within the proposed method for the control of risk resulting from the activities of the dealers.

7.3. Multiplier [m].

Given the relatively early stage of the evolution of activities in the financial markets, both domestically and internationally, it is recommended that a multiplier of 2 is used. This should provide management with a healthy "comfort zone" and is not inconsistent with market practice..

7.4. TRV.

The recommended TRV is CZK 10,000

7.5. Basis Risk Weighting used within individual instrument time buckets.

It is recommended that where there is not an exact match of life of individual offsetting instruments within any "time bucket" the weighting used will be 5%.

For example an apparent near zero risk position which comprises of a bought FRA with a life of 91 days, whose end date coincides with a sold FRA with a life of 90 days will be subjected to a 5% weighting.

This weighting will reflect the fact that a sudden overnight interest rate shift may adversely affect the later LIBOR fixing of the shorter maturity FRA. This is a real risk which is over and above the marginal difference in the basis point values of the two FRAs.

7.6. Basis Risk Weighting used when offsetting long and short positions across different time buckets by individual instrument.

It is recommended that where net longs in an instrument in one time bucket are offset against net shorts in another time bucket the weighting used will be 10%.

7.7. Basis Risk Weighting when offsetting long and short positions for different instruments.

It is recommended that where net longs in one instrument are offset against net shorts in another the weighting used will be 10 per cent.

8. Examples to demonstrate the use of TRUs.

8.1. Calculation of BPV.

- CSOB places CZK 50,000,000 for 90 days.

The BPV of the loan will be $CZK 50m * 90 / 360 * 0.01 / 100 = CZK 1,250$

8.2. Calculation of TRU value of a position.

- CSOB places CZK 50,000,000 for 90 days.
- BPV is CZK 1,250 [see 8.1. above].
- Its current volatility translates to a rate movement of 12 basis points.
- The multiple in place is 2
- Each TRU is equivalent to CZK 10,000

From the formula:

$$\text{Instrument TRU} = \frac{\text{BPV} * v * m}{\text{TRV}}$$

$$\text{Loan TRU} = \frac{1,250 * 12 * 2}{10,000}$$

$$\text{Loan TRU} = 3.00$$

Management can see immediately that the forecast probable cost of an adverse one-day move against the loan will produce a loss of CZK 30,000.

8.3. Adjusting offsetting TRUs to allow for Basis Risk using observed correlation.

Assume:

- Borrow cash with a maturity of one year with a TRU value of 10
- Buy corresponding three month deposit futures contracts also to the value of 10 TRUs.

On the face of it the net TRU exposure will be zero.

However, assume:

- The correlation between the chosen futures contract and the one year deposit is 85 per cent.

Adjusted TRU position will be:-

$$= 10 - (10 \times 85\%)$$

$$= 1.50 \text{ TRU.}$$

8.4. Adjusting offsetting TRUs to allow for Basis Risk using standard correlati

Assume CSOB:

- Buys FRA 6 against 12 months [180 days] CZK 200,000,000
- Sells FRA 6 against 9 months [90 days] CZK 100,000,000
- Sells FRA 9 against 12 months [90 days] CZK 100,000,000
- Lends Cash for 12 months [360 days] CZK 100,000,000
- Takes Cash for 6 months [180 days] CZK 100,000,000

Assume also:

- There are 2 time buckets:
 - Sight to 6 months
 - >6m to 1 year

8.4.1. FRA Portfolio.

- BPV of 6 v 12 FRA = $200,000,000 * 180/360 * .01/100 = \text{CZK } 10,000$
- BPV of 6 v 9 FRA = $100,000,000 * 90/360 * .01/100 = \text{CZK } 2,500$
- BPV of 9 v 12 FRA = $100,000,000 * 90/360 * .01/100 = \text{CZK } 2,500$

Given:

- Volatility of 6 v 12 FRA 10 basis points
- Volatility of 6 v 9 FRA 9 basis points
- Volatility of 9 v 12 FRA 11 basis points
- Multiple in place 2
- TRV CZK 10,000

Then TRU values will be:

- TRU 6 v 12 FRA $\frac{10,000 * 10 * 2}{10,000} = 20.00 \text{ TRUs}$

- TRU 6 v 9 FRA $\frac{2,500 * 9 * 2}{10,000} = 4.50$ TRUs
- TRU 9 v 12 FRA $\frac{2,500 * 11 * 2}{10,000} = 5.50$ TRUs

All three FRA positions are in the same time bucket i.e. " 6 months to 1 Year". Therefore, offset the bought FRA against the two sold FRAs, weighting the smaller value by a standard 5 per cent.

- $[20.00] - [(4.50 + 5.50) * 95\%]$ = 10.50 TRUs

8.4.2. Cash Portfolio:

- BPV of 1 year loan = $100,000,000 * 360/360 * .01/100 =$ CZK 10,000
- BPV of 6 month loan = $100,000,000 * 180/360 * .01/100 =$ CZK 5,000

Given:

- Volatility of 1 year loan 13 basis points
- Volatility of 6 month loan 15 basis points
- Multiple in place 2
- TRV CZK 10,000

Then TRU values will be:

- TRU 1 year loan $\frac{10,000 * 13 * 2}{10,000} = 26.00$ TRUs
- TRU 6 month deposit $\frac{5,000 * 15 * 2}{10,000} = 15.00$ TRUs

The loan and the deposit are in different time buckets. Therefore, offset 1 year loan against 6 deposit weighting the smaller value by a standard 10 per cent.

- $[26.00] - [15.00 * 90/100]$ = 12.50 TRUs

8.4.3. Net Portfolio TRU.

Offset Net FRA TRU against Net Cash Book TRU weighting the smaller value by a standard 10 per cent.

- $12.50 - [10.50 * 90/100]$ = 3.05 TRUs

The TRU position would be reported as 3.05 TRUs.

Management will be able to see immediately that the probable adverse P/L impact of the basis risk contained within the apparently zero risk position is CZK 30,500.

9. Examples which Establish Overall and Product TRU Limits.

The following example is for illustrative purposes only. Its purpose is to provide some indication of the type of process which would be discussed inside ALCO.

9.1. Calculation of maximum "Value at Risk".

Assume that Bank A has a capital of CZK 5,000,000,000 and that its management is prepared to risk a maximum of 5% of this total to an adverse movement in market rates in a full year [say 250 trading days]. However, management also decides that it does not wish to risk losing more than 1/25 of this amount on any one day.

- **Maximum overnight risk "pot" = $\frac{5,000,000,000}{25} * 5\% = \text{CZK } 10,000,000$**

9.2. Allocation to Strategically Important Activity ["SIA"].

Assume that it is strategically important to devote a large part of the "risk pot" to trading spot foreign exchange.

- **Bank A therefore decides to allocate CZK 6,000,000 to this activity.**

9.3. Allocation of Balance of Risk Pot to Other Activities.

The balance [i.e. CZK 4,000,000] would subsequently be allocated to other trading areas within Bank A.

9.4. Sub-allocation of CZK 6,000,000 allocated to SIA.

Assume Bank A sub-allocates:

- CZK 4,000,000 to spot CZK/USD
- CZK 2,000,000 to CZK/DEM.

9.5. Setting TRU Limits.

If TRV = CZK 10,000 then:

- The limit for CZK/USD would be $4,000,000 / 10,000 = \text{TRU } 400$
- The limit for CZK/DEM would be $2,000,000 / 10,000 = \text{TRU } 200$

9.6. Translating TRU Limits into Position Limits.

9.6.1. CZK/USD

Assume:

- CZK/USD is trading at 28.00
- overnight volatility assigned to this exchange rate by Bank A [for the purpose of this example] is CZK 0.28
- multiple = 2

Maximum Nominal Open Position in CZK/USD = USD 7,142,857

The TRU position reported for a position of this size would be:

$$\text{Pip Value} = \text{USD } 7,142,857 * .01 = \text{CZK } 71,428.57$$

$$\text{TRU} = \frac{71,428.57 * 2 * 28}{10,000}$$

$$\text{TRU} = 400.00$$

Management would have the comfort of knowing that the probability of the bank realising a loss over-night in excess of CZK 4,000,000 on a position which fully utilised the limit was statistically less than 2.5 per cent [taking the multiplier into account].

9.6.2. CZK/DEM

- CZK/DEM is trading at 18.00
- overnight volatility assigned to this exchange rate by Bank A [for the purpose of this example] is CZK 0.16
- multiplier = 2

Maximum Nominal Open Position in CZK/DEM = USD 6,250,000

The TRU position reported for a position of this size would be:

$$\text{Pip value} = \text{USD } 6,250,000 * .01 = \text{CZK } 62,500.00$$

$$\text{TRU} = \frac{62,500 * 2 * 16}{10,000}$$

$$TRU = 200.00$$

Management would have the comfort of knowing that the probability of the bank realising a loss over-night in excess of CZK 2,000,000 on a position which fully used the limit was statistically less than 2.5% [taking the multiplier into account].

Section 4

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

Liquidity Risk

Prague 28 July, 1994

Clive Grumball

Measurement and Control of Liquidity Risk in CSOB.

1. Overview.

Total risk to a financial institution can be classified under the following main headings:

- **Credit Risk**

The risk of loss due to the failure of a counterparty to honour an obligation.

- **Liquidity Risk**

The risk of failure to meet liabilities as they fall due.

- **Operations Risk**

The risk of loss due to front office or back office failures.

- **Market Risk**

The risk of loss due to incorrect position taking.

2. Purpose of this paper.

This paper focuses on the second category above - Liquidity Risk.

As such its purpose will be to propose a method to measure, monitor, and control liquidity risk in CSOB.

The proposals in this paper are additional / complimentary to the requirements of the Ceska Narodni Banka under its Provision on Liquidity Rules for Banks pursuant to Article 15 of the Act on Banks of February 1992.

3. Control of Liquidity Risk.

3.1. Background.

The effective management of liquidity risk is crucial to any bank and necessitates a prudential approach to both domestic and foreign currency liquidity needs. In the case of CSOB the potential problems are two-fold:

- The domestic money market is relatively new and dominated by one or two banks which control a large percentage of the deposit base. Whilst developments post 1992 have eased the general liquidity position of the domestic market, rates remain highly volatile and the market generally confined to maturities of 3 months or less.

- The bank has no currency capital with which to support any significant foreign currency element of the balance sheet.

The level of prudence will therefore be greater than might otherwise be the case.

3.2. Measuring Liquidity Risk.

CSOB is required to report its liquidity position to CNB on a quarterly basis in a pre-determined format. In addition the Economics Department receives a daily report *20 7 - Maturity Analysis Assets and Liabilities*. [This report is produced by IBIS and provides a summary maturity analysis of assets and liabilities in base currency.]

Whilst these reports may meet the specific requirements of the CNB and the Economics Department respectively, they do not necessarily afford CSOB management with an effective means to measure or control liquidity risk on a proactive basis. However, the information contained in these two reports, particularly the CNB report, could be re-formatted in a way which would allow CSOB this capability.

3.3. Methodology.

The main purpose of the report is to ensure management will be able to maintain control over CSOB's liquidity position even in a worst case scenario.

For this reason all facilities given by the bank or provided to the bank are reported as being utilised and liquid assets are assumed to required to be sold into an unwilling market which will be reflected in the price at which they can be realised.

Two separate reports would be required: one measuring CZK liquidity risk, the other foreign currency liquidity risk. Each report is compiled according to the sample report shown on page 5 of this section.

It is possible that once the domestic market becomes more liquid and CSOB develops strong links with non-domestic counterparts that control can be maintained through a single consolidated report.

3.3.1. Assets.

- All non-negotiable assets [including call and notice monies given] are allocated into their respective maturity "time buckets", together with associated interest amounts due to be received.
- All negotiable assets [e.g. Treasury bills; CDs; etc] are included in the category "Sight to 1 week" subject to a discount which is set by asset quality. The discount represents the forced sale risk associated with non-liquid market conditions.
- The total of the minimum reserve requirement held at the CNB will be included in the "Sight to 1 Week" category.

- All incoming cashflows associated with foreign exchange transactions are allocated into their respective maturity "time buckets".
- The total of assets maturing in the "Sight to 1 Week" category will be adjusted **downwards** by the amount of all commitments given by the bank [e.g. committed but undrawn overdraft facilities; committed stand-by facilities; etc].

The reason for this is that it is possible that in the case of a major liquidity crisis all such facilities will be fully drawn within 1 week.

- All fixed assets are included in the category "> 1 Year".

3.3.2. Liabilities.

- All liabilities [including call and notice monies taken] are allocated into their respective maturity "time buckets", together with associated interest amounts due to be paid.
- All outgoing cashflows associated with foreign exchange transactions are allocated into their respective maturity "time buckets".
- The total of liabilities maturing in the "Sight to 1 Week" category will be adjusted **downwards** by the amount of all commitments granted to the bank [eg committed but undrawn overdraft facilities; committed stand-by facilities; etc].

The reason for this is that it is possible that in the case of a major liquidity crisis the bank will fully utilise all such facilities within 1 week.

- CSOB Capital will be included in the category "> 1 Year".

3.3.3. Cumulative Totals.

The cumulative totals of each category of Asset and Liability is computed and the ratio of Cumulative Assets to Cumulative Liabilities [CA/CL] is calculated for each time bucket.

3.3.4. Limits.

A limit will be set for the minimum ratio of CA/CL for individual time buckets. Limits will apply to both CZK and foreign currency liquidity reports.

4. Recommended Limits.

Sight to 1 Week	100%
> 1 Week to 1 Month	100%

For each of the categories cumulative cash inflows must be equal to or greater than cumulative cash outflows.

> 1 month to 1 Year 60%

In this category cumulative cash inflows must be equal to or greater than 60% of cumulative cash outflows.

> 1 year No limit necessary.

The reduced requirement for the categories longer than 1 month is based on the assumption that central bank action should have resolved any major liquidity squeeze within that period, either in the domestic or international money markets.

5. Recommended discounts to be applied to negotiable paper.

Holdings of domestic Treasury Bills	0%
Holdings of domestic Government Bonds	5%
All other holdings	10%

6. Example Liquidity Profile.

Category	Sight-1w	>1w-1m	>1m-3m	>3m-6m	>6m-1y	>1 year
Assets in	1,945	1,457	968	1,297	7,275	7,987
G'tees etc	(475)	0	0	0	0	0
Cum Ass	1,470	2,927	3,895	5,192	12,467	20,454
Liabs out	1,648	1,209	6,385	5,866	929	5,000
G'tees etc	(150)	0	0	0	0	0
Cum Liab	1,498	2,707	9,092	14,958	15,887	20,887
CA/CL	98.13%	108.13%	42.84%	34.71%	78.47%	N/A
Limit	100%	100%	60%	60%	60%	N/A
Excess	** 28 **	0	* 1,560 *	* 3,783 *	0	N/A

N.B.

Final Cumulative Totals will not balance due to impact of guarantees etc and [any] holdings of negotiable assets whose maturity value is discounted for liquidity limit purposes.

Section 5

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

Gap Analysis

Prague - July 28, 1994

Clive Grumball

Gap Analysis

1. Overview.

Gap Analysis has been used as a method of risk management and control for a considerable time.

Whilst it is by no means the optimum methodology for risk measurement it can be extremely helpful to the risk manager, despite the fact that of late it has become somewhat maligned as a methodology.

2. Gap Analysis in Practice.

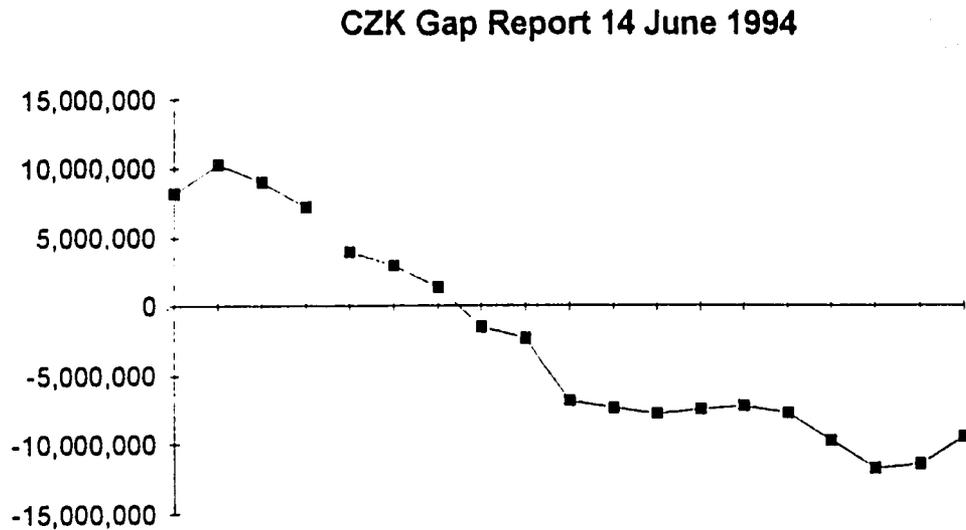
Essentially, the concept of Gap Analysis is to monitor the net difference in the total par value of assets less the total par value of liabilities re-pricing or maturing during a specific time period. If during a given time period the par value of assets exceeds the par value of liabilities then a positive gap will exist and so on.

The following portfolio is loosely based on the CZK Dealing Ladder [Report 0610B] as at 14 June 1994. It is presented in the format currently used, but is used for illustrative purposes only [i.e. the known deficiencies of the methodology of this report are ignored].

Maturity	Money On	Money Off	Gap	Cumulative
24 June 94	8,200,000	0	8,200,000	8,200,000
14 July	2,050,000	0	2,050,000	10,250,000
23 Sep		1,250,000	-1,250,000	9,000,000
4 Nov		1,800,000	-1,800,000	7,200,000
11 Dec		3,300,000	-3,300,000	3,900,000
24 Jan 95		1,000,000	-1,000,000	2,900,000
24 Feb		1,600,000	-1,600,000	1,300,000
16 Mar		2,800,000	-2,800,000	-1,500,000
18 May		800,000	-800,000	-2,300,000
16 Jun		4,600,000	-4,600,000	-6,900,000
15 Aug		500,000	-500,000	-7,400,000
13 Oct		425,000	-425,000	-7,825,000
29 Dec	300,000		300,000	-7,525,000
3 Feb 96	250,000		250,000	-7,275,000
15 Apr		500,000	-500,000	-7,775,000
21 May		2,000,000	-2,000,000	-9,775,000
7 Jun		2,000,000	-2,000,000	-11,775,000
31 Dec	275,000		275,000	-11,500,000
31 Dec 98 +	2,000,000		2,000,000	-9,500,000

The following diagram, perhaps, helps to gain some idea of the apparent risk profile:

Fig 1



Thus, as currently reported it would appear that a steadily reducing over borrowed position is being carried through to about end Feb 1995, from which point a steadily increasing over lent position is being carried.

This profile would be consistent with an expectation of increasing rates initially and decreasing rates subsequently.

However, reporting interest rate risk in this format can be misleading. The report shows an over lent position from 31 Dec 98 to infinity, which cannot be the case. This may result from the treatment of the Bank's capital / interest accruals / etc. in the report.

Perhaps, therefore, a better representation might be to assume that from 14 June 1994 all maturing deals are subsequently rolled on a straightforward overnight basis.

Eventually all exposures cancel themselves out leaving a zero trading position.

If the zero end position is used as the starting point a reverse cumulative gap report can be constructed as follows:

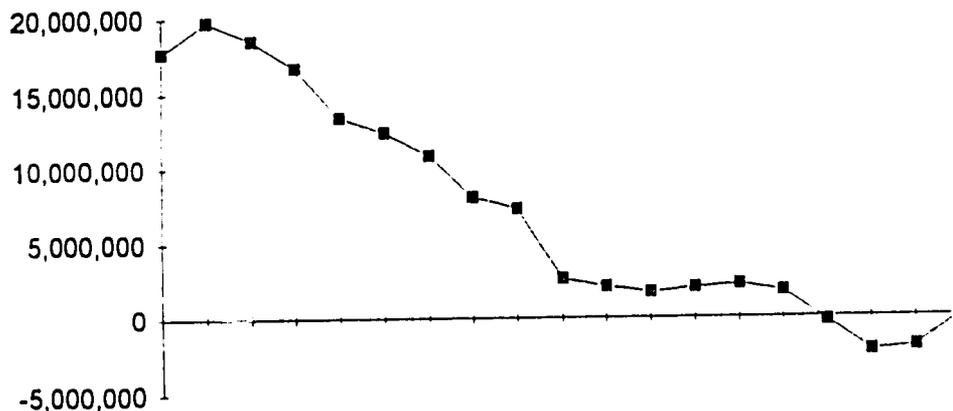
Maturity	Money On	Money Off	Gap	Rev. Cum
24 June 94	8,200,000	0	8,200,000	17,700,000
14 July 94	2,050,000	0	2,050,000	19,750,000
23 Sep 94		1,250,000	-1,250,000	18,500,000
4 Nov 94		1,800,000	-1,800,000	16,700,000
11 Dec 94		3,300,000	-3,300,000	13,400,000
24 Jan 95		1,000,000	-1,000,000	12,400,000

24 Feb 95		1,600,000	-1,600,000	10,800,000
16 Mar 95		2,800,000	-2,800,000	8,000,000
18 May 95		800,000	- 800,000	7,200,000
16 Jun 95		4,600,000	-4,600,000	2,600,000
15 Aug 95		500,000	- 500,000	2,100,000
13 Oct 95		425,000	- 425,000	1,675,000
29 Dec 95	300,000		300,000	1,975,000
3 Feb 96	250,000		250,000	2,225,000
15 Apr 96		500,000	- 500,000	1,725,000
21 May 96		2,000,000	- 2,000,000	- 275,000
7 Jun 96		2,000,000	- 2,000,000	- 2,275,000
31 Dec 96	275,000		275,000	- 2,000,000
31 Dec 98	2,000,000		2,000,000	0

As before this can be depicted diagrammatically as follows:

Fig 2

CZK Reverse Cumulative Gap Report 14 June 1994



Reported in this way, the view being taken is shown as being an expectation of increases in interest rates [as indicated by the over-borrowed position] coupled with a sharp flattening of the yield curve [as expressed by lending to 31 Dec 1998 and funding this position until June 1996 in an amount of CZK 2,000,000,000].

The original purpose of gap analysis was to both monitor cash flow needs and to identify interest rate exposure. This was more or less possible when the markets only traded portfolios of conventional loans and deposits but as the markets evolved two separate exercises became necessary - one for monitoring liquidity needs and a separate method to identify interest rate risk. It is at this point where confusion was introduced.

Another early failing of gap analysis was to set the individual time buckets into a few, often wide, periods. Typically these were:-

- 0 - 30 days
- 1 - 3 months
- 3 - 6 months
- 6 - 12 months
- 1 - 2 years
- 2 - 5 years
- 5 + years

Such time buckets were far too insensitive to be effective but the problem can be overcome by reducing the time periods involved. i.e. sub-divide each gap period into smaller and smaller periods.

However, this methodology, is open to the criticism that it might be administratively difficult to achieve - despite modern technology - and could result in a risk manager having to perfectly match all cash inflows and outflows, which would be impossible in practice.

This criticism appears to result from the an inability to differentiate between liquidity risk management and interest rate risk management, which may stem from the origins of gap analysis. Effective liquidity management may often require perfect matching [as will be discussed in a separate paper] but interest rate risk management need not.

Gap analysis can form an effective part of an interest rate management process, but it can only do so if a risk manager has a sufficient level of detail available. Ideally this should break down exposure for each individual daily period.

It is also argued that a further weakness of gap technology is that it precludes a risk manager from taking discrete incremental steps to control exposure. It is claimed that to do so might introduce a domino effect into the exposure management process which would result from the risk manager's attempts to plug gaps.

It is argued that the process of plugging gaps creates a series of subsequent cash flows which in turn cause new gaps to appear in later periods. These gaps must also be plugged, thereby perpetuating the problem. However, this need not be the case, provided the gap report is sufficiently detailed, as can be demonstrated.

In the example shown on the previous page we showed a gap report which indicated an over-borrowed position for the period from 16 Jun 95 to 21 May 96 and over-lent for the period from 6 June 96 to 31 Dec 98.

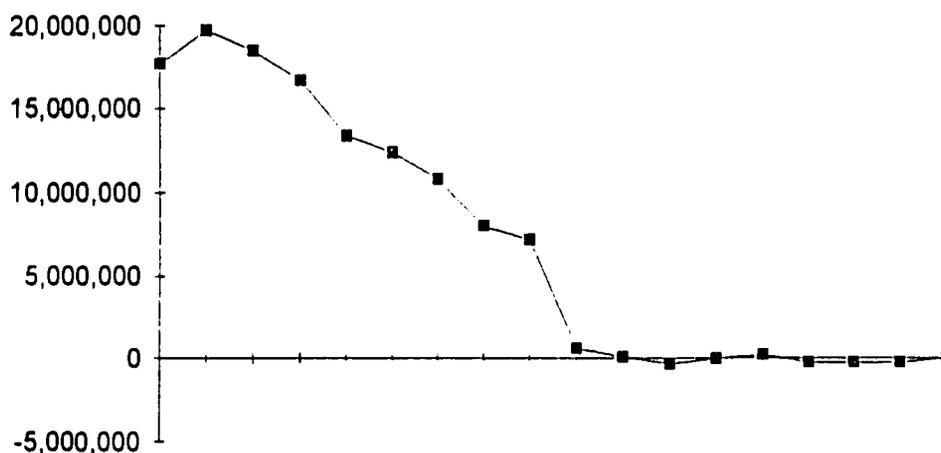
If it was required to eliminate these positions it would be possible to simply use [for example] FRAs to cover each period.

Let us assume we can sell an FRA for period 16 June 95 to 21 May 96 and buy an FRA for period 7 June 1996 to 31 Dec 1998, each in an amount of CZK 2 billion. The resulting impact on the Gap Report [with covered periods highlighted] will be:

Maturity	Money On	Money Off	Gap	Rev. Cum
24 June 94	8,200,000	0	8,200,000	17,700,000
14 July 94	2,050,000	0	2,050,000	19,750,000
23 Sep 94		1,250,000	-1,250,000	18,500,000
4 Nov 94		1,800,000	-1,800,000	16,700,000
11 Dec 94		3,300,000	-3,300,000	13,400,000
24 Jan 95		1,000,000	-1,000,000	12,400,000
24 Feb 95		1,600,000	-1,600,000	10,800,000
16 Mar 95		2,800,000	-2,800,000	8,000,000
18 May 95		800,000	- 800,000	7,200,000
16 Jun 95		6,600,000	-6,600,000	600,000
15 Aug 95		2,500,000	- 500,000	100,000
13 Oct 95		425,000	- 425,000	- 325,000
29 Dec 95	300,000		300,000	- 25,000
3 Feb 96	250,000		250,000	225,000
15 Apr 96		500,000	- 500,000	- 275,000
21 May 96	2,000,000	2,000,000	0	- 275,000
7 Jun 96	2,000,000	2,000,000	0	- 275,000
31 Dec 96	275,000		275,000	0
31 Dec 98	2,000,000	2,000,000	0	0

Fig 3.

Adjusted CZK Gap Report



If the same view was held when each FRA settles, the exposure could simply be removed by acquiring an asset or liability as appropriate, without fear of any domino effect in terms of interest rate risk.

It is clearly possible to take discrete incremental steps to control exposure. However, the critics may well be proved correct if the time buckets are indeed too wide.

We can show this as follows:

Assume 30 June 1994 CSOB reports the following exposures in the format specified for MIS:

	1 M	2 M	3 M	4 M	5 M	6 M	12 M	over
Assets	19,750	0	0	0	0	0	0	2,825
Liabs	0	0	0	1,250	1,800	3,300	6,200	10,025
Net	19,750	0	0	-1,250	-1,800	-3,300	-6,200	-7,200
Cum	19,750	19,750	19,750	18,500	16,700	13,400	7,200	0

Assume now that management instructs that all reported gaps are to be hedged at all times and that, initially, to do so the following FRAs are dealt:

- 1 v 4 30 Jul to 30 Oct sell 1,250,000,000
- 1 v 5 30 Jul to 30 Nov sell 1,800,000,000
- 1 v 6 30 Jul to 30 Dec sell 3,300,000,000
- 1 v 12 30 Jul to 30 Jul 95 sell 6,200,000,000
- 1 v 13 30 Jul to 30 Aug sell 7,200,000,000

This should produce the following report.

	1 M	2 M	3 M	4 M	5 M	6 M	12 M	over
Assets	19,750	0	0	1,250	1,800	3,300	6,200	10,025
Liabs	19,750	0	0	1,250	1,800	3,300	6,200	10,025
Net	0	0	0	0	0	0	0	0
Cum	0	0	0	0	0	0	0	0

But what happens to the report the next day [1 July] if the underlying positions on 30 June were in fact:

Assets

Placed to	2 Jul 1994	19,750,000,000
Placed to	7 Jul 1995	2,825,000,000

Total 22,575,000,000

Liabilities

Taken to	7 Oct 1994	1,250,000,000
Taken to	7 Nov 1994	1,800,000,000

Taken to 7 Dec 1994	3,300,000,000
Taken to 7 Jul 1995	6,200,000,000
Capital; Long Term Funding	10,025,000,000
Total	22,575,000,000

The July 1 report will show:

	1 M	2 M	3 M	4 M	5 M	6 M	12 M	over
Assets	19,750	1,250	1,800	3,300	6,200	7,200	0	2,825
Liabs	19,750	0	1,250	1,800	3,300	0	6,200	10,025
Net	0	1,250	550	1,500	2,900	7,200	-6,200	-7,200
Cum	0	1,250	1,800	3,300	6,200	13,400	7,200	0

On the face of it, therefore, if the strategy is to hedge out all exposures, further action is required, and required.....

3. Principal Advantage of Gap Analysis.

The main advantage of Gap Analysis, which is often overlooked, is that it is one of the few methods of risk evaluation which enables a risk manager to see the actual pattern of his risk exposure [as the diagrams demonstrate]. Obviously the greater the level of detail available the better, especially as there are few associated systems difficulties.

4. Weaknesses of Gap analysis.

However, there are real weaknesses of Gap Analysis.

4.1. Gap Analysis is incapable of differentiating between the different types of trading risk.

More often than not all financial market products traded within an institution are lumped together in one big risk pot and portrayed in a single Gap Report. The institution then sets limits based on its tolerance to risk by expressing risks within the overall portfolio as being a maximum gap for a particular period or series of periods.

Consider the following:-

A dealer:

- Enters into a five year interest rate swap paying fixed rate interest against receiving three month LIBOR.
- Purchases a five year Government Bond whose cash flow dates exactly match the swap.

- Issues a three month Certificate of Deposit.

[Amount 50 million units.]

In a Gap Report these positions would be reported as follows:-

Maturity		Assets maturing		Liabilities Maturing	Gap	Cum Gap
3 months	swap	50.0	cd	50.0	0	0
60 months	bond	50.0	swap	50.0	0	0

From the Gap Report it can be seen that the dealer's position appears to be risk neutral. But the relationship between the yield on one instrument and another is rarely constant, indeed it can alter quite dramatically, particularly where there is a difference in the perceived credit risk between the two.

In October 1987 for example the relationship between US Treasury Notes and US Dollar interest rate swaps moved from a position where swaps traded at rates which were approx 90 basis points over Treasury Note yields to 120 basis points over Treasury Note yields within a 24 hour period whilst fundamental interest rates remained unchanged.

If such a situation applied to the above position and it was [say] closed out at the most inopportune time a loss would result of 750,000 units approximately - from a position which appeared to be free of market risk.

4.2. Gap Analysis is incapable of demonstrating different calculation methodologies and assumptions made within individual products.

Consider the above situation but assume that the bond was issued with a coupon of 9 per cent and was purchased to yield 10 per cent to maturity.

The calculation of the yield to maturity by market convention assumes that total proceeds invested (i.e. cash paid at inception together with ALL future coupon receivables) are invested at 10 per cent.

Failure to achieve this re-investment rate would result in a potential loss to that position.

4.3. Gap Analysis cannot provide immediate information to the user of the actual magnitude of potential cash losses resulting from risks being assumed.

By and large, gap limits are set as arbitrary numbers with little or no regard or concept of what are the actual implications to the Profit and Loss account of the user.

This is perhaps the greatest failing of Gap Analysis.

4.4. Gap Analysis is incapable of effectively dealing with contingent exposures such as written options.

It is possible to incorporate options purchased specifically to hedge existing book exposures by recording them as if they had been exercised. However, in the case where options are purchased as trading vehicles, or in cases where options are written, the situation becomes far less clear.

5. Recommended Use of Gap Analysis in CSOB.

As discussed earlier, Gap Analysis may have a role to play in the control of risk but the numerous inherent deficiencies realistically eliminate it as the primary means of interest rate risk control.

It is recommended that Gap Analysis is used as one of the tools for controlling factor in the bank by the Treasurer / ALCO.

- Under the proposed new reporting format the profile of the bank's interest rate risk will be considered by reference to the interest gaps being carried.
- Based on the result of this exercise the Treasurer in liaison with ALCO will decide:
 - whether, as a strategic exercise, all or part of the current risk exposure should be hedged or, alternatively, a strategic risk position taken.
 - whether the current maximum permitted level of TRUs allocated to the dealing room is appropriate or should be reduced / increased.

6. Systems Implications.

6.1. IBIS

In general, IBIS is capable of producing a number of reports for Gap Analysis.

However:

- IBIS cannot currently position FRAs and other derivatives in any risk report.
- A number of products could be processed but are not and some products are currently being incorrectly processed.
- The new reporting format was specified some 6 months ago but there still appears to be no realistic production date for its use in CSOB.

However, it is recognised that for the new format to be effective, it must be

supported by detailed gap reports which break down the exposures into daily "time buckets". Failure to do so may well result in instances of "domino effect" from attempts to plug gaps described earlier in this paper.

6.1. FEDS

Valuta has screen based Gap Reporting. It also claims to be able to produce hard copy consolidated Gap Reports - but this has yet to be substantiated.

It is assumed that Gap Reports will be available to CSOB's specification. As such management will at least have something on which to base its use of Gap Analysis.

This, however, does not negate the requirement for similar IBIS produced reports.

Section 6

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

Simulation Analysis

Prague - July 28, 1994

Clive Grumball

Simulation Analysis.

1. Background

Simulation Analysis is the process which involves subjecting a portfolio to a series of assumptions about future market conditions.

This method will enable the identification of potential interest rate exposure. It will also help CSOB to become familiar with the consequences of market actions on potential problems.

In addition, it will help to identify the critical components of the impact of foreign exchange and interest rate risk to CSOB and, importantly, it requires the bank to take a prospective rather than retrospective look at its risk exposure.

However to be truly effective Simulation Analysis requires numerous rate forecasts and, as a result, it can be an intensive and time consuming process. These are major disadvantages to an active trading portfolio.

As a consequence Simulation Analysis could not realistically be used as a risk management tool for Department 21 but it should be used in the overall risk management strategy of Senior Management.

2. Basic Simulation Processes

At its most fundamental level simulation analysis typically focuses on two particular measures of risk:

- Market sensitivity
- Weighted market sensitivity.

2.1. Market Sensitivity

This is a measure of risk that describes the amount of change that an individual portfolio is exposed to for a given shift in interest rates or currency across the entire portfolio.

Typically, four measures of market sensitivity will be considered by risk managers:

- Sensitivity to FX rate shifts - FX Shift Sensitivity
- Sensitivity to a uniform parallel shift in interest rates - Parallel Shift Sensitivity.
- Sensitivity to a parallel shift in interest rates in an individual section of the yield curve. - Segment Shift Sensitivity.

- Sensitivity to a uniform shift in implied volatilities - Volatility Shift Sensitivity.

2.1.1. FX Shift Sensitivity.

FX Shift Sensitivity identifies the change in the value of a portfolio caused by a standard shift of [say] 1% in all exchange rates relative to CZK.

The FX Shift Sensitivity of each position is the change in its value when the derived mark to market value is converted into CZK at the current spot rate and then at the spot rate after the foreign currency has appreciated relative to CZK.

Each FX Shift Sensitivity within the portfolio is aggregated to give the overall FX Shift Sensitivity.

2.1.2. Parallel Shift Sensitivity

The Parallel Shift Sensitivity defines the change in value of each position within the portfolio, and for the portfolio as a whole, that is brought about by the change in the mark to market value of each asset / liability after a pre-defined parallel shift in the underlying yield curve.

The mark to market value of each asset / liability is calculated in the first instance from the current zero coupon curve. The underlying curve is then shifted throughout by a pre-defined standard amount and a new mark to market value of each asset / liability calculated from the resulting zero coupon curve.

The difference between the two values represents the Parallel Shift Sensitivity.

2.1.3. Segment Shift Sensitivity.

Segment Shift Sensitivity differs from Parallel Shift Sensitivity in that it concentrates on single segments of the yield curve rather than the whole curve. For example, a yield curve factor sensitivity can be calculated by shifting only the segment of the yield curve from [say] 9 months to 1 year by a pre-defined standard amount.

As with the Parallel Shift Sensitivity, the mark to market value of each asset / liability is calculated in the first instance from the current zero coupon curve. The relevant segment of the underlying curve is then shifted by the standard amount and a new mark to market value of each asset / liability calculated from the resulting zero coupon curve.

2.1.4. Volatility Shift Sensitivity.

Volatility Shift Sensitivity describes the change in value of each option position that is brought about by a standard movement [say 1%] of all implied volatilities.

The mark to market value of an option is derived by using the price of the underlying instrument and the implied volatility of that instrument within an options pricing model. The implied volatility is then adjusted by the standard shift and the option repriced.

The difference between the two valuations represents the Volatility Shift Sensitivity of the option and, when aggregated, the sensitivity for the portfolio.

2.2. Weighted Market Sensitivity.

Weighted Market Sensitivity is a measure of risk that identifies the probability weighted sensitivity of a portfolio based on the standard deviation of historical data and the covariance between various markets.

In order to derive the Weighted Market Sensitivity of a portfolio it is necessary to calculate the variance [standard deviation] of the value of the assets / liabilities within the portfolio using historical data, and then to calculate the total probable variance of the portfolio weighted by the correlation between the constituent elements of the portfolio.

The correlation between assets / liabilities is defined by a Covariance Matrix which can be based on returns over a specified period [say 250 business days].

A specified number of standard deviations [say 2] - both plus and minus - is applied to the current yield curve to give their positive and negative probable shift in value.

The probable shift in value of each asset / liability is then used to compute the Weighted Market Sensitivity of the portfolio. This is done by applying the value of each asset / liability to each "cell" in the Covariance Matrix. The resulting number for each asset / liability can then be multiplied by its weighting within the portfolio.

The results of this process will then be aggregated to produce the Weighted Market Sensitivity of the portfolio.

2.2.1. Weighted FX Shift Sensitivity.

To arrive at the Weighted FX Shift Sensitivity the current spot rates are shifted both up and down by the amount of [say] 2 standard deviations, and the CZK value of each element of the portfolio is calculated and compared to the spot valuation.

2.2.2. Weighted Parallel Shift Sensitivity.

The Weighted Parallel Shift Sensitivity is calculated by shifting each point in the current yield curve both up and down by [say] 2 standard deviations to arrive at the probable variance for the whole yield curve. The zero coupon curves are then calculated from which each asset and liability is revalued.

2.2.3. Weighted Volatility Shift Sensitivity.

The standard deviation of historical implied volatilities is used to calculate the Weighted Volatility Shift Sensitivity of option positions within the portfolio.

A multiple [say 2] of the standard deviations of the implied volatility of individual options are added to and subtracted from the current implied volatility and the option repriced using the new volatility.

These revaluations are aggregated and the result compared with the spot valuation to give the Weighted Volatility Shift Sensitivity.

3. Arbitrary Sensitivity Analysis.

Ideally, sensitivity analysis should be extended to provide CSOB with the ability to specify any combination of the following analysis to provide total flexibility of risk scenario to the Treasurer:

- Yield shifts
- Foreign Exchange shifts.
- Horizon analysis.
- Implied volatility changes.

3.1. Yield Shifts.

This analysis should allow for any segment of any yield curve to be shifted in a non-uniform manner.

3.2. FX Shifts.

This analysis should allow for any given shift of any currency against CZK and the position held revalued at the new rate.

3.3. Horizon Analysis.

As well as being able to specify shifts in the underlying interest and FX rates, CSOB should consider specific shifts in time to determine the value of each element of a portfolio at any specified date in the future.

In particular this allows the bank to take account of maturities and expirations of futures and options contracts.

All yield curves are shifted forward in time by the specified amount and each element of the portfolio re-valued off the new resulting zero coupon curve, taking into account their revised cash flows.

3.4. Implied Volatility Changes.

Options within the portfolio are re-priced according to CSOB's specified arbitrary shifts in implied volatilities.

4. Recommended Use of Simulation Analysis in CSOB.

It is recommended that Simulation Analysis is used as a controlling factor in the establishment of the TRU total currently applicable in the bank.

- Each month [say] the current mark to market value of the bank's equity will be compared to the worst case scenario resulting from a Simulation Analysis exercise based on each of the techniques outlined in this paper.
- Based on the result of this exercise management will decide:
 - a). Whether the current maximum permitted level of TRUs is appropriate or should be reduced / increased.
 - b). Whether, as a strategic exercise, Global Treasury should hedge all or part of the current risk exposure / take a strategic risk position.

5. Systems Implications.

There are significant systems implications in the introduction of Simulation Analysis in CSOB.

It would appear that Valuta has some modelling capability, but this was only demonstrated where it applied to individual trading positions. ALCO type risk management capability was not demonstrated although some of the underlying calculations were evident [e.g. instrument duration and basis point value].

It is possible that the level of simulation capability required will need to form part of the specification process with Valuta.

Section 7

Risk Measurement and the Control of Risk in Ceskoslovenska Obchodni Banka AS

Duration Analysis

Prague - July 28, 1994

Clive Grumball

Duration Analysis.

1. Overview.

Duration Analysis is a relatively new technique that has rapidly become a standard risk management tool.

In concept, the purpose of duration is to identify the magnitude of an institution's interest rate exposure but in such a way that it forms an advancement on the more basic methods such as Gap Analysis. This is achieved by attempting to focus on the one area where Gap Analysis is weakest i.e. it cannot quantify the potential risk to a position in terms of a cash value.

Duration has its roots in the combination of methods used by:

- Money market managers who were seeking ways to express the risks they had assumed in a format which would readily translate into the total cash at risk from a portfolio.
- Investment managers who measured the risk of their portfolio in terms of its "Basis Point Value", which is defined as being equal to the change in price of a given instrument for a one basis point move in its yield.

2. Approach of Money Market Managers.

In essence there are a number of ways in which money market managers attempt to achieve their aims. Essentially they choose simple bench mark instruments, either real or theoretical, and convert risk positions into equivalent positions taken in the chosen bench mark.

The three most popular versions of this method are as follows:-

- Milli-Months
- Milli- Quarters [also known as Futures Contract Equivalents]
- Milli-Years [also known as One Year Equivalents]

2.1. Milli-Months.

In the case of milli-months the risk position of a portfolio is expressed in terms of its equivalent amount in millions of currency units with a maturity of one month. [e.g. CZK 1,000,000 for a period of 12 months is equivalent to CZK 12,000,000 for a period of 1 month . The risk position would be described as being 12 milli-months of risk.]

If this methodology is applied to the CZK money position considered under Gap Analysis it would report that CSOB's interest rate risk on 14 June 1994 equated to the following milli-month position:

Maturity	Money On	Money Off	Gap	Milli-months
24 June 94	8,200,000	0	8,200,000	2,695.890
14 July 94	2,050,000	0	2,050,000	2,021.918
23 Sep 94		1,250,000	-1,250,000	- 4,150.685
4 Nov 94		1,800,000	-1,800,000	- 8,462.466
11 Dec 94		3,300,000	-3,300,000	-19,528.767
24 Jan 95		1,000,000	-1,000,000	- 7,364.384
24 Feb 95		1,600,000	-1,600,000	- 13,413.699
16 Mar 95		2,800,000	-2,800,000	- 25,315.068
18 May 95		800,000	- 800,000	- 8,889.863
16 Jun 95		4,600,000	-4,600,000	- 55,502.466
15 Aug 95		500,000	- 500,000	- 7,019.178
13 Oct 95		425,000	- 425,000	- 6,790.685
29 Dec 95	300,000		300,000	5,552.877
3 Feb 96	250,000		250,000	4,923.288
15 Apr 96		500,000	- 500,000	- 11,030.137
21 May 96		2,000,000	- 2,000,000	- 46,487.671
7 Jun 96		2,000,000	- 2,000,000	- 47,605.479
31 Dec 96	275,000		275,000	8,417.260
31 Dec 98	2,000,000		2,000,000	109,216.438

Example calculation of a milli-month exposure.

Consider position on 24 June.

Net exposure [gap] = 8,200,000,000

*Duration of exposure = 10 days = $10 / 365 * 12 \text{ months} = 0.328767 \text{ months}$*

*Milli-month exposure = $8,200,000,000 / 1,000,000 * .328767 * 12 = 2,695.89$*

The positive and negative positions are offset against one another to give the net open risk position.

In this case the total risk being run within the bank would be shown as **minus** 128,732.877 "milli-months". In other words it was equivalent to CSOB having lent 128,732,877,000 for a period of 1 month.

Using this system CSOB would be able to readily establish the approximate detrimental affect to the profit and loss account which might result from a defined rate shock of [say] 100 basis points.

In this instance, if interest rates rose by 100 basis points the position would produce a loss of CZK 107,277,397 [i.e. $128,732,877,000 * 30/360 * 1/100$].

2.2. Milli-Quarters [Futures Contract Equivalents]

In the case of futures contract equivalents the risk position of a portfolio is expressed in terms of its equivalent amount in futures contracts with a maturity of 1/4 of a year. [e.g. If a deposit futures contract existed in CZK in an underlying amount of CZK 1,000,000 per contract, CZK 1,000,000 for a period of 12 months is equivalent to 4 futures contracts.]

Applied to the 14 June 1994 portfolio would result in a position of 42,910.959 futures contracts bought.

As before, CSOB would be able to readily establish the approximate detrimental affect to the profit and loss account which might result from a defined rate shock of [say] 100 basis points.

Once again, an interest rate rise of 100 basis points would produce a loss of CZK 107,277,397 [i.e. $42,910,959,000 * 90/360 * 1/100$].

2.3. Milli-Years [One Year Equivalents]

In the case of one year equivalents the risk position of a portfolio is expressed in terms of its equivalent amount in millions of currency units with a maturity of one year. [e.g. CZK 1,000,000 for a period of 6 months is equivalent to CZK 500,000 for a period of 1 year.]

The 14 June position would thus equate to **minus** CZK 10,727,739,700 "one year equivalents". In other words it was equivalent to CSOB having lent 10,727,739,700 for a period of 1 year.

Using this system, CSOB would be able to readily establish the approximate detrimental affect to the profit and loss account which might result from a defined rate shock of [say] 100 basis points.

In this instance, if interest rates rose by 100 basis points the position would produce a loss of CZK 107,277,397 [i.e. $10,727,739,700 * 360/360 * 1/100$].

NB

Whichever method chosen produces the same P/L impact to the exposure under the chosen interest rate scenario. However milli-month measurement for risk control purposes is available on IBIS - the others are not.

3. Approach of Inv

As the markets have more often to maturity process further. This in terms of the measure

- This result is then reported as the duration of that instrument expressed
- The portfolio duration is subsequently established as the aggregate of individual instruments.

it

- CF_t
- PZ_t

Consider a bond with a coupon of 8% which is trading at par.

Time t	Cash Flow CF _t	Zero Coup price PZ _t	Req Mkt Value CF _t * PZ _t	Weighted CF _t *PZ _t *t
1 year	8.00	0.925925925	7.4074	7.4074
2 years	8.00	0.857338820	6.8587	13.7174
3 years	8.00	0.793832241	6.3507	19.0520
4 years	8.00	0.735029852	5.8802	23.5210
5 years	108.00	0.680583197	73.5030	367.5149
Totals			100.0000	431.2127

$$\text{Duration} = \frac{431.2127}{100.0000} = 4.31 \text{ years}$$

The theory behind duration is that, any increase in market rates [and corresponding decrease in the bond's value] will be partially off-set by the re-investment of the coupon payments at higher rates. This effectively lowers the exposure from the actual maturity of 5 years, to a weighted average of 4.31 years.

This is what the duration of the bond just considered is indicating. There is, however another way of looking at duration. i.e. Modified Duration.

Modified duration is the percentage change in a bond's present value for a 100 basis point change in the discount rate [market yield]. It is calculated by discounting an instrument's duration by its yield to maturity [YTM].

For an instrument with an annual coupon:

$$\text{Modified duration} = \frac{\text{Duration [in years]}}{[1 + \text{YTM}\%]}$$

In the case of the example above, the modified duration will be 3.99 [= 4.31 / 1.08].

Modified duration indicates the percentage change in a bond's price for a 100 basis point change in yield. It can subsequently be used to determine what this means in real cash term.

However, 100 basis points represents a larger shift in interest rates than dealers typically consider. Therefore, they consider the cash profit or loss on an instrument for a single basis point [0.01%] movement. This is measured by Basis Point Value or BPV which some dealers call "the value of an 01", where "01" stands for 0.01%.

In the example above a 1% change in price produces a 3.99% change in price. A 0.01% fall in the yield to maturity will, therefore, produce an increase in price of \$100 * 3.99% / 100 = \$0.04. Thus, the bond's new price will be 100.04.

4. Advantages of Duration Analysis.

Whichever method of expressing risk as a risk equivalent is used it can help a risk manager in a number of ways.

- It enables the risk manager to quantify a perhaps very complex portfolio in terms of a single common denominator.
- It enables him to quantify to a reasonable extent what his potential cash at risk will be.
- It offers the risk manager a way in which he can construct more economic hedges for his portfolio by selecting these to take advantage of any value which exists in the yield curve.
- It can also be used for analysing balance sheets. [e.g. Asset / Liability managers can compute the duration of equity as one of the components of balance sheet management.]
- It can help overcome one of the weaknesses of Gap Analysis in that it readily shows the risk differences between different instrument types which share similar maturities.

For example instruments which have identical maturities but differing coupons will have different durations.

- It readily allows calculation of cash at risk for a given yield curve shift for the portfolio as a whole.
- It can be used to measure exposure in options.

$$\text{An options duration} = D_u \times (P \Delta o / P \Delta u) \times (P_u / P_o)$$

where:

D_u = Duration of underlying instrument.

$P \Delta o / P \Delta u$ = The price change of the option relative to the price change of the underlying instrument.

(P_u / P_o) = The price of the underlying instrument relative to the price of the option.

5. Disadvantages of Duration Analysis.

However, despite these benefits duration analysis falls short as a truly effective method for controlling risk in that:

- It remains a somewhat clumsy method which requires a fairly considerable degree of systems capability to calculate, particularly in the case of exposures which are measured in terms of zero coupon bonds.
- It tends to concentrate on adverse interest rate movements which take the form of a parallel shift in the yield curve.
- It tends to focus on a portfolio as a whole which can present problems where a portfolio is multi-product.

For example it may be appropriate to express the risk of a portfolio of bonds in terms of its duration, but is it necessarily appropriate to express the risk of a portfolio of long dated forward foreign exchange positions in terms of its duration? The results of such a portfolio can depend not only on the interest rate levels in both relevant currencies, but also on the spot exchange rate between them.

- It does not recognise basis risk.
- Duration analysis is not a static analysis. As interest rates change, so too will the duration of an instrument. This phenomenon is known as "duration drift" or "convexity". This drift occurs because prices and yields do not change linearly, but rather have varying rates of change.

Convexity is particularly important for portfolios which are anticipated to be duration neutral, since an imbalance may well result from a change in interest rate levels. As a result these will need to be dynamically managed, and steps taken to make any adjustments necessary to maintain balance.

6. Recommended Use of Duration Analysis in CSOB.

It is recommended that Duration Analysis is used as a controlling factor by enabling management to determine the duration of CSOB's equity

- Each month [say] the duration of the bank's equity [DE] expressed in years will be calculated by the following formula:

$$DE = DA - [DL * W]$$

where:

DA = Duration of Assets expressed in years

DL = Duration of Liabilities expressed in years

W = Total of Assets / Total of Liabilities

- Based on the result of this exercise management will decide whether, as a strategic exercise, Global Treasury should hedge all or part of the current risk exposure / take a strategic risk position.

7. Systems Implications.

There are significant systems implications in the introduction of Duration Analysis CSOB.

Valuta calculates the modified duration and basis point values for fixed interest securities, but there has been no evidence that this can be extended across all products.

In theory, if it was not currently available, this should not present a major problem. However, it would need to form part of the FEDS specification for CSOB's needs.

BEST AVAILABLE DOCUMENT

**Deloitte &
Touche**



**Ceskoslovenska Obchodni Banka AS
- Liability Management**

Clive Grumball

Praha - 10 November 1994

**Deloitte Touche
Tohmatsu
International**

1. Overview.

CSOB management recognises that effective management of the bank's liquidity risk is crucial and necessitates a prudential approach to both domestic and foreign currency liquidity needs. In particular it is conscious of the obligations placed on it by the Ceska Narodni Banka [CNB] as outlined in Article 3 of its Provision on Liquidity Rules pursuant to Article 15 of Act No 21/1992 of the Collection of Laws on Banks - to ensure " ... the diversification of funding sources from the viewpoint of maturity, banking instruments and clientele "

The bank is aware that a large percentage of its liabilities are drawn from the inter-bank market and is investigating alternative, more diversified, sources of funding. The domestic retail deposit market has been suggested as a target source of funding and CSOB is considering a strategy to aggressively market for such deposits with a view to reducing the level of funds it takes from the inter-bank markets.

In theory this strategy has considerable merits. It offers the potential to fund by straightforward deposit taking and/or the issuance of a range of banking instruments to a clientele that may not be quite so price sensitive as the wholesale markets.

However, there may be fundamental factors that exist within the current business profile of the bank that will have direct implications for the immediate viability of such a strategy. In particular it is essential that the strategy will not create liquidity risk.

For this reason, before it decides on a course of action, it is necessary for CSOB senior management to know:

- the nature and extent of any liquidity risk currently being carried by the bank;
- the nature and extent of an apparent concentration of funding from the inter-bank markets;
- the likely impact of a significant switch from inter-bank funding to retail funding;
- any other related issues;

2. The Purpose of this Paper.

This paper sets out the findings of an investigation to establish these four factors and makes a number of recommendations to management regarding the issues raised.

3. Findings.

3.1. The Nature and Extent of the Liquidity Risk Currently Being Carried by the Bank.

- Despite the recent domestic bond issue and international syndicated loan, CSOB is still carrying a liquidity risk which may extend to CZK 3.5 billion in the period

"Sight to 1 Month" This period is considered to be critical in any liquidity crisis.

- Of the alternatives considered to eliminate this liquidity risk, the cheapest and [possibly] easiest to implement is for CSOB to negotiate committed stand-by facilities in both CZK and convertible foreign currencies. It is also highly relevant to the way in which the liquidity risk is actually created within the bank
- The current inadequacies of the bank's reporting systems ensures that it is virtually impossible for management to identify, measure and control liquidity risk - or to direct its strategic efforts in this area.

3.2. The Nature and Extent of any Dependency on the Inter-bank Markets as a Funding Source.

- CSOB draws over 40% of its funding from the inter-bank markets - this might be regarded as being extensive. However, inter-bank funding accounts for nearly 70% of the bank's funding with a maturity exceeding three months but only 11% of funding with a maturity of less than one month.

3.3. The Likely Impact of a Significant Switch from Inter-bank Funding to Retail Funding.

- Analysis of the existing deposit base suggests that it will be extremely difficult to merely substitute retail deposits for inter-bank funding for comparable maturities.

For this reason if the bank pursues a strategy for no other reason than to switch from inter-bank to retail sources of funding it is probable that it will significantly increase the liquidity risk being carried.

To avoid creating liquidity risk any reduction in the level of inter-bank funding as a percentage of total funding must be matched by other funding with a maturity at least equal to that which it is replacing. Alternatively there must be either

- a) an appropriate reduction in the bank's balance sheet and corresponding reduction in inter-bank funding [NB - This alternative still requires an appropriate maturity structure of the residual liabilities]

or

- b) a significant increase in the balance sheet funded entirely from non-bank sources [NB - This alternative will require an appropriate matching of maturities of new assets and liabilities]

3.4. Other Related Issues.

- Retail deposits may in practice be a more expensive source of funding compared with wholesale deposits
- There are serious deficiencies in IBIS that render the effective management control of the **current** business virtually impossible to achieve. Any extension of a branch network to tap further retail business will serve only to exacerbate the present situation, particularly since this will almost certainly result in a substantial increase in deal volumes by virtue of the nature of retail business

4. Recommendations.

- The bank should take immediate action to eliminate the current liquidity risk.
- The bank should postpone any thoughts it has regarding aggressively marketing for retail deposits until
 - it has completed a full cost/benefit exercise
 - it has totally eliminated the current systems deficiencies
- In addition to further long term bond issues similar to the recent three year deal, the bank should consider issuing longer-term subordinated floating rate debt to non-bank domestic institutions in preference to a full scale effort to attract retail deposits.

Diversification of Funding.

1. Overview.

CSOB management recognises that effective management of the bank's liquidity risk is crucial and necessitates a prudential approach to both domestic and foreign currency liquidity needs. In particular it is conscious of the obligations placed on it by the Ceska Narodni Banka [CNB] as outlined in Article 3 of its Provision on Liquidity Rules pursuant to Article 15 of Act No 21/1992 of the Collection of Laws on Banks.

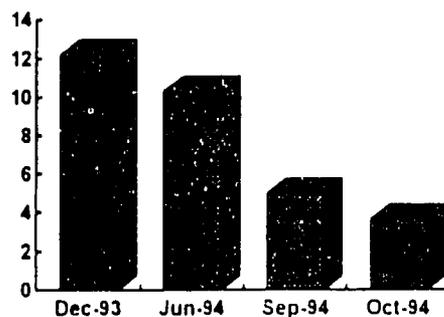
It is the policy of the bank to

- maintain an appropriate match of liabilities and assets carried by the bank
- obtain longer term funding
- reduce its reliance on the inter-bank market

Two notable successes have already been achieved in the area of longer term funding. In August the bank successfully raised CZK 6 billion by way of a bond issue. This was followed by the recent completion of a syndicated loan which raised USD 50 million. Both the bond issue and the syndicated loan were heavily over-subscribed which augers well for the future.

This issue and loan have resulted in a significant reduction in, but not the complete elimination of, the liquidity risk carried by the bank. This is discussed in para 3.1 below and demonstrated in Fig. 1.

Fig 1. Liquidity Risk - CZK billions



However, whilst the success of the bond issue and loan demonstrates that the bank should continue to be able to attract longer term funding, it may still face difficulties in meeting its objectives in full.

- The domestic money market is still relatively new and is dominated by one or two banks which control a large percentage of the deposit base. Indeed, 45% of the bond issue was subscribed for by domestic banks
- The bank has no rating from an international credit rating agency. This will adversely affect pricing and the ready availability of funds in the international markets, particularly if other Czech banks decide to follow CSOB's lead
- The bank's reporting systems do not provide reports which meet management's needs

2. Purpose of this Paper.

The purpose of this paper is to

- Identify the nature and extent of any liquidity risk being carried by CSOB
- Consider solutions to eliminate liquidity risk carried by the bank
- Identify the nature and extent of inter-bank funding
- Consider the viability of a strategy to aggressively market for domestic retail deposits compared to other sources of funding to ensure "the diversification of funding sources from the viewpoint of maturity, banking instruments and clientele ..." [Article 3 Para [b] CNB Provision on Liquidity Rules for Banks

Any other related issues will be discussed as they arise

3. Identification of the Nature and Extent of any Liquidity Risk being Carried by CSOB.

3.1. Assumptions Made.

3.1.1. Mitigating Factors Impacting The Bank's Current Funding Requirement.

There are two notable factors which may be affecting the bank's funding requirement

- Reported assets totalling some CZK 20 billion relate to the Collections Unit
- Reported assets totalling some CZK 12 billion relate to the Bank of Bohemia

It can be argued that these are temporary elements of the bank's balance sheet and, therefore, should be taken out of the liquidity equation. If this argument is accepted, then the percentage of inter-bank borrowing will drop to around 25% of total funding when these items mature on the assumption that inter-bank funding accounts for CZK 24 billion [= 75%] of the overall funding for these assets

However, for the purpose of this paper it is assumed that the bank will replace these assets since it is believed that the bank is not actively seeking to reduce its balance

sheet from present levels. For this reason, this paper assumes that the current funding associated with these assets will be regarded as an ongoing need.

3.1.2. Discrepancies Between Asset and Liability Amounts for Non-Convertible Foreign Currencies and CZK.

It should be noted that there is a significant discrepancy between asset and liability totals in the non-convertible foreign currency and CZK profiles respectively [Appendices C and D]. However for the purpose of this paper it is assumed that

- non-convertible foreign currency assets are being funded by CZK, either as provisions or as FX related activity

and that as a result

- the total liquidity shortfall is split almost equally between the domestic and convertible foreign currency elements of the balance sheet. The shortfall takes the form of committed stand-by facilities in the case of CZK and physical lending in the case of convertible foreign currency.

3.2. Measuring Liquidity Risk Carried by CSOB.

As stated in para 1 above, management faces a major problem which results from the current inadequacies of its reporting systems.

Unless this problem is resolved, it will be virtually impossible for management to identify the areas of need and, subsequently, to direct its strategic efforts to address these.

IBIS can produce a number of reports which relate to liquidity. However, a recent survey of reports showed that most of these are unusable as they are currently configured in CSOB. As a direct consequence of this, management has to rely solely on the liquidity report submitted **quarterly** to the CNB to assess the liquidity risk being carried by the bank. However, the information contained in the CNB report still needs to be re-formatted to produce a report which meets the bank's own specific liquidity risk management needs rather than those of the CNB - which has different priorities to CSOB.

Appendices A to D provide examples of the format required.

3.3. Analysis of the Liquidity Profiles per Appendices A to D.

Despite the recent bond issue and loan the liquidity risk currently being run by CSOB is still real, although it has been substantially reduced from the risk which existed at the end of June. Appendix A shows that at the end of September there was a visible risk [i.e. excluding stand-by facilities] of some CZK 2.2 billion - approx 1.4% of the reported totals. The syndicated loan will have reduced this to below CZK 1 billion.

However, in practice, the risk is somewhat greater since committed but undrawn stand-by facilities must also be included. Once these are taken into full account the risk probably still exceeds CZK 3.5 billion.

3.4. Strategies to eliminate reported liquidity mismatches for the time period "Sight to 1 Month".

Before contemplating any change in the balance of its funding sources, it is submitted that CSOB's first priority must be to ensure that it is fully liquid in both domestic and non-domestic currencies during the most critical period of any potential full scale liquidity crisis. This necessitates maintaining a "Cumulative Liquidity Gap" of zero in each of the categories "Sight to 1 Week" and "1 Week to 1 Month". The liquidity mismatches will be considered under two headings:

- Convertible Foreign Currency Borrowings
 - Where a visible liquidity mis-match is reported.
- Domestic Currency Borrowings [which includes non-convertible currency]
 - Where there is only a small net liquidity mis-match, but where it is assumed that committed stand-by facilities impact CSOB's liquidity profile.

3.4.1. Convertible Foreign Currency Borrowings.

Three possible options will be compared to eliminate the reported liquidity mismatch for the time period "Sight to 1 Month".

- To switch funding categories
- To increase the Balance Sheet
- To obtain a stand-by facility

3.4.1.1. Switch Funding Categories.

The first option to be considered is to persuade lenders of demand, 2 day notice, 7 day notice, and 1 month notice funds to extend and maintain the maturity of their money to [say] 40 days notice [i.e. such that it is always outside the 1 month date].

This will have the following cost implications:

Following the syndicated loan the amount which needs to be switched is approximately CZK 0.75 billion equivalent.

Assume

- Current Cost to borrow these funds "on demand" 2.00%
- Estimated Cost to borrow these funds on "40 days notice" 5.00%

Diversification of Funding

Bottom line impact = CZK 0.75 bn * 3% per annum

Bottom line impact = CZK 22,500,000

LESS savings achieved by a reduction in the level of mandatory reserves the bank is required to maintain with the CNB

Assume funding of reserves = 8.00% per annum.

Savings = CZK 0.75 bn * [12% - 4%] * 8%

Savings = CZK 4,800,000

Total bottom line impact = CZK 22,500,000 - CZK 4,800,000

Total bottom line impact = CZK 17,700,000.

3.4.1.2. Increase the Balance Sheet.

Another option available is borrow longer term funds [preferably as capital or quasi capital - e.g. subordinated debt] and buy high quality liquid assets. To avoid incurring interest rate risk the assets acquired would match the interest rate period of the liability taken. The liability would be recorded at maturity whilst the asset would be recorded at "Sight" [subject to any relevant discount].

The amount which needs to be borrowed and invested is approximately CZK 0.75 billion equivalent.

Assume:

- Estimated Cost to borrow these funds. PRIBOR + 75 bp
- Estimated Return from on-lending these funds. PRIBOR - 10 bp

The estimated cost above is based on the pricing of the recent syndicated loan.

Bottom line impact = CZK 0.75 bn * 0.85% per annum

Bottom line impact = CZK 6,375,000

PLUS cost to maintain a higher level of mandatory reserves that the bank is required to maintain with CNB.

Assume funding of reserves = 8.00% per annum.

Cost = CZK 0.75 bn * 4% * 8%

Cost = CZK 2,400,000

Total bottom line impact = CZK 6,375,000 + CZK 2,400,000

Total bottom line impact = CZK 8,775,000.

3.4.1.3. Obtain a Committed Stand-by Facility.

Assume.

- Amount required CZK 0.75 billion.
- Fee payable 40 basis points per annum.

Bottom line impact = CZK 0.75 billion * 0.40%

Bottom line impact = CZK 3,000,000.

3.4.1.4. Summary Comparison of Estimated Cost to Correct Mis-match.

Switch Maturities.	CZK 17,700,000
Increase Balance Sheet	CZK 8,775,000
Obtain Stand-by	CZK 3,000,000

3.4.2. CZK and Non-Convertible Foreign Currency Borrowings.

As with convertible foreign currencies three possible options will be compared to eliminate the reported liquidity mismatch for the time period "Sight to 1 Month":

- To switch funding categories.
- To increase the Balance Sheet.
- To obtain a stand-by facility.

3.4.2.1. Switch Funding Categories.

The amount that would need to be switched is approximately CZK 3.0 billion equivalent.

Assume:

- Current Cost to borrow these funds "on demand". 2.00%
- Estimated Cost to borrow these funds on "40 days notice" 8.00%

Bottom line impact = CZK 3.0 bn * 6% per annum

Bottom line impact = CZK 180,000,000

LESS savings achieved by a reduction in the level of mandatory reserves the bank is required to maintain with the CNB.

Assume funding of reserves = 8.00% per annum.

Savings = CZK 3.0 bn * [12% - 4%] * 8%

Diversification of Funding

Savings = CZK 19,200,000

Total bottom line impact = CZK 180,000,000 - CZK 19,200,000

Total bottom line impact = CZK 160,800,000.

3.4.2.2. Increase the Balance Sheet.

As before, another option available is borrow longer term funds [preferably as capital or quasi capital - e.g. subordinated debt] and buy high quality liquid assets. To avoid incurring interest rate risk the assets acquired would match the interest rate period of the liability taken. The liability would be recorded at maturity whilst the asset would be recorded at "Sight" [subject to any relevant discount].

The amount which needs to be borrowed and invested is approximately CZK 3.0 billion equivalent.

Assume:

- Estimated Cost to borrow these funds. PRIBOR + 75 bp
- Estimated Return from on-lending these funds. PRIBOR - 10 bp

For the purpose of this exercise the above cost of funds is based on the terms of the syndicated loan, albeit this was made in USD.

Bottom line impact = CZK 3.0 bn * 0.85% per annum

Bottom line impact = CZK 25,500,000

PLUS cost to maintain a higher level of mandatory reserves that the bank is required to maintain with CNB.

Assume funding of reserves = 8.00% per annum.

Cost = CZK 3.0 bn * 4% * 8%

Cost = CZK 9,600,000

Total bottom line impact = CZK 25,500,000 + CZK 9,600,000

Total bottom line impact = CZK 35,100,000.

3.4.2.3. Obtain a Committed Stand-by Facility.

Assume.

- Amount required CZK 3.0 billion.
- Fee payable 40 basis points per annum.

Bottom line impact = CZK 3.0 billion * 0.40%

Bottom line impact = CZK 12,000,000.

3.4.2.4. Summary Comparison of Estimated Cost to Correct Mis-match.

Switch Maturities.	CZK 160,800,000
Increase Balance Sheet	CZK 35,100,000
Obtain Stand-by	CZK 12,000,000

3.4.3. Summary Comparison of Estimated Cost to Correct all Mis-matches by Using Each of the Three Methods Demonstrated.

Switch Maturities.	CZK 178,500,000
Increase the Balance Sheet	CZK 43,875,000
Obtain a Stand-by	CZK 15,000,000

4. Identification of the Nature and Extent of any Dependency on the Inter-Bank Market.

4.1. Liability Analysis per Appendices A to D.

The analysis of the consolidated profile [Appendix A] confirms that CSOB has a significant dependency on the interbank market for its funding [approx. 43%]. It also indicates that this level is consistent across the various elements of the consolidated funding base.

However, the analysis also indicates that inter-bank borrowing provides the only real source of funding for maturities greater than 1 month.

- Inter-bank funding accounts for nearly 70% of the bank's funding with a maturity exceeding three months but only 11% of funding with a maturity of less than one month.**

This is further borne out by the bond issue where 45% of the issue was subscribed for by banks, whilst the loan was provided in its entirety by banks. Thus it would seem that if CSOB management carries through with its policy to reduce the level of inter-bank funding dependency it may well create a far more serious problem for the bank as a whole.

This problem will arise because, unless replacement funding has comparable maturities, the bank will simply exacerbate any liquidity risk in the shorter maturity liquidity profile categories.

5. To develop a strategy to diversify the Bank's funding sources which takes full account of all the related issues.

Once it has eliminated the liquidity risk outlined in para 3.3 above, CSOB must consider the implications of a switch away from inter-bank funding to other sources

5.1. Options.

Two options will be considered:

- Maintain Balance Sheet Footings and Switch Funding Sources.
- Increase the Balance Sheet Footings.

5.1.1 Maintain Balance Sheet Footings and Switch Funding Sources.

Assume target inter-bank dependency = 25% maximum.

Let y be the amount needed to switch from inter-bank to other funding to achieve the required target dependency of 25%

Given

- Level of inter-bank funding [30 Sep] CZK 46,801.00 million
- Total funding [30 Sep] CZK 108,026.85 million

$$\frac{46,801.00 - y}{108,026.85} = \frac{25}{100}$$

$$4,680,100 - 100y = 2,700,671.25$$

$$100y = 1,979,428.75$$

$$y = \text{CZK } 19,794.29 \text{ million}$$

- It will be necessary to switch approx. CZK 19.8 billion from inter-bank to other funding to achieve a reduction in the percentage share of interbank funding from 43% to 25%. Additionally, the maturity of the replacement monies must at least match the maturity of the original funding.

5.1.1.1. Cost implications.

In theory these will be zero since the exercise merely represents a change of lender.

5.1.2. Increase the Balance Sheet Footings.

Let y be the additional amount of "other" funding that will need to be borrowed to achieve the required target dependency of 25%.

Given that as at 30 Sep:

Diversification of Funding

- Level of inter-bank funding CZK 46,801.00 million
- Total funding CZK 108,026.85 million

$$\begin{array}{rcl} 46,801.00 & = & 25 \\ \hline 108,026.85 + y & & 100 \\ 4,680,100 & = & 2,700,671.25 + 25y \\ 25y & = & 1,979,428.75 \\ y & = & \text{CZK } 79,177.15 \text{ million} \end{array}$$

- ☐ It will be necessary to borrow approx. CZK 79 billion from non-inter-bank sources to achieve a reduction in the percentage share of interbank funding from 43% to 25%. This represents an increase of more than 50% in the bank's balance sheet footings.

5.1.2.1. Cost Implications.

In theory this exercise will have no direct cost implications since it is assumed that the money raised will be utilised in profitable on-lending. However, the maturities of on-lending would need to mirror that of the liabilities and clearly there are significant capital implications for the bank in pursuing this option.

Pursuing this option must be regarded as a long-term exercise and one which would need to be carefully analysed

6. Strategies to Achieve Objective to Reduce Dependency on the Inter-bank Markets.

There are three possible strategies available to CSOB:

- Tap the Domestic Retail Market.
- Tap the Domestic Wholesale Market.
- Tap the International Market

6.1. Tapping the Domestic Retail Market.

Theoretically, this option provides the best option from a cost basis point of view. However, before going on to discuss this option, consider the following "think point"

THINK POINT.

It is calculated that it costs 150 units to process each deal ticket.

Would you prefer to deal:

- **100 times to borrow 1 million units for a period of 1 day at 2.00%**
- or
- **Once only to borrow 100 million units for a period of 1 day at 7.30%?**

The theory is that a branch network can be created which collects a vast pool of free or near free deposits from the public at large by way of current accounts or similar. The practical realities are demonstrated by the Think Point

- To borrow 100 million units at 2% by way of 100 transactions results in a repayment of principal plus interest after one day of:

$$100,000,000 * [1 + 2 / 100 * 1 / 365] = 100,005,479.45$$

The cost to process is:

$$100 * 150 = 15,000 \text{ units.}$$

$$\text{Total Cost of Deposit Exercise} = 100,005,479.45 + 15,000$$

$$\text{Total Cost of Deposit Exercise} = 100,020,479.45$$

- To borrow 100 million units at 7.3% by way of 1 transaction results in a repayment of principal plus interest after one day of:

$$100,000,000 * [1 + 7.3 / 100 * 1 / 365] = 100,020,000.00$$

The cost to process is:

$$1 * 150 = 150 \text{ units.}$$

$$\text{Total Cost of Deposit Exercise} = 100,020,000 + 150$$

$$\text{Total Cost of Deposit Exercise} = 100,020,150.00$$

Diversification of Funding

Clearly the Wholesale borrowing in this simple example is cheaper in real terms than the Retail borrowing - despite the 5.30% difference in the interest rate paid

This example is intended to show that, often, retail deposits may not be as "cheap" in reality as they appear at first instance. It is important, therefore, that CSOB is fully aware of the likely true cost of acquiring a retail deposit base before actively pursuing one.

The processing costs used in the example were not taken from "thin air" They are based on the findings of detailed surveys known to have been carried out in four UK banks. These showed that the average cost of processing deals ranged between \$150 and \$200 per transaction. Whilst it is accepted that current labour processing costs may be lower in the Czech Republic than in the UK, it is possible that the average amounts available on individual retail accounts will also be somewhat lower

For example, an IBIS report which was investigated recently contained 3,219 pages of data. Each page contained approx. 66 account balances but few of these exceeded CZK 25,000 in amount. This is borne out by an analysis of the number of non-bank accounts maintained in CSOB.

At the end of September there were 224,887 non-bank accounts maintained at the bank. These amounted to a total amount of CZK 51.2 billion [i.e. an average balance of CZK 227,700 approx.] and accounted for approximately 47% of deposits taken.

Based on this information it is possible to carry out a very basic cost analysis as follows:

If it is assumed that 47%

- of the bank's workforce and related costs [salaries and employees benefits]

and

- of general operating costs

are apportioned to this business then:

- Average number of employees utilised	=	1,488
- Average number of accounts per employee	=	151
- Average balance "allocated" per employee	=	CZK 34.4 million
- Average salary and operating costs per employee	=	CZK 628,950

Therefore.

- ☐ **Average margin required to support each employee = 1.82% [Assuming no credit write-offs.]**

If it is assumed that there are an average of 50 movements across each account each year then the average cost per account move can be estimated as follows

$$\text{Average cost} = \text{CZK } [1,488 * 628,950] / [224,887 * 50]$$

□ **Average cost = CZK 83**

However, given an inflation rate of 12.5%, costs double in 7 years: income may not. Arguably, this could easily lead to costs not dissimilar to those discussed in the Think Point - 150 units per deal.

6.1.1. Control.

A significant retail deposit base has other implications which must also be addressed, not the least of which is how the bank proposes to control this business

There are serious deficiencies in IBIS which render the effective management control of the **current** business virtually impossible to achieve. As a result the bank is undoubtedly carrying significant risks in all forms that could have a material impact on its profitability. Any extension of the branch network to tap further retail business, or the increase in deal volumes which will surely result by virtue of the nature of retail business, will serve only to exacerbate the present situation.

6.1.2. Entering a "Non-natural" Market.

One of the potential problems to be faced by the bank if it expands into retail banking is that this is not a natural business of the bank - the great strength of the bank is its expertise in the wholesale markets of trade finance and foreign exchange. Arguably, therefore the bank should consider exploiting the retail market from the point of view of its strengths rather than to create something whose purpose [i.e. diversification of funding] might be better served by other means.

For example, perhaps one way of building a form of retail deposit base might be to use the Cekobanka-Chequepoint network as a means to distribute CSOB Travellers Cheques, particularly with the advent of a freely convertible Crown. CSOB would have the use of the proceeds of sales of travellers cheques until they were cashed. In addition it would earn commission and a dealing spread on each transaction.

NB - American Express boasts a huge float of free funds from this type of business - a large part of which is never reclaimed for a variety of reasons - together with a vast amount of highly profitable foreign exchange activity.

6.2. Tapping the Domestic Wholesale Market.

One of the problems to be faced by CSOB in tapping retail deposits is to persuade sufficient depositors to place their money for longer maturities. Experience suggests that this will never be easy unless virtually all the cost "benefit" which may be associated with these deposits is foregone. Perhaps, therefore, the better option is to

continue to access the domestic wholesale market rather than the domestic retail market.

CSOB has recently tapped longer-term domestic funds with the issue of CZK 6 billion of bonds in August. In so doing it was able to attract funds at 11.125% for 3 years fixed [cf with 13.75% approx which it is currently paying for somewhat smaller amounts]. The bank might also consider issuing sub-ordinated debt to the domestic pension funds, life assurance companies, etc. Issues in this form funds raised would count as Tier 2 capital [up to 50% of which would count as core capital] and any interest rate risk would be more or less neutralised.

There may well be cost implications resulting from raising sub-ordinated debt since potential holders may well want a rate premium for providing a form of capital, particularly if it in any way affects their own capital adequacy ratios. In practice, however, this cost should be set against the ability to "gear up" on the funds raised.

6.2.1. Control.

Whilst the systems deficiencies already mentioned may still exist, there may not be the same control implications for this activity, provided it is centred and monitored in Praha.

6.3. Tapping the International Wholesale Market.

It was seen in para 3.4.1 above that despite the recent success in the international syndicated loans market CSOB still has a need to increase its longer maturity convertible foreign currency borrowings, in the absence of obtaining a stand-by facility, if it is to become fully liquid in the category "Sight to 1 Month". The amount required to achieve this is CZK 0.75 billion equivalent approx.

It is to be hoped that the bank's reputation and the high regard with which the Czech Republic itself is held will combine to ensure that the international wholesale markets will continue to be an important source of new funding.

In this respect it will obviously help if CSOB ultimately obtains a credit rating from one of the international rating agencies. Apart from anything else this should help to reduce the cost of acquiring long-term funding and/or increase its availability.

In the meantime the bank might consider an expansion of its branch network in the international wholesale, rather than domestic retail markets. In so doing it will be able to capitalise on its strengths and the international relationships it has developed over the years. At the very least it might consider branches in Frankfurt and London.

6.3.1. Control.

6.3.1.1. Funding from Praha.

Whilst the systems deficiencies already mentioned may still exist, there may not be the same control implications for this activity, provided it is centred and monitored in Praha.

6.3.1.2. Expanding the CSOB Branch Network Internationally.

As will be the case in the event of an expansion by the bank into significant domestic retail banking activity, there is the very real issue of how the bank proposes to control an international branch network

Management will still need to address the current deficiencies in the bank's reporting systems and operating procedures which render the effective management control of the current business virtually impossible to achieve before implementing a strategy to create an international branch network to access the international wholesale deposit markets.

APPENDIX A.

Analysis of the Consolidated Liquidity Profile.

U300 E1000

1. Data Source.

The data contained in each table is taken from *Report 1) - Consolidated CZK - Foreign Convertible Currencies - Foreign Non-Convertible Currencies - Prehled Sketenecne [Zhytkove] Splatnosti Aktiv a Pasiv ke dni 30 Zari 1994* submitted to CNB

Fig 1 - Analysis of Assets.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified	Classified Assets
Cash	4,571.00						
Central Banks	3,715.20						
Treasury Bills	9,930.00						
Banks	11,468.00	1,295.60	10993.00	1,701.40	2,830.50		
Clients	249.20	3,765.80	2,909.60	543.40	37,709.40	2,660.30	38,260.20
Securities	7,299.72				568.28	1,922.70	
Other Assets						6,115.40	
Part'ptions						2,023.50	
Fixed Assets						2,294.30	

"Liquid" securities [e.g. T-Bills] have been allocated to the category "Sight to 1 Week" in accordance with the proposal in the paper *"Risk Management and the Control of Risk in Ceskoslovenska Obchodni Banka AS - Section 4 - Liquidity Risk"* submitted to the management of CSOB

Fig 2 - Analysis of Liabilities.

BEST AVAILABLE DOCUMENT

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified
Central Banks	34.70	53.90	140.30	61.70		396.10
Banks	3,946.90	1,164.40	5,631.40	5,604.00	30,454.30	
Clients	31,975.90	6,649.20	5,349.10	1,929.60	5,171.20	107.10
Securities Issued	176.00	469.35	154.60	40.20	8,192.50	324.40
Capital						5,105.00
Others						39,694.80

Fig 3 - Liquidity Profile.**BEST AVAILABLE DOCUMENT**

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months
Assets Maturing	37,233.12	5,061.40	13,902.60	2,244.80	94,384.58
Liabilities Maturing	36,133.50	8,336.85	11,275.40	7,635.50	89,445.40
Cumulative Assets Mat	37,233.12	42,294.52	56,197.12	58,441.92	152,826.50
Cumulative Liabs Mat	36,133.50	44,470.35	55,745.75	63,381.10	152,826.50
Cumulative Gap	1,099.62	(2,175.83)	451.37	(4,939.18)	0
Ratio of cum Ass/Liabs	103%	95%	101%	92%	100%
Limit	100%	100%	60%	60%	N/A
Excess	0	2,175.83	0	0	0

This Liquidity Profile report shown is broadly similar to that which would be needed to implement the proposed liquidity limit structure for CSOB, which is in the process of being submitted to ALCO

3.2. Analysis of Liquidity Risk.

It is clear from the above Liquidity Profile [Fig 3] that CSOB is exposed in the category "1 Week to 1 Month" - **which is a critical periods for any possible liquidity squeeze** - to the extent of CZK 2.20 billion approximately

This represents around 1.4% of the bank's total footings.

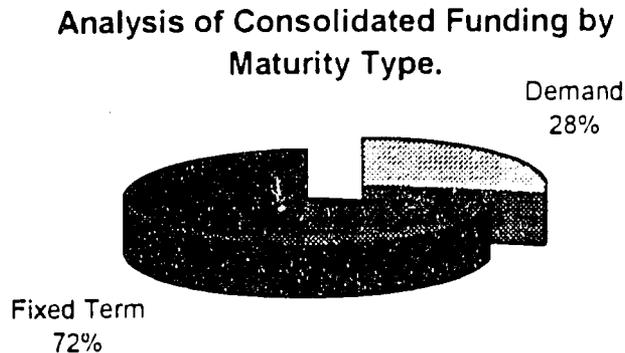
However, this risk is further compounded since the bank has granted committed - but as yet undrawn - facilities to customers [CZK 2.8 billion at 31 December 1993]. Thus the total risk to the bank during the critical period of any possible liquidity squeeze is likely to be around CZK 5 billion.

3.2. Analysis of Liabilities.

3.2.1. Analysis of Liabilities by Maturity Type

The following chart illustrates the breakdown of the reported liabilities - excluding those under the category "Others" and the bank's capital.

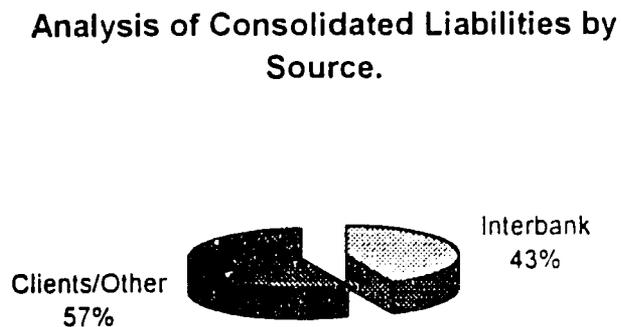
Fig 4.



3.2.1. Analysis of Liabilities by Source.

The following chart illustrates the breakdown of the reported liabilities excluding those under the category "Others" and the bank's capital.

Fig 5.



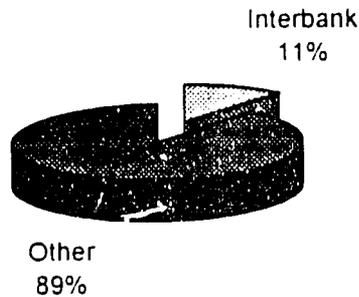
It is clear that CSOB has a heavy reliance on inter-bank funding [CZK 46.8 billion out of total borrowings CZK 108 billion].

3.2.2. Analysis of Liabilities by Source by Maturity Type.

The following two charts illustrate the concentration of funding source by maturity type.

Fig 6.

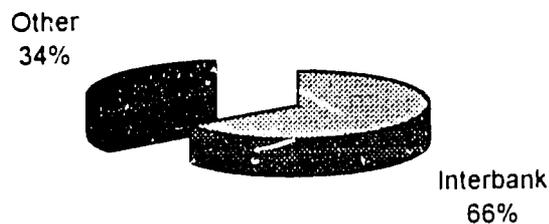
Analysis of Liabilities by Source: < 1 Mth



It should be noted that of the total of client funding repayable within 7 days [CZK 32.0 billion] approximately 90% appears to be "on demand".

Fig 7.

Analysis of Liabilities by Source: > 1 Mth



From these charts it would appear that interbank funding is the only real source of longer maturity borrowing.

Interbank borrowing accounts for CZK 41.7 billion out of a total of CZK 63.6 billion with a maturity > 1 month. In particular, it accounts for CZK 36.1 billion out of total borrowings of CZK 52.3 billion with a maturity longer than 3 months

3.2.3. Analysis of Source by Maturity.

The following two charts illustrate the spread of funding source by maturity

Fig 8.

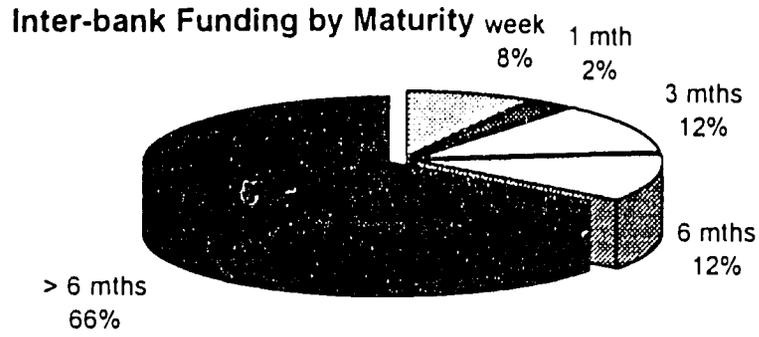
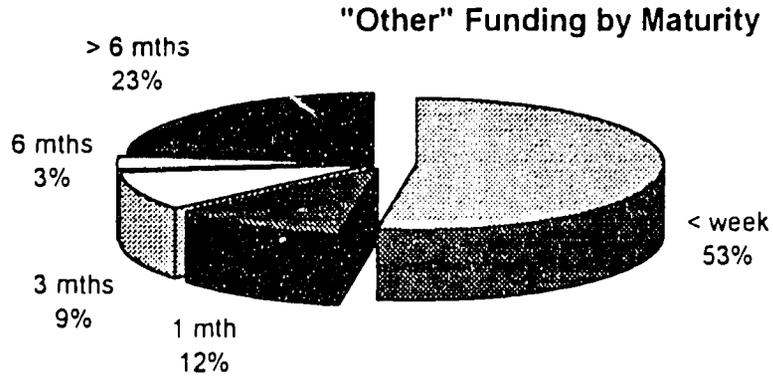


Fig 9.



APPENDIX B.

Convertible Foreign Currency Liquidity Profile.

FINANCIAL STATEMENTS

1. Data Source.

The data contained in each table is taken from *Report D - Consolidated CZK - Foreign Convertible Currencies - Foreign Non-Convertible Currencies - Prehled Sketencne [Zhytkove] Splatnosti Aktiv a Pasiv ke dni 30 Zari 1994* submitted to CNB

Fig 1 - Analysis of Assets in Convertible Foreign Currencies.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified	Classified Assets
Cash	2,794.60						
Banks	7,755.30	365.60	575.30	0	1,532.10		
Clients	245.30	1,812.70	2,409.00	214.90	5,037.00	242.50	11,118.80
Securities	1,308.50				145.40	565.40	
Other Assets						1,497.30	
Part'ptions						297.60	

"Liquid" securities [e.g. T-Bills] have been allocated to the category "Sight to 1 Week" in accordance with the proposal in the paper *"Risk Management and the Control of Risk in Ceskoslovenska Obchodni Banka AS - Section 4 - Liquidity Risk"* submitted to the management of CSOB

Fig 2 - Analysis of Liabilities in Convertible Foreign Currencies.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified
Central Banks	11.50					
Banks	1,955.20	264.50	1,025.50	1,254.00	12,493.20	
Clients	9,964.90	4,056.70	1,950.00	711.80	629.40	24.70
Securities Issued	68.00	0	0	0	78.60	0
Others						4,245.30

BEST AVAILABLE DOCUMENT

Fig 3 - Liquidity Profile for Convertible Foreign Currencies.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months
Assets Maturing	12,103.90	2,178.30	2,984.30	214.90	20,436.10
Liabilities Maturing	11,999.60	4,321.20	2,975.50	1,965.80	17,471.20
Cumulative Assets Mat	12,103.90	14,282.20	17,266.50	17,481.40	37,917.50
Cumulative Liabs Mat	11,999.60	16,320.80	19,296.30	21,262.10	38,733.30
Cumulative Gap	104.30	(2,038.60)	(2,029.80)	(3,780.70)	(815.80)
Ratio of cum Asx/Liabs	101%	88%	89%	82	98%
Limit	100%	100%	60%	60%	N/A
Excess	0	2,038.60	0	0	0

BEST AVAILABLE DOCUMENT

This Liquidity Profile report shown is broadly similar to that which would be needed to implement the proposed liquidity limit structure for CSOB, which is in the process of being submitted to ALCO

2. Analysis of Liquidity Risk.

It is clear from the above Liquidity Profile that CSOB is exposed in the category "1 Week to 1 Month" - **which is a critical period for any possible liquidity squeeze** - extending to CZK 2.00 billion approximately.

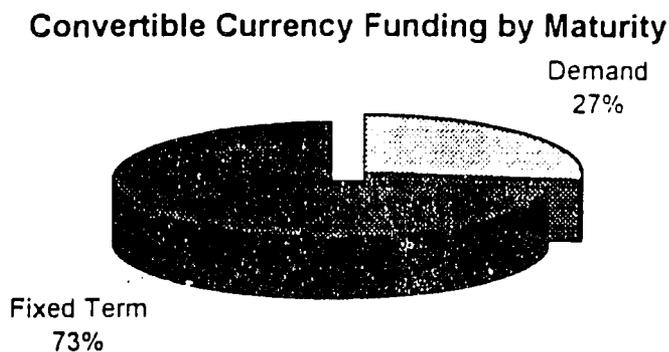
This represents around 5% of the bank's footings in convertible foreign currencies and, as such, represents a significant risk in this category

3. Analysis of Liabilities.

3.1. Analysis of Liabilities by Maturity Type

The following chart illustrates the breakdown of the reported liabilities - excluding those under the category "Others" and the bank's capital.

Fig 4.



3.2.1. Analysis of Liabilities by Source.

The following chart illustrates the breakdown of the reported liabilities excluding those under the category "Others" and the bank's capital.

Fig 5.

Convertible Currency Funding by Source.



It is clear that CSOB has a heavy reliance on inter-bank funding [CZK 17.0 billion out of total borrowings CZK 34.5 billion]

3.2.2. Analysis of Liabilities by Source by Maturity Type.

The following two charts illustrate the concentration of funding source by maturity type.

Fig 6.

Analysis of Liabilities by Source: < 1 Mth

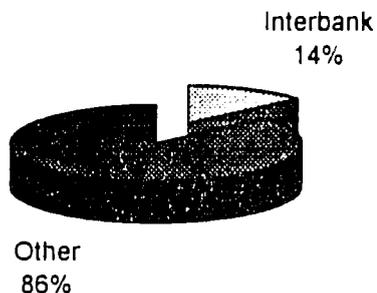
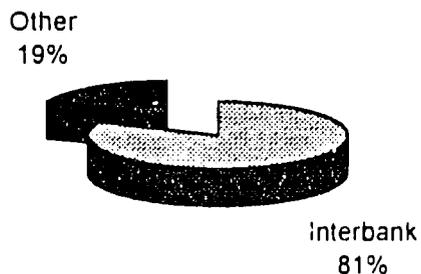


Fig 7.

Analysis of Liabilities by Source: > 1 Mth



From these charts, it would appear that interbank funding is the only real source of longer maturity borrowing. In particular it accounts for CZK 13.75 billion out of total borrowings of CZK 15.2 billion with a maturity longer than 3 months- i.e. more than 90% of this category.

By comparison of the total of client monies taken [CZK 17.5 billion], more than 80% is repayable within 1 month [CZK 14.1 billion].

3.2.3. Analysis of Source by Maturity.

The following two charts illustrate the spread of funding source by maturity

Fig 8.

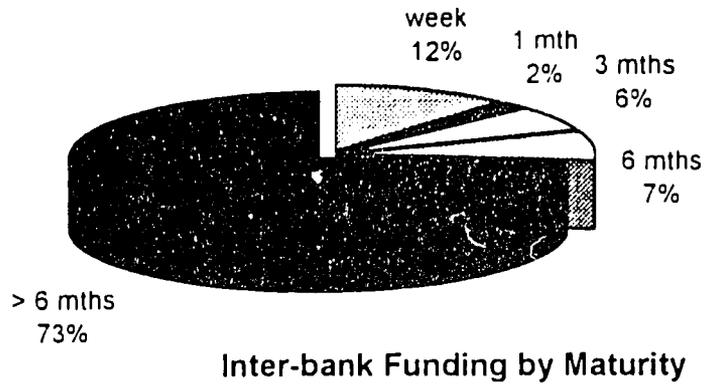
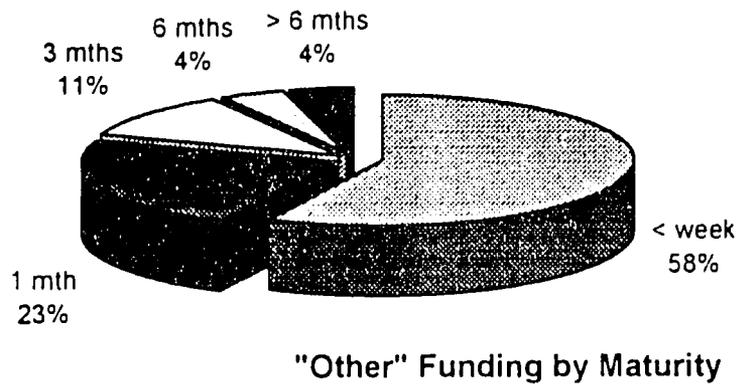


Fig 9.



APPENDIX C.

Analysis of the Non-Convertible Foreign Currency Liquidity Profile.

BEST AVAILABLE DOCUMENT

1. Data Source.

The data contained in each table is taken from *Report D - Consolidated CZK - Foreign Convertible Currencies - Foreign Non-Convertible Currencies - Přehled Skutené [Zbytkové] Splatnosti Aktiv a Pasiv ke dni 30 Zari 1994* submitted to CNB

Fig 1 - Analysis of Assets in Non-Convertible Foreign Currencies.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified	Unclass
Cash	155.00						
Central Banks	28.50						
Banks	17.30				617.20		
Clients	0	944.10	291.00	160.10	7,839.50	919.10	2,228.20
Securities	1,839.15				204.35	63.70	
Other Assets						592.10	
Participations						2.50	
Fixed Assets						131.50	

"Liquid" securities [e.g. T-Bills] have been allocated to the category "Sight to 1 Week" in accordance with the proposal in the paper *"Risk Management and the Control of Risk in Československá Obchodní Banka AS - Section 4 - Liquidity Risk"* submitted to the management of CSOB

Fig 2- Analysis of Liabilities in Non-Convertible Foreign Currencies.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified
Central Banks	9.20	51.10	113.60	50.00		
Banks	634.70	85.30	255.90	0	3,194.10	
Clients	3,955.90	560.30	257.30	36.10	42.50	17.00
Securities Issued		0.05	137.00	0.90	167.70	
Others						990.90

Fig 3 - Liquidity Profile for Non-Convertible Foreign Currencies.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months
Assets Maturing	2,039.95	944.10	291.00	160.10	12,598.85
Liabilities Maturing	4,599.80	696.75	763.80	87.00	4,412.20
Cumulative Assets Mat	2,039.95	2,984.05	3,275.05	3,435.15	16,034.00
Cumulative Liabs Mat	4,599.80	5,296.55	6,060.35	6,147.35	10,559.55
Cumulative Gap	(2,559.85)	(2,312.50)	(2,785.30)	(2,712.20)	5,474.45
Ratio of cum Ass/Liabs	44%	56%	54%	56%	152%
Limit	100%	100%	60%	60%	N/A
Excess	2,559.85	2,312.50	361.16	253.26	0

BEST AVAILABLE DOCUMENT

This Liquidity Profile report shown is broadly similar to that which would be needed to implement the proposed liquidity limit structure for CSOB, which is in the process of being submitted to ALCO.

2. Analysis of Liquidity Risk.

It is clear from the above Liquidity Profile that CSOB is exposed in all categories, and in particular in the categories "Sight to 1 Week" and "1 Week to 1 Month" - **which are the critical periods for any possible liquidity squeeze** - extending to CZK 2.60 billion approximately.

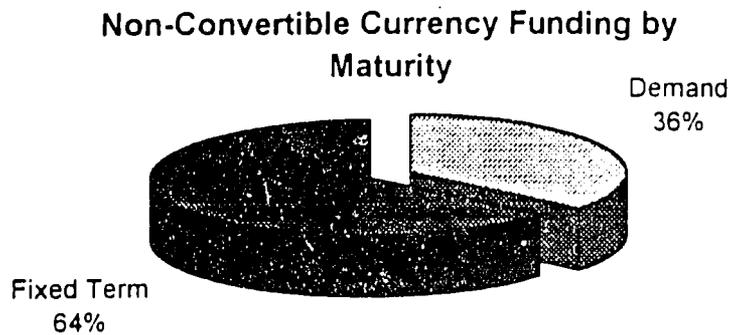
This represents around 16% of the bank's footings in non-convertible foreign currencies and, as such, represents a significant risk in this category.

3. Analysis of Liabilities.

3.1. Analysis of Liabilities by Maturity Type

The following chart illustrates the breakdown of the reported liabilities - excluding those under the category "Others" and the bank's capital.

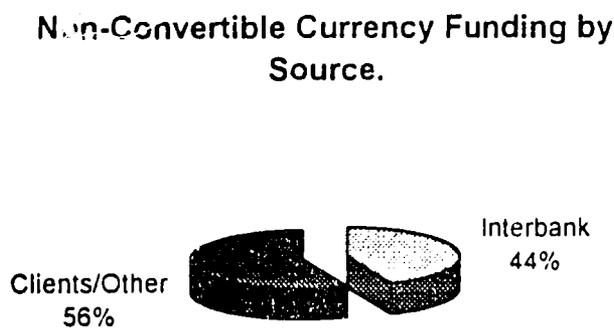
Fig 4.



3.2.1. Analysis of Liabilities by Source.

The following chart illustrates the breakdown of the reported liabilities excluding those under the category "Others" and the bank's capital.

Fig 5.



It is clear that CSOB has a heavy reliance on inter-bank funding [CZK 4.2 billion out of total borrowings CZK 9.6 billion]

3.2.2. Analysis of Liabilities by Source by Maturity Type.

The following two charts illustrate the concentration of funding source by maturity type.

Fig 6.

Analysis of Liabilities by Source: < 1 Mth

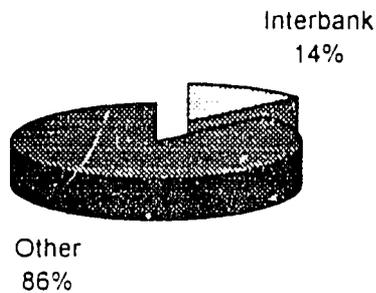
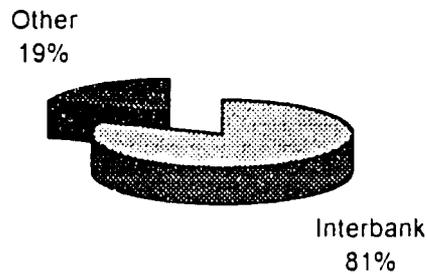


Fig 7.

Analysis of Liabilities by Source: > 1 Mth



From these charts, it would appear that interbank funding is the only real source of longer maturity borrowing. In particular accounts for CZK 3.2 billion out of total borrowings of CZK 3.5 billion with a maturity longer than 3 months- approx 90% of this category.

3.2.3. Analysis of Source by Maturity.

The following two charts illustrate the spread of funding source by maturity.

126

Fig 8.

Inter-bank Funding by Maturity

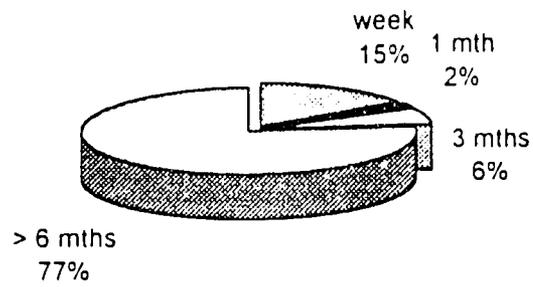
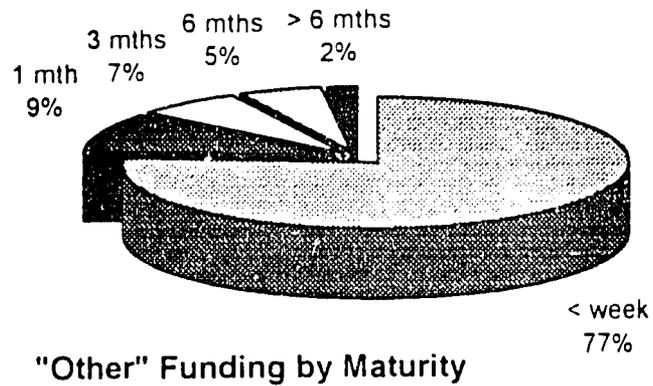


Fig 9.



157

APPENDIX D.

Analysis of the CZK Liquidity Profile.

1. Data Source.

The data contained in each table is taken from *Report D - Consolidated CZK - Foreign Convertible Currencies - Foreign Non-Convertible Currencies - Prehled Sketencne [Zbytkove] Splatnosti Aktiv a Pasiv ke dnu 30 Zari 1994* submitted to CNB

Fig 1 - Analysis of Assets in CZK.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified	Classified
Cash	1,021.40						
Central Banks	3,686.70						
Treasury Bills	9,930.00						
Banks	3,695.40	930.00	10,417.70	1,701.40	680.90		24,913.20
Clients	3.70	1,009.00	209.60	168.40	24,832.50	1,498.70	0
Securities	4,152.07				218.53	1,293.60	0
Other Assets						4,026.00	
Participations						1,723.40	
Fixed Assets						2,162.80	

"Liquid" securities [e.g. T-Bills] have been allocated to the category "Sight to 1 Week" in accordance with the proposal in the paper *"Risk Management and the Control of Risk in Ceskoslovenska Obchodni Banka AS - Section 4 - Liquidity Risk"* submitted to the management of CSOB.

Fig 2 - Analysis of Liabilities in CZK.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months	Unspecified
Central Banks	14.00	2.80	26.70	11.70	0	396.10
Banks	1,357.00	814.60	4,350.00	4,350.00	14,767.00	
Clients	18,055.10	2,032.20	3,141.80	1,181.70	4,499.30	65.40
Securities Issued	108.00	469.30	17.60	39.30	7,946.20	324.10
Capital						5,105.00
Others						34,458.60

BEST AVAILABLE DOCUMENT

Fig 3 - CZK Liquidity Profile.

Category	Sight to 1 week	1 week to 1 month	1 month to 3 months	3 months to 6 months	> 6 months
Assets Maturing	23,089.27	1,939.00	10,627.30	1,869.80	61,349.63
Liabilities Maturing	19,534.10	3,318.90	7,536.10	5,582.70	67,562.00
Cumulative Assets Mat	23,089.27	25,028.27	35,655.57	37,525.37	98,875.00
Cumulative Liabys Mat	19,534.10	22,853.00	30,389.10	35,971.80	103,533.80
Cumulative Gap	3,555.17	2,175.27	5,266.47	1,553.57	4,658.80
Ratio of cum Ass/Liabs	118%	110%	117%	104%	96%
Limit	100%	100%	60%	60%	N/A
Excess	0	0	0	0	N/A

This Liquidity Profile report shown is broadly similar to that which would be needed to implement the proposed liquidity limit structure for CSOB, which is in the process of being submitted to ALCO.

2. Analysis of Liquidity Risk.

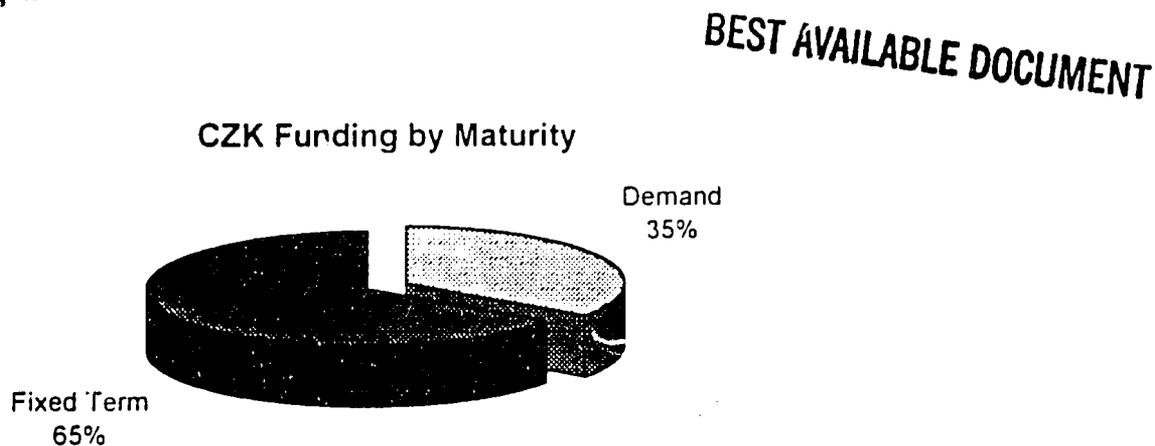
It is clear from the above Liquidity Profile that CSOB has no visible exposure.

3. Analysis of Liabilities.

3.1. Analysis of Liabilities by Maturity Type

The following chart illustrates the breakdown of the reported liabilities - excluding those under the category "Others" and the bank's capital.

Fig 4.



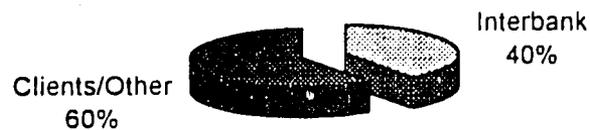
130

3.2.1. Analysis of Liabilities by Source.

The following chart illustrates the breakdown of the reported liabilities excluding those under the category "Others" and the bank's capital.

Fig 5.

CZK Funding by Source.



It is clear that CSOB has a heavy reliance on inter-bank funding [CZK 25.6 billion out of total borrowings CZK 64 billion]

3.2.2. Analysis of Liabilities by Source by Maturity Type.

The following two charts illustrate the concentration of funding source by maturity type.

Fig 6.

Analysis of Liabilities by Source: < 1 Mth

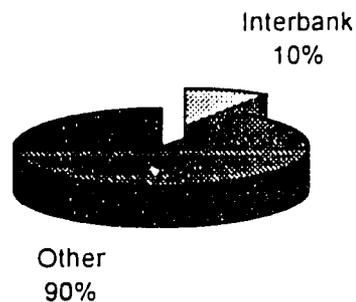
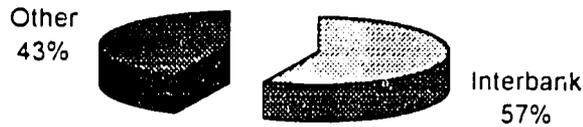


Fig 7.

Analysis of Liabilities by Source: > 1 Mth



From this chart, it would appear that, despite the recent bond issue, interbank funding is still the pre-dominant source of longer maturity borrowing. However, the balance has been redressed somewhat [June figures show interbank funding accounted for 62% of funds taken with a maturity longer than 1 months].

3.2.3. Analysis of Source by Maturity.

The following two charts illustrate the spread of funding source by maturity.

Fig 8.

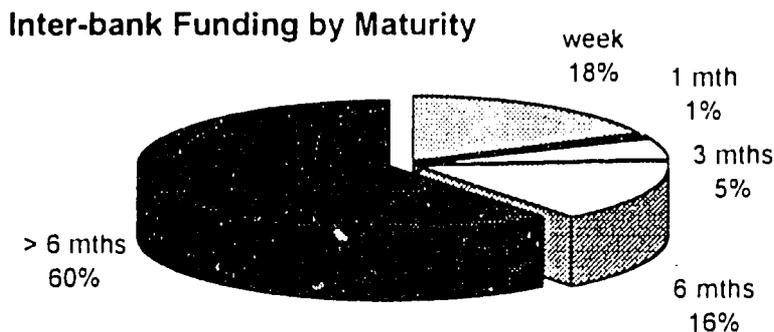


Fig 9.

