

Building Advanced Early Alarm Systems for Predicting Financial Crises: A Future Vision for Fiscal Policy in Iraq



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ABSTRACT: The accelerating repercussions of financial crises that struck the world have significantly affected global economies in general and the banking sector in particular. These crises, characterized by banking failures, have prompted financial institutions to develop models, systems, and early warning indicators to predict banking crises and avoid the negative effects of cyclical fluctuations and unexpected shocks. This research aims to lay the foundation for an early warning system to monitor financial disturbances in Iraq. The goal is to identify financial imbalances, prevent the collapse of Iraqi financial institutions, and shield the economy from financial and monetary crises.

KEYWORDS: Financial Crises, Alarm System, Fiscal Policy, Financial Institutions, monetary crises

I. INTRODUCTION

In the 1980s, many banks in both developed and developing countries were affected by multiple financial crises. These crises varied in nature depending on the specific circumstances of each country and each bank, creating a state of economic imbalance that consequently affected the global financial and banking system. Research indicates that financial instability has become entrenched in the international system, becoming its dominant characteristic. Numerous factors have contributed to the exacerbation of this phenomenon, most notably the increase in capital flows between countries, the integration of financial markets, and the liberalization of the movement of goods between countries. The direct relationship between financial stability and economic growth has influenced various financial institutions, international monetary institutions, national institutions, and economic authorities. These entities strive to maintain financial stability and avoid financial crises that negatively affect economic growth. These crises resurfaced at the beginning of the third millennium, significantly affecting countries' economies by decreasing exports, increasing inflation rates, and causing a rise in banking defaults. Such repercussions prompted financial and banking policymakers and central banks to intervene by adopting measures to overcome these crises. We now aim to design an early warning system for crises, serving as a tool for guidance and warning to decision-makers and financial and monetary policymakers. This system is particularly relevant to Iraq, given its significant exposure to financial crises.

II. PROBLEM STATEMENT

Because of global economic fluctuations and specific challenges faced by Iraq, it is critical to explore the feasibility of designing an early warning system to prevent the collapse of Iraqi financial institutions and mitigate the negative impacts on the Iraqi economy.

III. RESEARCH AIMS

1. Develop an early warning system to predict financial and monetary crises and shocks.
2. Monitor the impact of these crises on the state's financial and monetary performance.

IV. RESEARCH IMPORTANCE

This research aims to highlight the importance of an early warning system and explore its potential benefits for enhancing Iraq's financial and monetary stability.

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V. RESEARCH HYPOTHESES

1. Is it possible to implement an early warning system in Iraq?
2. Is it possible to prevent financial and banking crises originating from abroad from affecting the domestic economy?

VI. RESEARCH METHODOLOGY

A: *The Concept of Early Warning of Financial Crises*

An early warning system for financial crises consists of procedures, processes, indicators, and models that classify and compile information to identify institutions at risk. This system aims to predict potential risks and their effects on financial institutions, allowing for proactive measures before a crisis occurs, thus providing a vision for the future (Raymah, 2013, p. 140). The International Monetary Fund (IMF) defines early warning systems as econometric models used to predict financial crises before they occur. These systems rely on external variables and the historical relationships between these variables that cause crises. The IMF emphasizes that the system's experimental framework depends on a set of leading variables and indicators that signal abnormal behavior during a crisis. The quality and frequency of data about potential risks are crucial for the effectiveness of early warning systems (Al-Munajjid, 2018, p. 12). High-quality, timely, and detailed data enable accurate predictions and the identification of risks, ensuring that the system provides reliable warnings. Early warning systems are also defined as the ability to absorb signals related to the possibility of crises. This involves the overall economy taking actions and measures to prevent falling into crises. This process requires recording and monitoring all signals that anticipate the occurrence of a crisis (Gharibi, 2017, p. 18).

B: *The Importance of the Early Warning System*

Early warning systems are considered an effective and important means of hedging and alerting in the face of a financial crisis that is likely to occur. By providing warnings before a crisis happens, these systems allow us to take preventive measures. The importance of having such early warning systems includes the following points:

1. The importance of knowing when a crisis occurs is critical, as in most cases, the exact timing of a crisis is unknown.
2. These systems provide all preferences and data on a periodic basis, helping decision-makers maintain complete control.
3. These systems are linked to the phenomenon of contagion and the mechanisms of crisis transmission through information and the characteristics of the economies that will be exposed to the crisis.
4. They continuously update the indicators of the early warning system, allowing for the flexibility that characterizes the economy of that country (Nour El-Din, 2013, p. 151).

C: *The Importance of the Early Warning System for Predicting Bank Crises*

The significance of early warning systems in relation to banking crises lies in their legal value and their role as a continuous means of guiding, warning, and directing policy decisions in banks. When the financial or monetary system is likely to face crises under certain conditions, these systems can help by enabling preventive policies and measures. The benefits include:

1. Allowing policymakers to pinpoint financial vulnerabilities accurately.
2. Providing early signals to experts about undesirable events affecting the financial system, greatly aiding in the continuous supervision of financial institutions.
3. Helping experts understand the functioning of financial institutions correctly to evaluate banking risks.
4. Addressing financial problems that may reduce the effectiveness of macroeconomic tools, highlighting the importance of the system.
5. Developing safeguards against crises to enhance caution within financial institutions.
6. Focusing supervision on overall preventive aspects, ensuring the use of precautionary measures.
7. Predicting the occurrence of crises within a timeframe of three months to a year.
8. Complementing, rather than replacing, existing monitoring and supervision devices (Hasiba, 2018, pp. 32-33).

D: *Types of Early Warning Systems*

Building and designing an early warning system involves mechanisms to determine priority areas within the system by ranking the degree of risk. This system addresses areas with high risks through three main steps:

The First Step: Identifying the data that the system should use to alert, which forms the general framework of the system. This involves selecting effective indicators that reflect the degree of risk. These indicators are based on previous scientific experiments and financial and economic theories. Indicators can be classified into three types:

- **Exciting Indicators:** Factors affecting the system from outside.
- **Accelerating Indicators:** Factors that accelerate the development of the degree of risk.

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- **Structural Indicators:** Factors related to the fundamental structure of the system.

The Second Step: Developing appropriate tools for analysis that combine previously conducted methods and quantitative analysis. The role of these tools includes:

- Providing a means to scientifically and systematically research aspects of exposure to danger.
- Understanding relationships and connections that can be invested in and transferred across markets and countries.
- Identifying the repercussions and possibilities related to the crisis.
- Directing and controlling the use of laws.

The Third Step: Implementing statistical evaluation mechanisms and forecasting methods to produce data and numerical estimates. These results are then discussed with specialists and stakeholders to assess their reality, relevance, and link them to other factors (My Saying, 2017, pp. 326-327).

F: What are the early warning indicators for crises?

It is possible to divide the early warning system indicators used to predict crises into two types: macroeconomic and microeconomic indicators in the performance of institutions. This division helps identify financial imbalances to prevent economic problems that could lead to collapse, as shown in the following table.

Table (1): Precaution Indicators and Early Warning of Crises

Partial precautionary indicators:	
2- Asset quality	1- Capital adequacy: risk-adjusted aggregate capital ratio, frequency distribution of capital ratios.
4- Indicators of the borrowing institution: debt-to-equity ratio. - Corporate profitability, - Other indicators of corporate conditions, - Household sector indebtedness.	3- Lending institution indicators: sectoral credit concentration, - lending denominated in foreign currency, - non-performing loans, - loans to loss-making public institutions, - asset risks, - linked borrowing, - financial leverage indicators.
6-Revenues and profitability: return on assets, return on equity, income and spending rates,- Structural indicators.	5- Soundness of management: spending rates, - revenue ratio per employee, - expansion in the number of financial institutions.
8- Sensitivity to market risks: interest rate risks. - Foreign exchange rate risk, - Stock price risk. - Commodity price risks.	7- Liquidity: Central Bank facilities to commercial banks, - segmentation in interbank lending rates, - deposits relative to total cash, - loan-to-deposit ratio, - maturity structure of assets and liabilities, - secondary market liquidity measures.
	9- Market-specific indicators: prices for financial instruments - Indications of excessive returns: - Classification of sovereign return spreads

Financial and Banking Qualitative Indicators (Partial):

Macroeconomic indicators:	
2- Inflation	1- Economic growth: total growth rates. - Sector deterioration.
4- Interest and exchange rates: Fluctuation in interest and exchange rates. - The level of local real interest rates.-Sustainability of the exchange rate.-Exchange rate guarantees.	3- Balance of payments: trade account deficit.- Adequacy of foreign exchange reserves. External debt (including maturity structure).
6-Contagion framework: the interrelationship between financial markets, -side effects of trade.	5- Lending boom and asset prices: Lending booms- Booms in asset prices

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In 1992, the Basel Committee established standards for capital adequacy under the auspices of the Bank for International Settlements. Indicators for reducing risks and measuring the functioning of the banking system include capital adequacy, asset quality, management, profitability, and liquidity (CAMEL). This system utilizes several financial indicators to quickly assess the financial position of any bank and classify its status. Initially introduced in 1979 in the United States by five regulatory bodies, including the Federal Reserve Bank, CAMEL stands for Capital adequacy, Asset quality, Management, Earnings, and Liquidity. Its key features are:

- Standardized bank classification.
- Uniform style of inspection reports.
- Reduced inspection duration.
- Emphasis on evaluation over mere reporting.
- Foundation for regulatory decisions and corrective actions post-inspection.
- Demonstrates transparency in reflecting data and information provided to the central bank.

1. Indicators of Macroeconomic Variables Linked to Financial System Stability:

The financial system is significantly impacted by economic activities, particularly macroeconomic variables that precede banking crises. Monitoring these variables across the entire economy is crucial, especially in relation to capital, exchange rates, economic growth, balance of payments, inflation levels, interest rates, lending trends, stock prices, and other pertinent indicators (Al-Jani, 2005, p. 272).

The second type comprises indicators from the joint early warning system toolkit developed collaboratively by the International Monetary Fund and the Financial Stability Board. These are detailed in Table No. (2):

Table 2: Joint Early Warning Process Toolkit by the International Monetary Council for Financial Stability

First: Weaknesses in sectors and markets:	
4- Asset prices, market evaluation, and detection of price bubbles: real estate price bubbles, stock price potentials, feedback loops between non-performing loans and macroeconomic performance.	1- Risks and vulnerabilities in the external sector: cross-border capital expenditures, external imbalances, inconsistency between exchange rates, external financing gaps, and the possibility of an external crisis.
5- The nature of risks in financial markets: scientific financial stability map, expenditures in asset prices and markets.	2- Risks and vulnerabilities in public finance: risks of debt and financing renewal, market perceptions of the risks of stopping payment of sovereign debt, and the extent of financial austerity required.
	3- Risks and vulnerabilities in the corporate sector: financial leverage, liquidity, profitability, stock valuation, and possibilities of default.
Second: Country risk models: Crisis risk models, total GDP at risk, models measuring crisis duration.	
Third: Determine the systemic repercussions:	
2- Analysis of major developed financial institutions: weaknesses in individual major developed financial institutions, repercussions of systemic risks and financial distress, measuring banking vulnerabilities at the level of individual countries.	1- Analysis of the repercussions and effects of infection: - Tools for measuring contagion effects/repercussions using financial market data. - Tools for measuring contagion effects/repercussions using cross-border data
3-Scientific scenarios: global expectations model, public finance model, integrated global monetary and financial model, cross-sectional time series model for cross-observed components.	

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G: Analysis of the Early Warning System for Financial Crises

When we talk about recording, monitoring, and analyzing signals, we aim to identify impending or highly dangerous crises. The early warning system offers four possibilities in signal analysis:

1. Confirmation: In this scenario, signals and information confirming the impending crisis are accurate.
2. Failure: Here, the manager fails to correctly analyze the data and information, potentially leading to a severe crisis.
3. Early warning: This involves an attempt to alert the manager and decision-makers about an impending market crisis. The information may be unintentionally or intentionally misleading.
4. Explicit rejection: In this case, the manager or decision-makers declare that the crisis-related information is incorrect, based on their experience and judgment at the time (Heikal, 2006, 168).

H: Factors Affecting the Effectiveness of the Early Warning System

Several factors can either enhance or diminish the effectiveness of the early warning system:

1. Information system effectiveness: The early warning system requires extensive and diverse data and information sources to function optimally. Some argue for the necessity of an ideal dashboard to manage this vast amount of information effectively (Hugo, 2008, 42).
2. Communication system effectiveness: This refers to the channels through which data and information are transmitted, exchanged, and acted upon. A quick and efficient communication channel enhances the system's efficiency and its ability to detect crises early (Al-Baz, 2015, 68).
3. Skills and efficiency of the crisis management team: The effectiveness of the early warning system heavily depends on the capabilities of the crisis management team. Qualified individuals with managerial experience enable swift problem-solving and crisis mitigation (Al-Naji, 2012, 36).
4. Leadership effectiveness in critical decision-making: Effective leadership plays a crucial role in crisis management, minimizing losses and damages. The leader's behavior and decision-making skills are instrumental in sensing and addressing crises before they escalate (Youssef, 1998, 109).

I: Building Early Warning Systems to Predict Financial Crises

1. Signal Extraction Method: This method, pioneered in 1995, involves analyzing financial indicators before and during financial crises, comparing them with non-crisis periods. Any deviation in these indicators from normalcy signals an impending crisis. The method converts indicators into binary signals: 1 indicates a crisis warning if an indicator surpasses a threshold, while 0 indicates no crisis. It identifies crisis determinants, estimates the starting point, and calculates conditional probabilities. Its advantage lies in the indicators' predictive capability (Journal of Economics, 2018, 31-62).
2. Specific Dependent Variable Method (Logit Model): This method uses a non-linear logistic model to establish the relationship between selected variables and the probability of a crisis. It employs multiple binary and multiple models to estimate the effect of variables on crisis occurrence statistically.
3. Artificial Neural Networks Method: This advanced method utilizes artificial intelligence, mimicking human thought processes through interconnected virtual relationships in computer programs. By processing historical crisis data, it predicts banking and financial crises up to two years in advance, enhancing crisis prediction capabilities (Journal of Economics, 2018, 31-62).

VII. CONCLUSION

1. Iraq possesses the necessary early warning indicators for crisis prevention.
2. Implementing early warning indicators will safeguard Iraq from financial crises.
3. This globally effective system enhances crisis management through presented indicators.
4. Iraq should explore the feasibility of implementing artificial neural networks, artificial intelligence, and logarithmic models.

VIII. RECOMMENDATIONS

1. Is Iraq committed to adopting this advanced global system for its banking and financial sectors?
2. Iraq needs enhanced transparency and disclosure to facilitate the implementation of such an advanced system.
3. While not universally mandated, it is advisable for all countries to consider adopting this system.
4. Implementing artificial intelligence requires robust data and outcomes to support such initiatives.

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