

**Achievement of Market-Friendly Initiatives and Results Program
(AMIR 2.0 Program)**

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**Early Warning Systems and Training to
The Central Bank of Jordan**

Final Report

**Deliverable for Capital Markets Component, Task No. 634
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This report was prepared by Hargrove Consultancy in collaboration with Chemonics International Inc., prime contractor to the U.S. Agency for International Development for the AMIR Program in Jordan.

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1 Background and Major Objectives of Trip

As part of the Training Needs Assessment, the Central Bank of Jordan (“CBJ”) has identified the need for an Early Warning System (“EWS”) for monitoring the condition of the banks under its supervision between on-site examinations. A technical assistance plan was proposed to assist the Bank Supervision Department in developing such a model for monitoring bank performance whereby the consultant would work "hands on" with department staff, reviewing Jordanian bank information and identifying variables and ratios to be part of the system.

The first step is to outline the Early Warning Systems Technical Assistance Plan for CBJ. The purpose of the trip was to develop that plan and to begin to assess the information available.

2 Meetings Held

Several meetings were held with CBJ Supervision staff and advisors:

- December 15: Meeting with senior staff to discuss purpose of trip and tasks to be accomplished.
- December 16: Meeting with Maher Hasan, Senior Analyst to review bank information and summarize ratios used by other EWS (see Annex 2). Worksheet of bank information provided consultant for preliminary review.
- December 17: Meeting with Maher Hasan and May to discuss how data was being described and assessed, and to clarify some of the data elements.
- December 18: Meeting with senior staff to propose preliminary work plan for the TA and to discuss preliminary assessment of banks. (see Annex 1 and Annex 3)

3 Preliminary Findings

CBJ collects information from its banks on a monthly, quarterly, semiannual and annual basis. The quarterly data is essentially comparable to the typical call report data collected by most bank supervision departments. However, the data is currently stored in an old COBOL system that is being converted to an Oracle system that will permit manipulation of the data necessary for an EWS.

The annual and semiannual data are audited, whereas the quarterly data is not, leading CBJ to rely more on the former data. It was noted, however, that most quarterly data in other banking systems is not audited, either, and that does not necessarily imply lack of credibility; rather any major adjustments can be noted and proper allowances taken into consideration.

CBJ also noted that some Jordanian banks make provisions for credit and other losses only annually, rather than monthly or quarterly, diluting the effectiveness of an EWS. It was noted that the model can make automatic adjustments for that, however, CBJ can consider requiring banks to review the adequacy of their allowances at least quarterly.

Although CBJ has 20-year historical information on its banks, it has been using the CAMEL rating system for only 5 years. Again, this should not present a major hurdle for an EWS. Much of the data, however, needs to be “cleaned” to make certain it is comparable from bank to bank, and the “outliers” be investigated and/or eliminated. Other adjustments include eliminating intangibles so that tangible net worth is used, among others. Once the data is complete, the consultant can assist CBJ in this process.

4 Deliverables

The deliverables for the trip include the work plan and information variables used in other EWS (Annex 1 and Annex 2). Additional information regarding the FDIC’s four systems was also delivered to CBJ.

5 Work Plan and Next Steps

CBJ is preparing for an IMF Financial Sector Assessment Program (“FSAP”) that is scheduled for February 2003. Much of the information and data that is being compiled for that program is the same information for the proposed EWS. Accordingly, CBJ requested that the timing for the next consultancy be concurrent with the FSAP the second half or February. The Work Plan proposed to CBJ is attached as Annex 1.

Annexes

Annex 1: Suggested Work Plan

Annex 2: Summary of Ratios Used in Statistical Models of Early Warning Systems

ANNEX I

Suggested Work Plan

ANNEX 1

Central Bank of Jordan: Development of an Early Warning System

Suggested Work Plan

A. Objectives and Scope

The Central Bank of Jordan (“CBJ”) is interested in developing an off-site surveillance system for monitoring the condition of the banks under its supervision between on-site examinations. Such an early warning system (“EWS”) can be useful in scheduling and prioritizing examination resources and in identifying problem banks for early intervention. The proposed consulting services are intended to provide assistance to CBJ staff in the development and utilization of the EWS.

B. Consulting Services

Consultant will assist the CBJ Supervision Department in the design and implementation of a model to detect the deterioration and probability of failure of Jordanian banks under its oversight responsibility. Such assistance will be provided in the following areas:

1. Definition of the purpose of the model (ie., to predict failure, to predict downgrade, to flag need for on-site examination, etc.)
2. Development of specifications for the model (data inputs, qualitative factors, if any, regression methodology, frequency of run, etc.)
3. Identification of variables to be used in developing the system and in validating the outputs
4. Development of procedures to follow in utilizing the EWS
5. Development of standard reporting format

C. Time Table

- December, 2002: Develop work plan and informational needs for EWS
Begin to compile profile of typical bank within each rating category (1-5)
- February, 2003: CBJ completes input of historical data and “cleans” data in conjunction with preparation for FSAP in February. The timing for the next consultation was recommended to be on or about February 14, 2003.

ANNEX 2

Summary of Ratios Used in Statistical Models of Early Warning Systems

Summary of Ratios Used in Statistical Models of Early Warning Systems¹

Supervisor	Rating System	Primary Purpose	Primary Components	Methodology
FRB (USA)	SEER (1993) System for Estimating Examination Ratings	Estimate a probable rating or a rating downgrade for individual bank that is singled out for further review.	1. Past due loans 2. Non-accrual loans 3. Foreclosed r/e loans 4. Tangible capital 5. Net income 6. Investment securities 7. Asset growth (percentile)	Model provides a statistical relationship between latest rating and 45 financial and non-financial variables using multinomial logistic regression. Quarterly call report data used for backward regression. Estimation period not fixed so variables and coefficients change quarterly.
FRB (USA)	SEER (1993) System for Estimating Examination Ratings	Risk rank model that estimates the probability that a bank will fail (or become critically undercapitalized) over the next 2 years	8. Prior management rating 9. Prior CAMELS composite	Model uses a bivariate probit regression technique to estimate probability of failure (dependent variable 1 or 0). Run quarterly based on most recent call report data, actual failures from 1985-9, and a detailed “risk profile analysis” which includes a “peer analysis” and a “change analysis.”
FDIC (USA)	SCOR (1995) and SCOR Lag Statistical CAMELS Off-site Rating	Estimate likely downgrades of banks with current CAMELS rating of 1 or 2.	1. Equity 2. ALLL 3. 30-89 days past due loans 4. 90+ days past due loans 5. Non-accrual loans 6. OREO 7. Charge-offs 8. Provisions for loan losses 9. Pretax Income 10. Volatile liabilities 11. Liquid assets 12. Loans and long-term securities	Ordered logit model of CAMELS ratings to estimate downgrades of 1 or 2-rated banks comparing one-year prior call report data to current on-site exam rating. The coefficients of the estimated relationship are used in conjunction with present call report data to estimate future ratings, assuming same relationship holds. Run every quarter with a time horizon of 12-18 months, although accuracy found to decline beyond 6 months.
FDIC (USA)	GMS (1980’s) and CG Growth Monitoring System and Consistent Grower	Detect rapid growth that is thought to signal risky behavior	1. Non-core funding 2. Gross loans 3. Assets/employee	Quarterly analysis of relationship between loan growth and non-core funding with independent variables compared to other

¹ Source: “Supervisory Risk Assessment and Early Warning Systems,” Sahajwala and Van den Bergh, Basel Committee on Banking Supervision, Working Papers No. 4, December, 2000.

			<ol style="list-style-type: none"> 4. Growth in non-core funding 5. Growth in equity 6. Asset growth rate 7. Loan growth rate 8. Change in loan mix 	high and low growth banks using percentile rankings
OCC ² (USA)	Bank Calculator	Identify primarily small and medium “banks at risk” of failure within a 2 year horizon	<ol style="list-style-type: none"> 1. Portfolio risk associated with interest rate and maturity gaps, NPLs and prior CAMELS rating 2. Bank condition risk associated with capital and profitability 3. Bank environment risk associated with unemployment 	Absolute risk model estimated using standardized logistic regression method
French Banking Commission	SAABA (1997) Support System for Banking Analysis	Classify bank into one of five categories depending on anticipated solvency ratio	<ol style="list-style-type: none"> 1. Undertakes detailed credit analysis of portfolio using internal and external data sources 2. Qualitative factors including ownership and shareholder quality, management and internal controls 	Expected loss model using adjustments to loans for an expected loss amount based on probability of default. It is run every 6 months.

² In process of being tested in December, 2000.