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Forecasting Financial Crises in Turkey with Leading Indicators (1992:Q1-2023: Q1)*

ABSTRACT

Economic crises are defined as severe price fluctuations that exceed acceptable levels in goods, services, production, and foreign exchange, all of which are regarded as fundamental building blocks of an economy. Depending on how they manifest, economic crises can be examined from two perspectives. The first is real sector crises. They manifest as inflation and stagnation crises in the goods and services markets, as well as unemployment crises in the labor markets. The second is financial crises which are defined as a sudden, sharp, and obvious deterioration of all or most financial indicators such as short-term interest rates, asset prices, payment deterioration, and bankruptcy of companies and financial institutions. One of the key issues addressed by the models that emerged as a result of the efforts to develop a theory for financial crises is the detection of financial crisis symptoms before they occur. In this context, many empirical studies have been conducted to create early warning systems that will forewarn crises and take them under control, and various models have been developed to explain the financial crisis phenomenon. These models formed the leading indicators through the analysis of the pre-crisis macroeconomic indicators. These studies investigate how various macroeconomic aggregates change before crises occur and whether crises can be predicted accordingly. Although crises can be similar or dissimilar in terms of occurrence and ethics, they pose a threat to the socioeconomic stability of all world economies. At the same time, estimating the occurrence probability of a crisis using leading indicators is a critical point for countries to turn crises into opportunities.

Keywords: Crisis, Financial Crises, Crisis Models, Financial Crisis İndicators

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INTRODUCTION

Studies on the predictability of financial crises have grown in importance especially since the 1990s in order to avoid the economic and social costs of financial crises and the adverse effects of possible internal and external delays in the implementation of policies. Within the framework of early warning systems against crises, determining the leading indicators and adopting appropriate policy choices and practices to eliminate the likelihood of a crisis or to implement the necessary measures are the key factors for national economies.

This study aims to analyze the relationship between the financial crises in Turkey during the period 1992:Q1-2023:Q1 and the financial crisis indicators mentioned in the economics literature. The indicators employed in the study include stock prices, gross international reserves, private sector loans, net reserves, current account balance (CAB) to GDP ratio, CID to GDP ratio, exports to imports ratio, short-term international reserves to gross reserves ratio, real interest rate on deposits, capacity utilization rate, net reserves to total liabilities ratio, total domestic loans, foreign currency deposits, foreign currency deposits to gross reserves ratio. The data used have three different sampling periods depending on data availability. The first period is between 1992: Q1-2023: Q1. The second period is 1998: Q1-2023: Q1 and the last period is 2002: Q4-2023Q1. In order to determine the predictive power of different crisis indicators, the volatilities of the above-mentioned indicators obtained from GARCH (1,1) models are analyzed..

THE CONCEPT OF CRISIS

The concept of crisis is defined in the economic literature as an Economic Crisis, which corresponds to terms such as depression, recession, stagnation, or tough period, and in general terms as a result of general events that occur in a sudden and unexpected situation that will significantly undermine the national economy. The concept of economic crisis can be evaluated at two different points according to the way it is formed; the first one is the Real Sector Crises. These crises emerge as inflation crises and recession crises in goods and services markets and unemployment crises in labor markets. The second one is Financial Crises, which arise more specifically due to problems in money markets (Yücel and Kalyoncu, 2010, p.54). In the literature, there are many definitions of financial crises. For example, Kindleberger (1978) and Minsky (1992) defined a financial crisis as a combination of a sharp fall in asset prices, an increase in the failures of firms in real and financial

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markets, the presence of deflation or inflation, and disruptions in foreign exchange markets. According to Mishkin (1992, pp. 117), a financial crisis is a disruption in financial markets that exacerbates adverse selection and moral hazard problems. Monetarists, on the other hand, defined a financial crisis as a sharp reduction in the money supply and, in the absence of bank panics, an extreme fall in asset prices and a contraction in the real sector. Schwartz (1986) described this situation as a "fake financial crisis" (Alpdoğan, 2019, pp. 5).

Financial Crisis Models and Leading Indicators

Models that emphasize some key aspects of financial crises have been classified into three groups in the literature. These are referred to as first, second and third generation crisis models.

The first-generation crisis model started with Krugman's (1979) analysis of balance of payments crises based on the work of Salant and Henderson (1978) and was later developed by Flood and Garber (1984) (Kruger and Osakwe, 1998, pp. 2). According to Krugman's model, also referred to as the canonical crisis model, when a fixed exchange rate is in effect, an increase in the volume of domestic credit more than the demand for money leads to a gradual but steady decline in the international reserves of the country and speculative attacks on the national currency (Özer, 1999, pp. 56) These models emphasize the importance of the underlying macroeconomic factors that trigger the crisis and attribute monetary crises to the structural incompatibility of macroeconomic policies, i.e. unsustainability. It is stated that financial crises are a result of wrong economic policies, financing budget deficits by printing money, and inconsistencies such as keeping the exchange rate fixed (Yücel and Kalyoncu, 2010, pp. 56). In this case, financing macro policies by increasing the money supply leads to inflation, capital flight and negative expectations. This leads to a deficit in the balance of payments. The monetary authority, which insists on maintaining the fixed exchange rate system, is then forced to rely on its reserves to cover the balance of payments deficit. From the point of view of a developing country's economy, it will not be feasible to insist too much on the fixed exchange rate regime due to the limited amount of reserves. At this point, the currency is either devalued or floated. According to the first-generation model, the crisis is a consequence of wrong macroeconomic policies (Karaçor and Alptekin, 2006, pp. 238).

Following the European Monetary Crisis of 1992-1993, it became evident that first-generation crisis models were insufficient to explain the ongoing crisis. Developments in Europe during this period forced governments to decide between actively stimulating the economy and maintaining the exchange rate regime. Thus, second-generation crisis models emerged under the leadership of Obstfeld (1994, 1996) (Goldstein and Razin, 2015, pp. 159). *Second-generation crisis models* emphasize macroeconomic policy problems. According to the second-generation models, the emergence of the crisis is firstly due to consistent self-feeding expectations, secondly due to herd behavior, and thirdly due to contagion (Babić and Žigman, 2001). The common feature of the second-generation crisis models is that they emphasize the possibility of a crisis in economies even without a deterioration in the basic indicators of the economy (Esquivel and Larrain, 1998, pp. 3).

As a result of the inadequacy of the first- and second-generation crisis models in explaining the 1997 Asian crisis, which emerged as a wave of crises in emerging economies in Asia in the late 1990s, *third-generation crisis models* were introduced. During the Asian crisis, the interaction between money and banking crises, also termed as twin crises, has been analyzed altogether. In this model, which is based on the idea that banking and money crises feed each other and lead to a vicious circle in the economy, the spillover effect of crises across countries is based on Krugman's "Government Moral Risk Approach" and Sachs' "Financial Aggression Approach" (Ayla, 2019, pp. 841). The third generation of financial crisis models is a combination of the first and second generation of financial crisis models, which argues that the economic relations between the government and large capitalized companies lead to crises. In these models, the instability or crisis in one financial market in one country can lead to a crisis in another country that cannot be accounted for by macroeconomic fundamentals (Masson, 1998, pp. 2).

Leading Indicators of Crisis

The explanatory variables utilized in the models developed to explain and predict crises can be evaluated in a wide range. Due to the problems caused by financial crises in the economy and the costs they impose, the ability to predict crises in advance will contribute to both preventing the damage that crises will bring to the economy and reducing the costs of crises (Özer, 1999, pp. 47). By itself, no single economic indicator is sufficient to provide a reliable prediction of whether a crisis will occur or not. However, there is a high probability that a few early warning systems based on key economic indicators will provide an indication of a poor situation and a clue that a financial crisis could occur at any time. Nevertheless, the leading indicators that can be helpful in predicting crises are closely related to the considerations of which factors are most likely

to contribute to a crisis. For example, if fiscal problems are considered to be the main causes of monetary crises, fiscal deficits, public consumption and credit extended by the banking system to the public sector would be the main indicators (Edwards, 1989). Similarly, if the weaknesses of the financial sector are considered to be at the root of financial crises, variables such as the private sector credit growth rate, the short-term debt position of the banking sector and the structure of domestic interest rates can be taken into account as indicators (Kaminsky, Lizondo and Reinhart, 1997, pp. 10-11).

LITERATURE

There are many studies that seek to predict or explain financial crises with the assistance of leading indicators.

Main studies in the literature are as follows;

- ✓ Kaminsky, Lizondo, Reinhart, (1997), The signal capture method was implemented with monthly data between 1970-95. 79 crises in 20 countries were analyzed. The most important signals are -real exchange rate, M2/gross national. Reserve, -capital market. index, output, and export growth indicators are considered to provide the most relevant indicators.
- ✓ Apoteker and Barthelemy (2001) analyzed the validity of leading indicators for 40 emerging market economies based on monthly and quarterly data for the period 1970 - 2001 in order to predict financial crises in terms of growth, financial structure, foreign capital situation, cyclical balance and banking system.
- ✓ Bussiere and Mulder (1999) observed the crises of 46 countries, including Mexico, the Asian Crises and many emerging market economies, and calculated the fundamental value of the weighted average of the changes in the exchange rate and reserves. In the study, it is stated that political instability has a significant impact on the depth of the crisis, both pre- and post-election.
- ✓ Berg and Pattillo (1999) analyzed the Asian Crisis in 23 countries for the period 1995-1997. In the study, as an alternative to the KLR method, probit regression model was used to determine crisis forecasters. According to the KLR method, when a signal is detected in the period 1995:5-1996:12, the probability of a crisis in 1997 is 37%, while this rate is 51% in the probit regression model.
- ✓ Öztürkler and Göksel (2013), for the period 1998-2012 (Turkey's February 2001 crisis), -Emerging Markets bond index, -Ratio of trade balance (deficit) to reserves, -Exchange rate volatility, they determined that the signal approach yielded successful results.
- ✓ Kaya and Yılmaz (2007), for the period 1990-2002, determined that the Signal approach utilized in the detection of the April 1994 and February 2001 crises yielded successful results. (The leading indicators used are - (Foreign Trade Balance/GNP, -Budget Balance/GNP, -M2Y/GNP)
- ✓ Avcı and Altay (2014) utilized the regression tree model to identify the crises that occurred in 1990-2010 (Turkey, Mexico, Thailand, Malaysia), 1992-2010 (Argentina), Turkey (1994,2001), Argentina (2002,2009), Mexico (1994,2009), Malaysia (1997,2009), Thailand (1997) and overall achieved successful results.
- ✓ Kamin, Schindler and Samuel (2001), the study was conducted on 26 emerging economies with annual data from 1981 to 1989. As a definition of a crisis, the threshold value of the change in the real exchange rate and reserves is calculated as 1.75.
- ✓ Nag and Mitra (1999), in the study conducted with monthly data for Indonesia, Malaysia and Thailand between 1980 and 1998, calculated that the threshold value of the weighted average of the change in exchange rate and reserves as the definition of crisis is 2. The standard deviations of the countries are above the average. Approximately 80% of the values indicated a crisis signal before the Asian crisis broke out.
- ✓ Salgado, Aziz, and Caramazza (2000) measured the validity of leading indicators for a total of 50 countries, 20 developed and 30 developing countries, with the help of 23 variables including economic warming, external balance, unemployment rate, short-term capital flows and world interest rates based on monthly and annual data for the period 1975 - 1997. In the analysis, the standard deviation in the weighted average of the exchange rate and reserves by a factor of 1.5 and the total average is defined as a crisis. The variables employed in the analysis such as overvaluation, periodic foreign trade rates, inflation, domestic credit growth, M2/Reserves, world real interest rates and current account balance were proved to be effective in explaining the crisis.

METHODOLOGY AND DATA

To analyze the predictive power of some of the leading indicators of economic crises in Turkey, we use quarterly data. The data that we used in the study has three different sample period depending on the availability of data. The first period is between 1992Q1-2023Q1 the second period is between 1998Q1-2023Q1 and last period is between 2002Q4-2023Q1.

To determine the predictive power of different crises indicators predicting the crises, we examine the volatilities of these indicators obtained by GARCH(1,1) models. Before discussing the empirical results of the study, we first give brief information about the GARCH (1,1) model and the discuss the predictive power of these indicators by analyzing their volatilities in related period.

GARCH Models

GARCH model are the extension of ARCH (autoregressive conditionally heteroscedastic) models. ARCH model is used to model the variance of a time series such as exchange rate, stock prices. The purpose of using ARCH models is to describe a changing, possibly volatile variance.

An extension of ARCH model, Generalized Auto Regressive Conditional Heteroskedasticity (GARCH) is a statistical model used in analyzing time-series data. In this model, it is believed that the error variance is serially correlated. A GARCH model uses values of the past squared observations and past variances.

General form of GARCH(p,q) model is expressed as follow:

$$Y_t = a + \boldsymbol{\beta}'\boldsymbol{Xt} + \varepsilon_t \quad (1)$$

$$\varepsilon_t|\Omega_t \sim iid\ N(0, ht_t)$$

$$h_t = \gamma_0 + \sum_{i=1}^{p} \delta_i h_{t-i} + \sum_{j=1}^{q} \gamma_j \varepsilon_{t-j}^2 \quad (2)$$

Its simplest for is GARCH(1,1) model and the variance equation for GARCH(1,1) is

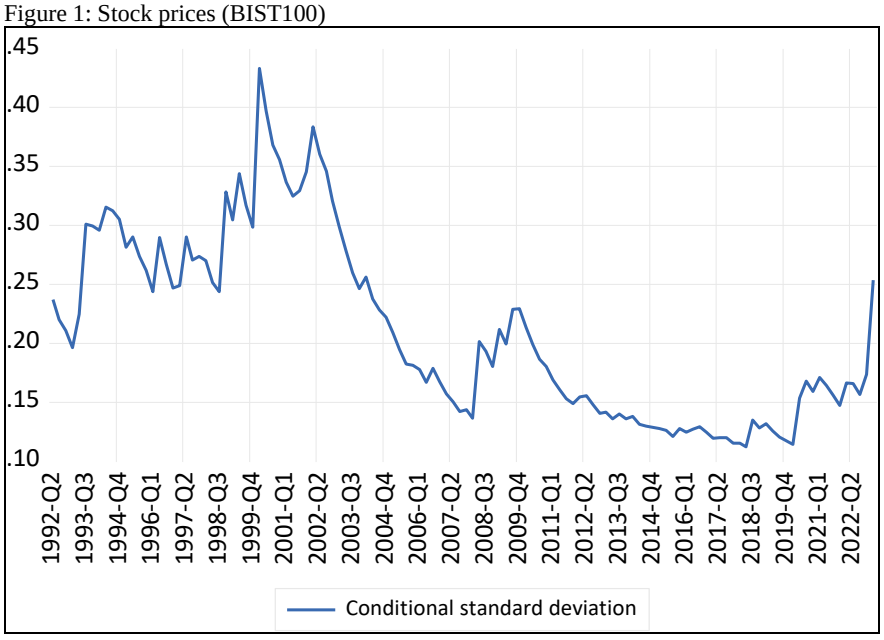
$$h_t = \gamma_0 + \delta_1 h_{t-1} + \gamma_1 \varepsilon_{t-1}^2 \quad (3)$$

In this study, we employ the suitable AR(r)-GARCH(p,q) models to capture the volatility of crisis indicators, similar to the approach taken by Akhtaruzzaman, Boubaker, and Goodell (2023). After estimating the GARCH model for each indicator, we generate volatility plots for each indicator by utilizing the conditional standard deviation derived from a GARCH(1,1) model.

Empirical Results

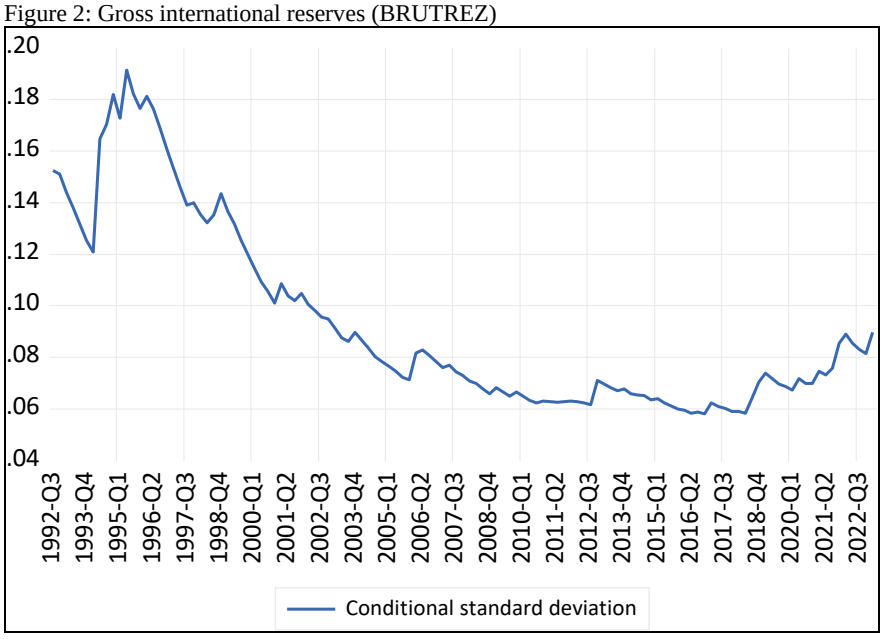
We start with stock prices. The BIST100 index is an important indicator in evaluating the overall performance of the Turkey's stock market. As is seen in the graph of return volatilities (**Hata! Başvuru kaynağı b ulunamadı.**), there is a significant increase in the volatilities of stock returns before almost every crisis in the Turkish economy, 1994, 1998, 2000 and 2001, 2008 global crises and recent turmoil in the Turkish economy.

Figure 1: Stock prices (BIST100)



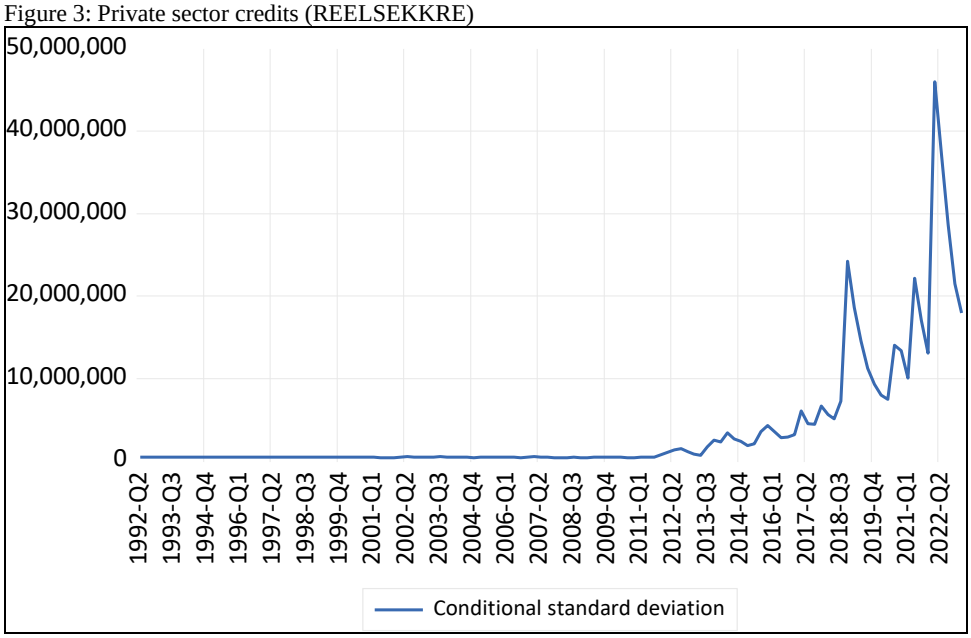
The second indicator is the gross international reserves of Turkey. It serves as a good indicator in the 1994 currency crises since there is a significant increase in the volatilities of gross international reserves (Figure 2)

Figure 2: Gross international reserves (BRUTREZ)



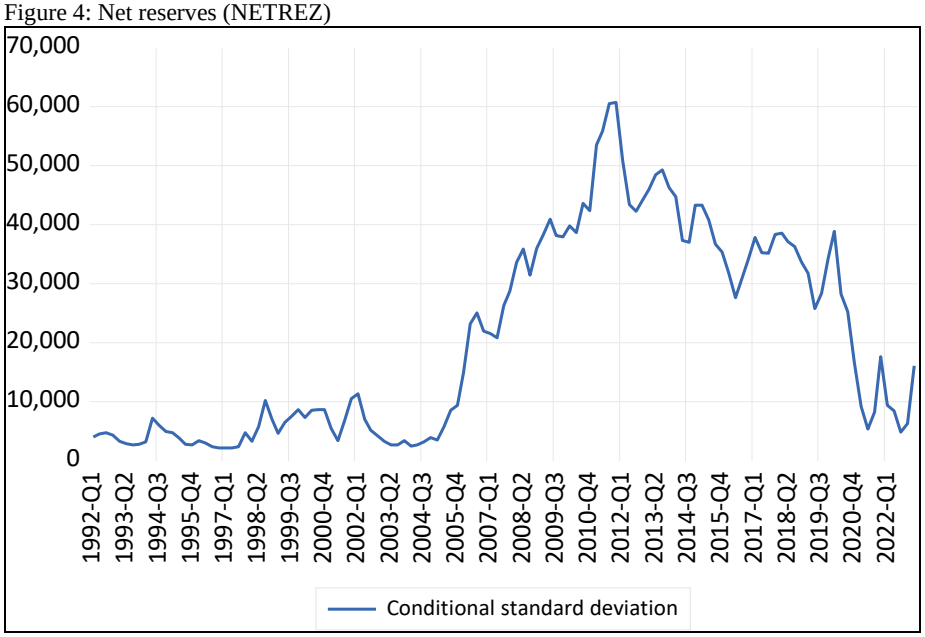
Third indicator is private sector credits which serves as a valuable tool in assessing the recent fluctuations in the Turkish economy, beginning in early 2018 (**Hata! Başvuru kaynağı bulunamadı.**). This is because, under t he new regime, the Turkish economy has become heavily reliant on credit expansion.

Figure 3: Private sector credits (REELSEKKRE)



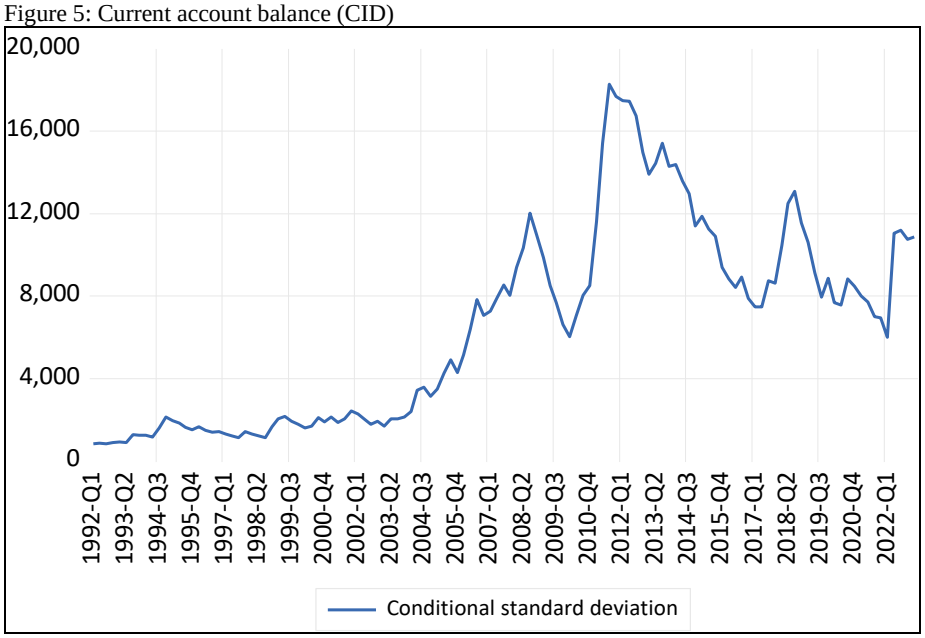
Another indicator is net reserves. Net reserves volatility indicates how the Turkish economy has become vulnerable to external shocks like global crisis of 2008. During the period of 2004-2013, Turkey was the one of the countries attracted large amount of capital inflows (**Hata! Başvuru kaynağı bulunamadı.**).

Figure 4: Net reserves (NETREZ)



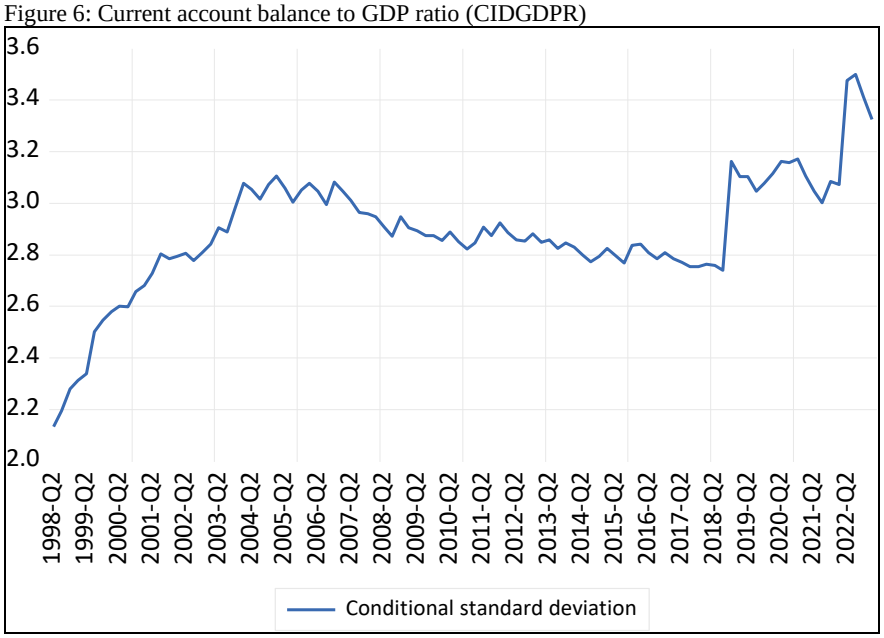
Another indicator is current account balance (CAB). As is seen **Hata! Başvuru kaynağı bulunamadı.**, CAB h as served an excellent leading indicator prior to 2008 cries and recent turmoil in Turkish economy has been going on since 2018.

Figure 5: Current account balance (CID)



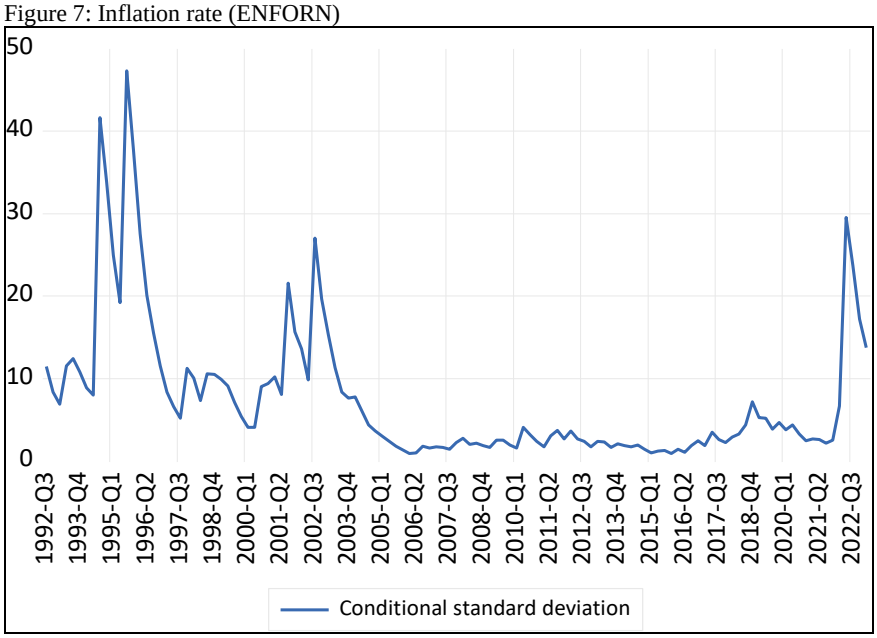
CAB to GDP ratio is also a good crisis indicator. As we can see in **Hata! Başvuru kaynağı bulunamadı.**, its v olatility had risen significantly prior to the 2000 and 2001 crises, as well as the recent turmoil. Thus, if we want a leading indicator of crises in Turkey, the CAB GDP ratio should be a reliable one to predict upcoming crises.

Figure 6: Current account balance to GDP ratio (CIDGDPR)



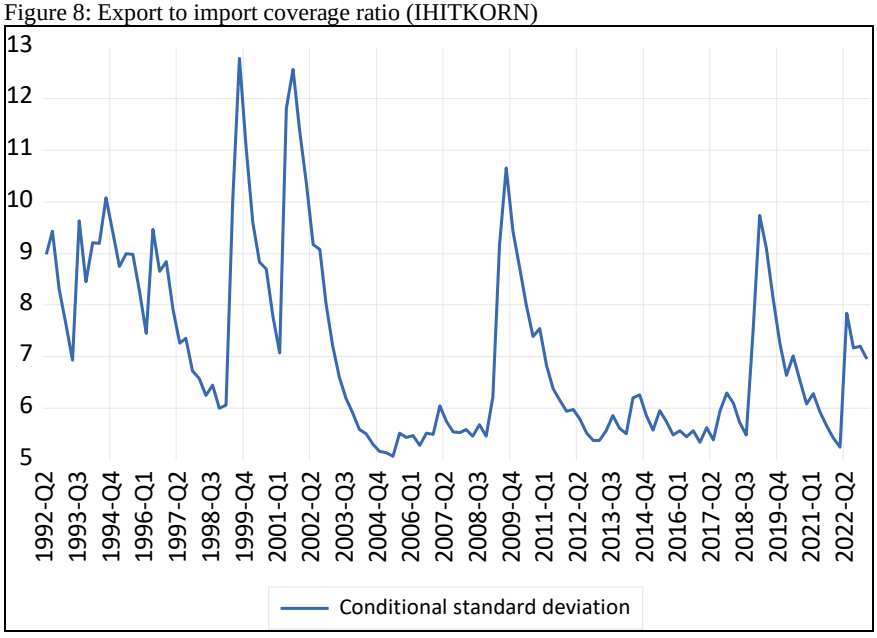
Inflation volatility can also be utilized to gain insights into the likelihood of future crises in Turkey, as evidenced by its significant increase during the 1994, 2000, and 2001 crises, as well as the recent turmoil (**Hata! Başvuru kaynağı bulunamadı.**). This measure proves particularly useful in predicting crises resulting f rom domestic factors.

Figure 7: Inflation rate (ENFORN)



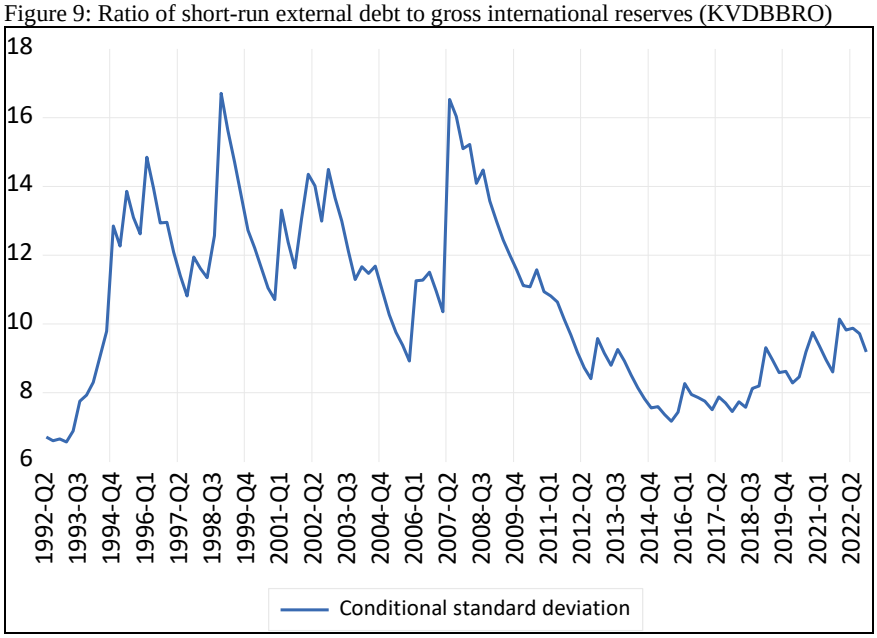
The export-to-import coverage ratio is regarded as one of the most crucial indicators for assessing balance of payments crises, particularly in countries like Turkey, where the industrial sector heavily relies on imports and exports serve as a significant source of exchange rate earnings. Based on the volatility plot on **Hata! Başvuru k aynağı bulunamadı.**, this indicator can be employed to identify the potential occurrence of economic turmoil in Turkey, as it has consistently exhibited a substantial increase prior to each crisis.

Figure 8: Export to import coverage ratio (IHITKORN)



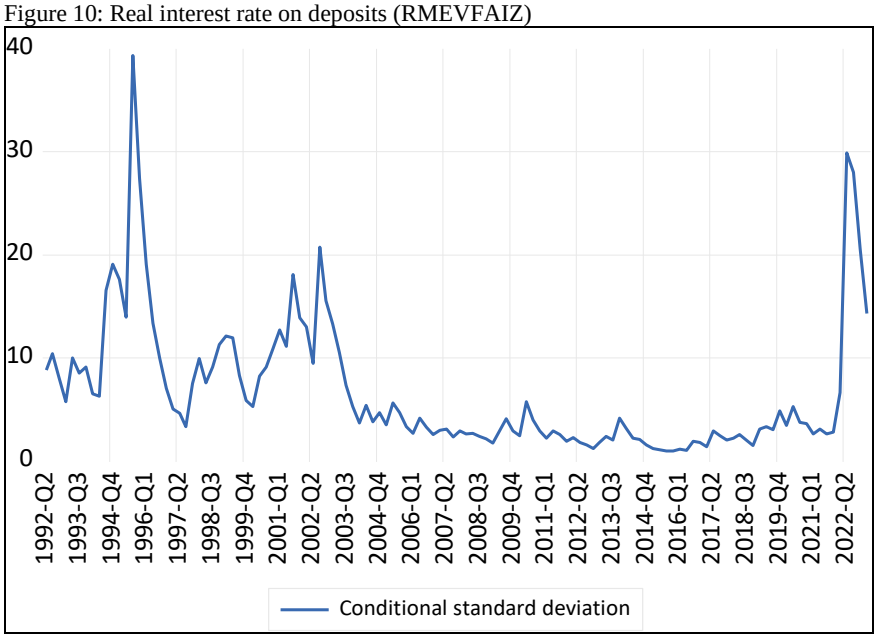
Another widely utilized indicator of crises is the ratio of short-run external debt to gross international reserves. This indicator, as well as its volatility, can be employed to assess the likelihood of a crisis. It is noteworthy that the volatility of this indicator experienced a substantial increase prior to the crises of 1994, 2000, and 2008 (**Hata! Başvuru kaynağı bulunamadı.**). Therefore, in addition to its conventional application, one can c onsider this volatility as an additional factor for analysis.

Figure 9: Ratio of short-run external debt to gross international reserves (KVDBBRO)



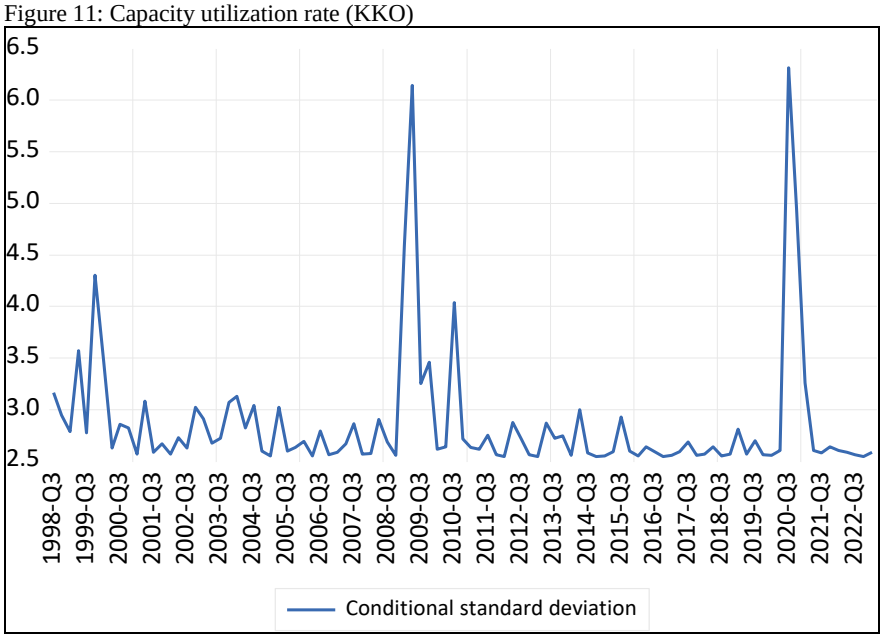
Another indicator that proves to be significant is the real interest rate on deposits. It has shown its effectiveness in the crises of 1994, 2000, and 2001, but its importance becomes particularly prominent following the decision of the Central Bank of the Republic of Turkey (CBRT) to reduce policy rates (**Hata! B aşvuru kaynağı bulunamadı.**).

Figure 10: Real interest rate on deposits (RMEVFAIZ)



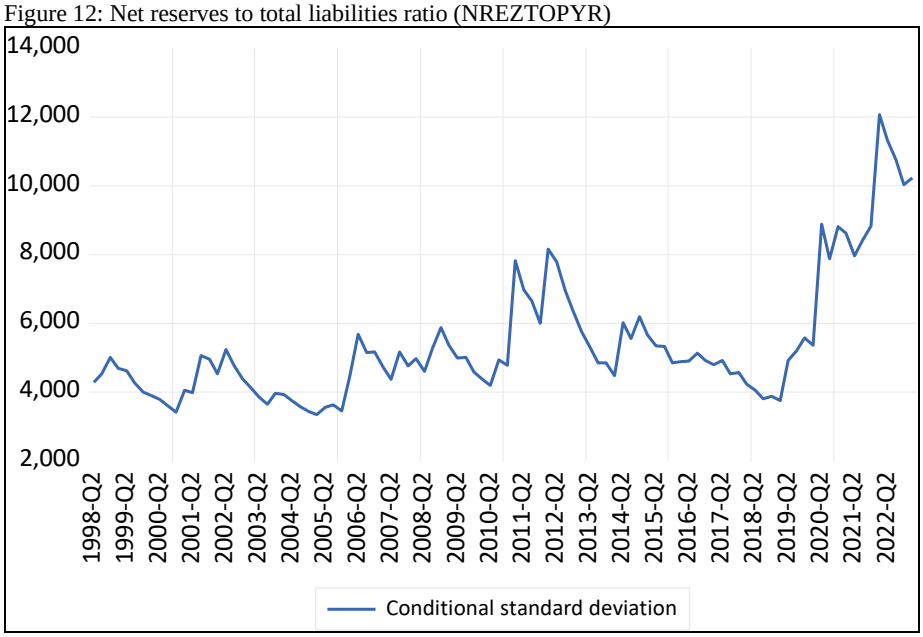
The volatility of the capacity utilization ratio has demonstrated its usefulness as a reliable leading indicator, particularly during periods of upheaval triggered by external factors, such as the 1998 East Asian crisis, the 2008 global crisis, and the ongoing Covid-19 pandemic (**Hata! Başvuru kaynağı bulunamadı.**).

Figure 11: Capacity utilization rate (KKO)



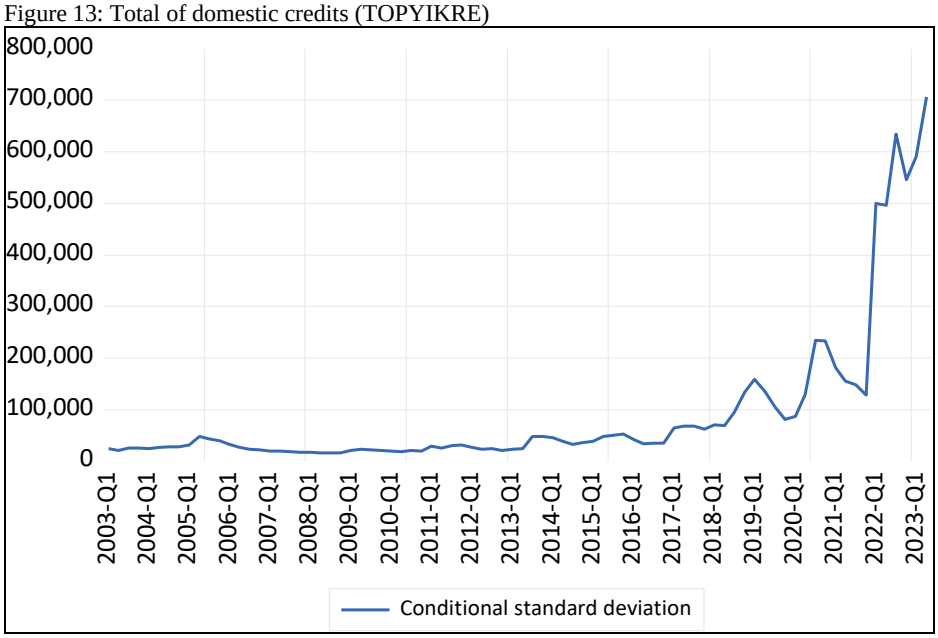
The ratio of net reserves to total liabilities indicates the strength of an economy's position in relation to its external financial commitments. A higher ratio signifies that an economy possesses a greater amount of foreign exchange reserves and a stronger financial buffer to meet its obligations. This situation holds significant importance in supporting economic stability and exchange rate stability. There has been an increase in volatility during the period of 2011-2012. The volatility of this ratio has significantly increased following the period of turmoil in 2018 (**Hata! Başvuru kaynağı bulunamadı.**).

Figure 12: Net reserves to total liabilities ratio (NREZTOPYR)



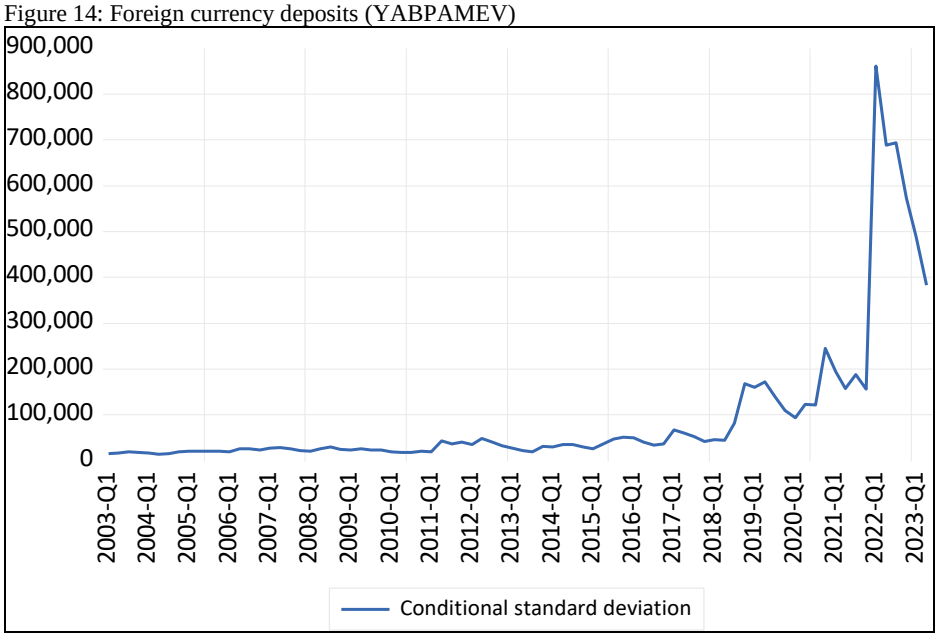
There are several banking system indicators, and one of them is the total of domestic credits. This indicator has proven to be reliable, especially during the implementation of macroprudential measures by the Central Bank of the Republic of Turkey (CBRT) to support economic policies aimed at combating inflation. However, it is worth noting that the volatility of this indicator has experienced a significant increase after 2022 (**Hata! B aşvuru kaynağı bulunamadı.**).

Figure 13: Total of domestic credits (TOPYIKRE)



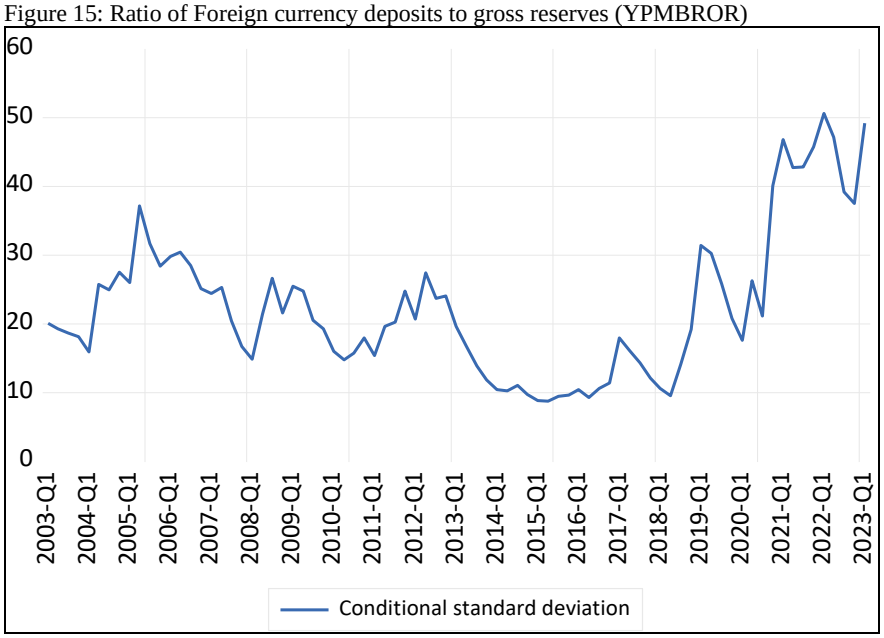
Foreign currency deposits are considered crucial indicators in countries like Turkey, where there is a high level of currency substitution. This indicator not only reflects the extent of currency substitution but also serves as a warning sign when the volatility of foreign currency deposits starts to rise, indicating potential upcoming difficulties. As of the year 2022, there has been a significant and concerning increase in volatility (**Hata! B aşvuru kaynağı bulunamadı.**).

Figure 14: Foreign currency deposits (YABPAMEV)



The ratio of foreign currency deposits to gross reserves is employed to assess a country's vulnerability to external shocks and the potential for balance of payments crises. The escalating volatility of this ratio since 2018 should be subject to careful examination in conjunction with other indicators related to the balance of payments (**Hata! Başvuru kaynağı bulunamadı.**).

Figure 15: Ratio of Foreign currency deposits to gross reserves (YPMBROR)



CONCLUSION

The Turkish economy has been walking a rather risky path, particularly after the 1990s, encountering frequent financial crises along with observed fluctuations in widely accepted leading crisis indicators in the literature. Early warning systems for crises play a crucial role in identifying these leading indicators, thereby mitigating the probability of crises and implementing appropriate policy choices and measures, which are of utmost importance for country economies. In this regard, Turkey's experiences with the 1994 and 2001 crises offer significant lessons. Notably, the stability program implemented after the 2001 crisis and the institutional regulations in the monetary and financial markets have partially demonstrated their effectiveness in coping with crises. However, there remains a necessity to address financial crisis indicators in the context of economic policy with increased sensitivity.

This study focuses on the years 1994, 1998, 2000, 2001, and 2008, which are recognized as crisis years, and employs appropriate AR(r)-GARCH(p,q) models to model the volatility of indicators using well-established crisis indicators from the literature for financial crises.

The volatility of some indicators significantly increased during these crisis years. Therefore, it can be argued that these indicators may have predictive power (See Table 1 on Appendix). Among the indicators examined, stock prices demonstrated the highest level of success in capturing all the relevant crises during the estimation period. The second most successful indicator is the export-to-import coverage ratio, which successfully captured all the crises except for the one in 2008. In terms of the inflation rate and the real interest rate on deposits, these indicators proved to be the third most successful, as they accurately captured the crises in 1994, 2000, and 2001. The ratio of short-run external debt to gross international reserves successfully captured the crises in 1994, 2000, and 2008, while gross international reserves alone only captured the crisis in 1994. Furthermore, the current account balance and the ratio of foreign currency deposits to gross reserves were only successful in capturing the crisis in 2008. The current account balance to GDP ratio accurately captured the crises in 2000 and 2001, while the capacity utilization rate captured the crises in 1998 and 2008. On the other hand, private sector credits, net reserves, net reserves to total liabilities ratio, and the total of domestic credits and foreign currency deposits were unsuccessful in capturing any of the crises.

Additionally, it has been observed that the volatility of certain indicators reached its peak during the periods of 2011-2012, 2018-2019, and 2022-2023, although these periods are not typically recognized as crisis years. Specifically, the current account balance exhibited the highest volatility during both the 2011-2012 and 2018-2019 periods, as well as the ongoing period of 2022-2023. Private sector credits, the CAB to GDP ratio, and the export-to-import coverage ratio also experienced high volatilities in the years 2018-2019 and 2022-2023. Furthermore, the volatilities of the net reserves to total liabilities ratio and the ratio of foreign currency deposits to gross reserves reached their peaks in 2011-2012 and 2018-2019.

In economies like Turkey, which have been contending with financial crises for an extended period, it is recommended to design and implement more sophisticated policies, taking into account variables that elevate the likelihood of crises, as a means to avoid them effectively.

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APPENDIX

Table 1: The years with high volatility of indicators.

Label	Variable	1994 crisis	1998 crisis	2000 crisis	2001 crisis	2008 crisis	2011-2012	2018-2019	2022-2023
BIST100	Stock prices	✓	✓	✓	✓	✓			
BRUTREZ	Gross international reserves	✓							
REELSEKKRE	Private sector credits							✓	✓
NETREZ	Net reserves						✓		
CID	Current account balance					✓	✓	✓	✓
CIDGDPR	CAB to GDP ratio			✓	✓			✓	✓
ENFORN	Inflation rate	✓		✓	✓				✓
IHITKORN	Export to import coverage ratio	✓	✓	✓	✓			✓	✓
KVDBBRO	Ratio of short-run external debt to gross international reserves	✓		✓		✓			
RMEVFAIZ	Real interest rate on deposits	✓		✓	✓				✓
KKO	Capacity utilization rate		✓			✓		✓	
NREZTOPYR	Net reserves to total liabilities ratio						✓	✓	
TOPYIKRE	Total of domestic credits								✓
YABPAMEV	Foreign currency deposits								✓
YPMBROR	Ratio of foreign currency deposits to gross reserves					✓	✓	✓	

Table 2: Estimation Results of GARCH models

Dependent Variable	Stock prices	Gross international reserves	Private sector credits	Net reserves	Current account balance
Label	**BIST100**	**BRUTREZ**	**REELSEKKRE**	**NETREZ**	**CID**
C	0.0365**		444128.4115***	202.2887	-707.5398***
	(0.0183)		(53835.5339)	(471.2645)	(169.9941)
AR(1)		0.2058**			
		(0.0801)			
Variance Equation					
C	0.0013	0.0002***	51850848605**	2953681.0299	147293.8105
	(0.0010)	(0.0001)	(20252963340)	(2015523)	(131465)
RESID(-1)^2	0.1438**	0.0628*	0.3024***	0.8443***	0.3280**
	(0.0617)	(0.0299)	(0.0238)	(0.2563)	(0.1521)
GARCH(-1)	0.8346	0.8909***	0.5546***	0.2677**	0.7404***
	(0.0659)	(0.0287)	(0.0245)	(0.1192)	(0.0927)
Observations	124	125	124	125	125
R-squared	-0.0318	-0.0281	-0.0883	-0.8992	-0.5409

Adjusted R-sq	-0.0318	-0.0281	-0.0883	-0.8992	-0.5409
S.E. of regression	0.2234	0.1081	11399683	24939	7649
Sum sq resid	6.1372	1.4256	15984190973139100	77124334493	7254702897
Log likelihood	24	121	-1973	-1357	-1229
Durbin-Watson	1.8835	2.0773	1.2035	0.0431	0.3139

Table 2: Estimation Results of GARCH models (continued)

	CAB to GDP ratio	**Inflation rate**	**Export to import coverage ratio**	**Ratio of short-run external debt to gross international reserves**	**Real interest rate on deposits**
Dependent Variable	**CIDGDPR**	**ENFORN**	**IHITKORN**	**KVDBBRO**	**RMEVFAIZ**
C	-0.0226	-0.2981	-0.0530	0.0401	-0.0535
	(0.3014)	(0.2997)	(0.6378)	(0.8780)	(0.1974)
AR(1)		0.3487			
		(0.0699)			
Variance Equation					
C	0.7228	-0.1263	7.0904**	6.4503	0.2869
	(1.7515)	(0.3190)	(3.4664)	(7.2611)	(0.3637)
RESID(-1)^2	0.0347	1.1683	0.1738**	0.1298*	0.9704***
	(0.0701)	(0.1619)	(0.0774)	(0.0702)	(0.1156)
GARCH(-1)	0.8873***	0.5279	0.6930***	0.8259***	0.4774***
	(0.2505)	(0.0450)	(0.0893)	(0.0824)	(0.0486)
Observations	100	125	125	124	125
R-squared	-0.0004	0.0509	0.0000	-0.0003	-0.0001
Adjusted R-sq	-0.0004	0.0430	0.0000	-0.0003	-0.0001
S.E. of regression	2.9063	7.6565	7.3069	10.6362	7.1751
Sum sq resid	836	7093	6567	13802	6332
Log likelihood	-247	-364	-416	-461	-367
Durbin-Watson	2.1195	2.0971	1.8555	1.8943	1.4138

*Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01*

Table 2: Estimation Results of GARCH models (continued)

	Capacity Utilization rate	**Net reserves to total liabilities ratio**	**Total of domestic credits**	**Foreign currency deposits**	**Ratio of Foreign currency deposits to gross reserves**
Dependent Variable	**KKO**	**NREZTOPYR**	**TOPYIKRE**	**YABPAMEV**	**YPMBROR**
C	-0.0426	100.8895	18123.6502***	9268.3761**	3.0836*
	(0.3051)	(490.3773)	(3306.5083)	(4161.9282)	(1.6541)
AR(1)	-0.0887				
	(0.1444)				
Variance Equation					
C	6.0136***	1923336	100713419**	52656930	18.2553
	(2.2088)	(2461503)	(44708374)	(82216499)	(25.6811)
RESID(-1)^2	0.2219*	0.2135*	0.3578***	0.5630***	0.4244**
	(0.1262)	(0.1167)	(0.1219)	(0.2078)	(0.2109)
GARCH(-1)	0.0688	0.7607***	0.5864***	0.6096***	0.6202***
	(0.3136)	(0.1551)	(0.0844)	(0.1066)	(0.1487)
Observations	99	100	82	82	81
R-squared	0.0217	-0.0005	-0.1953	-0.0698	-0.0173
Adjusted R-sq	0.0116	-0.0005	-0.1953	-0.0698	-0.0173
S.E. of regression	3.0274	5697	220673	161081	23.3440
Sum sq resid	889	3213386003	3944418951100	2101706202898	43596
Log likelihood	-243	-996	-1029	-1019	-358
Durbin-Watson	2.1619	2.1670	0.3900	1.4392	2.6008