
Currency crises and economic growth of emerging countries:

An Analysis for Turkish economy in 1970-2017

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Abstract:

The main purpose of this research paper is to identify the effect of currency crises on economic growth in the emerging Turkish economy. The objective of present study is to empirically examine the short-run and the long run relation between currency crisis and economic growth condition in turkey over the period from 1970 -2017, by employing the autoregressive distributive lag (ARDL) modelling technique based on Pesaran et al. (2001). The selected period is important, because it represents the crucial time for Turkish economy, this explains his affected by too many economic phenomena.

This research work is one of the very few studies that have investigated Influence the currency crisis on long run economic growth in turkey country situation using ARDL model. Moreover, it contributes to the existing literature in the area.

Keywords: *currency crises, GDP Growth, impulse function, Turkish economy, Autoregressive Distributed Lag (ARDL).*

JEL Classification : *F31, F43, G01*

I. Introduction

In recent decades, the economic situation was characterized by series of profound and rapid changes. It has contributed to the re-operation of many economic and financial systems to suit these transformations in developed and emerging economies. The financial crises of various kinds are focus of attention of many researchers and economists, they reflect the phenomenon spread throughout history (*Franklin Allen, 2009, p. 98*), it should also be noted that, the crises are a feature of the capitalist economic system, which was confirmed by the economic thinker *charles.p.kindlerberger* in 1978 when he said.

“There is no Capitalism without Financial Crises”.(*lacoste, 2015, p. 11*)

The various works of economic researchers have proved that analyzing, and understanding crises and comparing them is complex and difficult. (*Michael Bordo, 2002*), has identified three types of international crises: financial crises, which include (exchange rate crises, financial bubble crises, public debt crises), banking crises and systemic crises. Where every kind of crisis leads to the collapse of financial asset prices and the result is a financial crisis that threatens the stability of financial systems.

In general, financial crises come in several forms, depending on whether they affect financial markets or financial institutions. As a result, we note there are major types of financial crises, such as exchange rate crises, bank crises, real estate crises and debt crises, financial market crises, and other types of crises in twin crises.

We note that during these last years, the economic situation has **been aggravated** by the financial and economic crises **experienced** by a number of countries in the world, particularly emerging countries as a result of their macroeconomic instability, as a result of an economic policy that is not appropriate to their real potential.

Some studies have indicated that more than a third of the International Monetary Fund (IMF) member states suffered crises during the 1980-1999 period, which was caused by the fragility of their economic structure.

The most important of these crises is the Mexican currency crisis, which declared the first real crisis in this emerging country, which lasted from 1994 to early 1995, which had devastating effects on the countries of the region. **Two years later**, exactly in July 1997, the Asian financial crisis spread from Thailand to other countries in the region: the Philippines, Malaysia and Indonesia. Most recently, the Russian crisis emerged in August 1998, the Brazilian crisis of January 1999, the Turkish crisis in 2000 and the Argentine crisis of 2001, which had negative effects on the economies of those countries.

Currency crises are conceptually defined as an abrupt depreciation of the currency, for example, (*Frankel, Jeffrey A. et Rose, Andrew K, 1996*), defined a currency crisis as a depreciation of the nominal exchange rate of at least 25 % that is also at least a 10 % cent increase in the rate of nominal depreciation. Also According to the authors (*Eichengreen, Barry, Rose, Andrew K., et Wyplosz, Charles, 1995*), where the currency crisis is specified to include both the significant decline

in value as well as the speculative attacks that the authorities have avoided. Moreover, the Currency crashes are a main cause of losses on the level of financial markets and turbulence in international trade.

During these crises, the costs of international settlements can become too costly or even impossible to honor, especially when crises affect the global economy. In the context of the severe turbulence, linked with currency crises, and given the importance of the subject, and its impact on the macroeconomic level, we attempted to study the currency crises.

The purpose of this work is to try to measure the impact of the currency crisis on economic growth, with a focus on the Turkish economy during the period 1970-2017.

The rest of this paper disorganized as follows: First, we present the main works on the subject, which is related to the impact of the currency crisis on economic growth. The second section, we identify a more detailed of the episodes of currency crises, the third section, presents information about the economic method used which is the Autoregressive Distributed Lag (**ARDL**) model, then involves an interpretation of the analysis results, the final section, presents some concluding remarks.

II. Literature review

(Bordo M., Eichengreen D., Klingebiel D & Martinez-Peria M., 2001), focused on studying the frequency of financial crises and their effects on economic growth, Their analysis covers a long period (1880-1997) and applies to a sample of industrialized and emerging countries.

The authors distinguish in particular the periods of 1880-1913 (gold standard period), 1919-1939 (between two wars), 1945-1971 (the regime of Bretton Woods) and 1973-1997 (post Bretton Woods), comprising on the periods selected the sample size varies from 21 and 56 emerging and industrialized countries.

Overall, their results show that a crisis has an annual cost of 5 to 10% of GDP and that its effects last on average from two to three years. Although the frequency of crises almost doubled during the "modern" period post-1973, its costs did not increase as compared to the previous period. An important conclusion of this study is therefore that financial globalization has not amplified the severity of the crises.

Table (1): long-term evolution of duration and the depth of crises

	1880 -1913	1919-1939	1945-1971	1973-1997	1973-1997
				21countries	56countries
Average duration of crises in (years)					
Currency crises	2,6	1,9	1,8	1,9	2,1
Banks crises	2,3	2,4	----	3,1	2,6

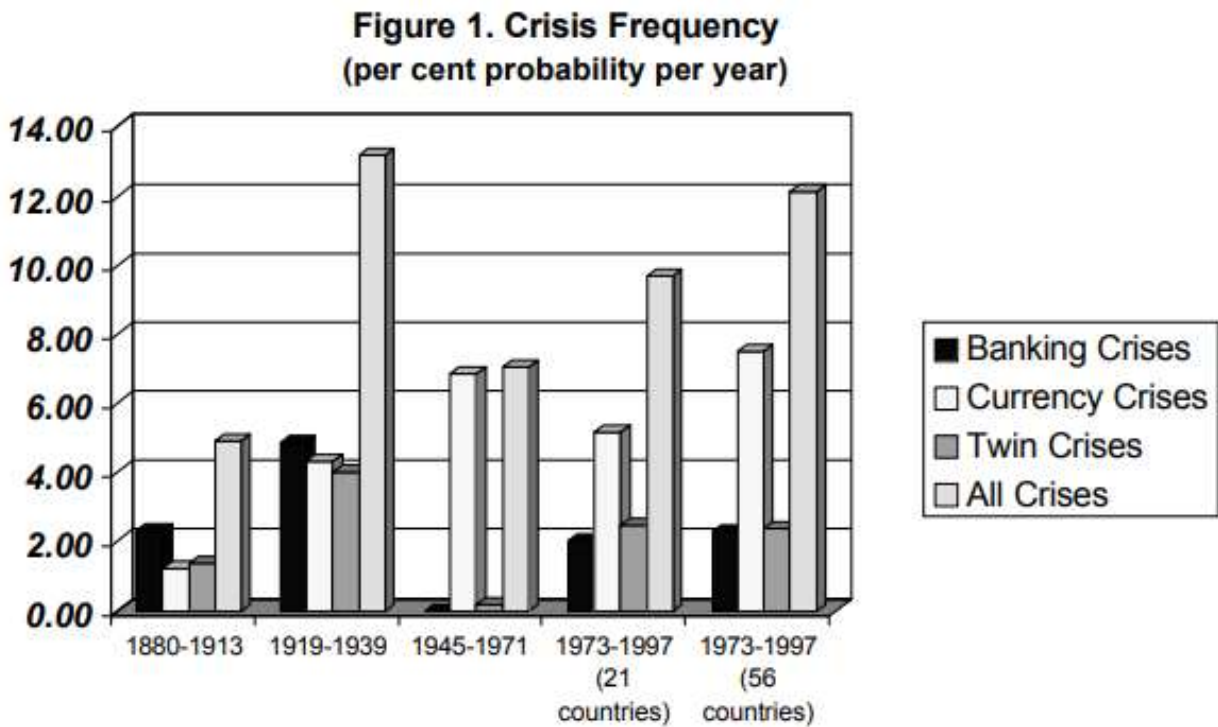
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All crises	2,4	2,4	1,8	2,6	2,5
Average depth of crises (cumulative losses of GDP)					
Currency crises	8,3	14,2	5,2	3,8	5,9
Banks crises	8,4	10,5	---	7,0	6,2
All crises	9,8	13,4	5,2	7,8	8,3

Source:(Bordo M., Eichengreen D., Klingebiel D & Martinez-Peria M., 2001)

According to the study by the authors, the financial crises, specifically the currency crises, are characterized by the short term, and this during the Bretton Woods period from 1945 to 1971 compared to other periods. Also, in terms of the depth of the impact of currency crises on economic growth, where a slight effect was observed in the same period, the table above shows the average duration and depth of crises

Figure (1): Frequency of Crises



Source:(Bordo M., Eichengreen D., Klingebiel D & Martinez-Peria M., 2001)

From an empirical point of view, (Barro, 2001), evaluated the impact of currency and banking crises in Asia in 1997 on investment and economic growth, adopting a panel approach (on a sample of 67 emerging and industrialized countries) with five-year observations, its study focuses on 10 countries divided into two groups over the period (1960-2000).

The first group consists of countries that experienced the largest currency devaluation more than 50% between July 1997 and early 1998 (South Korea, Indonesia, Malaysia, Philippines and Thailand), while the second group is composed of (China, Hong Kong, Japan, Singapore and Taiwan).

The results of this study show that a currency crisis is associated with a 1.3% loss in the growth rate of the Real GDP and 0.4% of the investment rate (defined by the investment / GDP ratio)

From an empirical point of view, (Ben Abdallah, M., & Diallo, K, 2004) evaluated the incidence of financial crises (currency, banking and twins crisis) on the growth and on the investment. From a sample of 17 emerging countries, during the period 1974 -2000, using dynamic panel approach, the analysis conducted in this study; highlight the significantly negative effects of currency and banking crises on economic growth and investment.

The authors find that crises, whatever their type, are generally followed by a substantial contraction of the economic activity. More specifically, currency crises, in contrast to the banking ones, appear to have a more substantial impact on the economic growth than on the investment. On the other hand, twin crisis seems to have a greater impact than the two first ones.

(CERRA, Valerie et SAXENA, Sweta Chaman, 2008), studied the effect of currency crises and political crises on economic growth from a sample of 109 industrialized and emerging countries, Using panel data for a large number of countries.

The authors show that ,the crises, and other negative shocks lead to absolute divergence and lower long-run growth, whereas we find absolute convergence in expansions ,also The output costs of political and financial crises are permanent on average and long-term growth is negatively linked to volatility. Their found that the various shocks are followed by a loss of between 4% and 16% of GDP. These authors also imply that panel data studies can help identify the sources of growth and that economic models should be capable of explaining growth and fluctuations within the same framework.

(BUSSIÈRE, Matthieu, SAXENA, Sweta C., et TOVAR, Camilo E., 2012), Attempted to analyze the relationship between economic growth and exchange rates. The authors have tried to show how exchange rate crises affect economic growth and the trend of GDP, using a sample of 108 emerging and developing economies for the period 1960-2006.

Showing they are associated with a loss of between 2% and 6% of GDP. The losses in terms of economic growth appear before the onset of the crisis, which led to the conclusion that the decline in economic activity is one of the precursors of the currency crises. The most interesting conclusion drawn by these authors is that currency crises have a positive effect on economic growth one year after the onset of a crisis.

(Ali Raza ,Mohd Zaini Abd Karim, 2017), tested the influence of currency crises, systemic banking crises, and global financial crisis on the relationship between export and economic growth in China by using the annual time series data from the period of 1972 to 2014.

Thousandth Johansen and Jeuselius' cointegration; auto regressive distributed lag bound testing cointegration, Gregory and Hansen's cointegration and pooled ordinary least square techniques with error correction model.

This research paper indicate the positive and significant effect of export of goods and services on economic growth in both long and short run, whereas the negative influence of systemic banking crises and currency crises over economic growth is observed.

The authors also concluded that the impact of export of goods and service on economic growth becomes insignificant in the presence of systemic banking crises and currency crises.

(*Chang-Shuai, 2017*), Worked on the effect of banking and currency crises on long-run growth. The data cover 130 economies during the period of (1800 to 2010), some dating from 1800 with the rest beginning in later years. The author identify that both the frequency of banking crises and the frequency of currency crises have a negative and statistically significant effect on growth in the short run and a positive effect on growth, though statistically insignificant, in the longer run.

More specifically, the author find that the frequency of banking crisis, is statistically significantly Correlated to growth for the time windows of 1 decade and 2 decades, and then this negative relationship becoming increasingly more statistically insignificant overall for time windows from 3 decades to 10 decades. Finally, it turns into positive, though statistically insignificant, for the time windows of 13 decades and longer for the sample. And with regard to the frequency of currency crisis is significantly negatively associated with growth overall for the time windows of 1 decade to 10 decades, and it turns into insignificantly positive for time windows for 13 decades and even longer.

(*Hamida, 2018*), worked to measure the impact of currency crises on the economic growth, This research paper Applied impulse response function and the technique of dynamic panel , using a sample of 17 emerging countries over a period stretching from 1980 to 2015. This study of impulse response functions has shown that the impact of currency crises on economic growth of emerging countries is negative and persistent over the short period and varies from one country to another. For all countries and over a period of 10 years, a currency crisis has had a negative effect, which can reach 11% of GDP during the first four years after the crisis. The author shows in this study the deep and persistent effect of currency crises on economic activity.

III. Identification of Crisis Periods

Crisis periods are determined by constructing a crisis index. Where Different empirical and theoretical aspects show that there is superiority in a theoretical approach to another. Therefore, different sources of tension must be considered in order to identify currency crises in emerging economies.

a) Definition of a currency crisis index

There are various and many ways to identify the warning indicators in the empirical framework, as the currency crisis has also known many concepts in many empirical studies.

According to the study conducted by the author (Hamida, 2018), when the crisis index reaches significant values, then the currency crisis is determined, where the high in the crisis index is a strong pressure on the foreign exchange market, which requires the sale of the local currency.

More specifically, the currency crisis is a period where the index is larger Two or three times the standard deviation of the mean.

b) Index Calculation

Where we chose to use the Crisis Index rated (Crise) approaching those developed by *Sachs & al or Goldfagin & Valdés*.

The index is defined as an average of changes in the real exchange rate against the US dollar, and negative changes in international reserves, weighted by the inverse of their respective standard deviations (*Cartapanis, A., Dropsy, V., & Mametz, S, 1998*).

$$CRISE_{i, \tau} = \left[\frac{\log\left(\frac{TCR_{i, \tau}}{TCR_{i, \tau-1}}\right)}{\sigma_{DTCR}} \right] - \left[\frac{\log\left(\frac{RES_{\tau}}{RES_{\tau-1}}\right)}{\sigma_{RES}} \right] \dots\dots\dots (1)$$

With

$$TCR = (TCN \times P_{us}) / P \dots\dots\dots (2)$$

Whereas:

TCN : Nominal exchange rate (unités de livre turque TL/unités de dollar américain US\$
IPC^{US} : US price index (indice des pris à la consommation américaine
IPC : Domestic price index(indise des prix à la consommation turkey
RES : Foreign exchange reserve in US dollars;(réserves internationales moins le stock d'or de la Banque centrale
DTCR : log (TCR _t /TCR _{t-1})
DRES : log (RES _t /RES _{t-1})
σ_{DTCR} : Standard deviation of DTCR
σ_{RES} : Standard deviation of DRES

TCR: real exchange rate against the dollar (an increase corresponds to a real depreciation of the domestic currency).

The crisis index is high when the standardized rate of real consumption of the currency is high and / or the standardized rate of decline in foreign exchange reserves is high.

This indicator makes it possible to determine the periods during which the country is subject to speculative attack, which is then identified by the extreme values of the index

Model and Methodology

We shall present our data sources then the econometric approach

I. identify of research period and Sources of Data

The sample includes 47 annual observations for the period 1970-2017. This period was determined through a series of currency crises that affected the Turkish economy, changed the channel of financial decisions, and issued new economic policies and reforms, The study data used to estimate **ARDL** model were obtained from different issues of World Bank database exactly in world development indicators (WDI) and International financial Statistics(IFS).

II. Methods Of Estimation

The autoregressive distributed lag (**ARDL**) is a technique that allows us to simultaneously estimate the short-run and long run dynamics of our model, even when the time-series are stationary I (0) or integrated of order I (1).

The variables may include a mixture of stationary and non-stationary time-series for ARDL Bounds testing approach proposed by(PESARAN, M. Hashem, 1997), (Pesaran, M. H., Shin, Y., & Smith, R. J, 2001).

➤ **The model**

The estimate of the impact of currency crises on growth is made from the following growth equation:

$$GDP = f(inflation , i ndexcrisis)..... (3)$$

The mathematical representation of an ARDL regression model is:

$$GDP(t) = \alpha_0 + \beta_1 GDP(t - 1) + \beta_2 INF(t) + \beta_3 INDEXCISIS(t) + \varepsilon(t)..... (4)$$

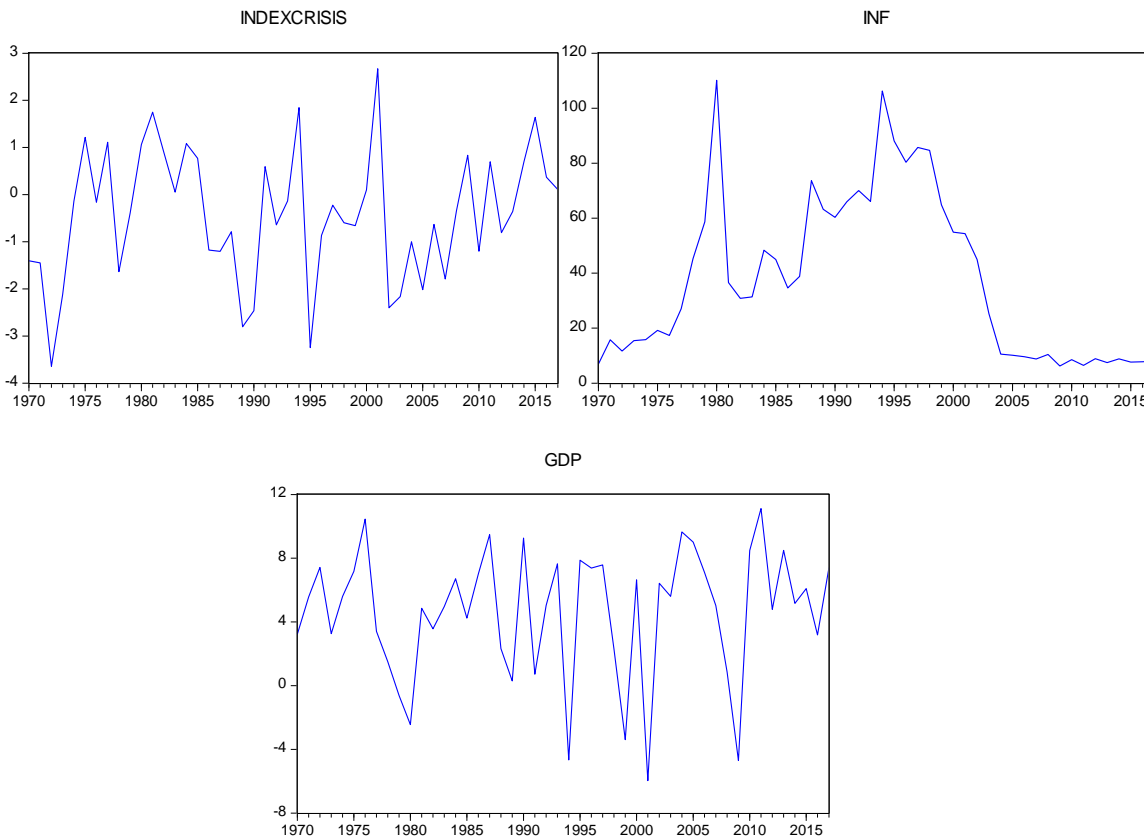
Where:

α_0 Represent the intercept of the function or we can say the constant, and ε is a random "disturbance" term, and then β_1 ; β_2 ; β_3 are parameter to be estimated.

III. Empirical Results

a) Pre-estimation Analysis

Before estimation, the graphs of the time series under study are plotted, descriptive statistics are displayed, unit root test for the variables are performed, and co-integration analysis is done on the variables. The figures below show the line graphs of the historical performance of the variables used in this study.



Source: Author's Computation with E-view 09

b) Unit Root Tests for the Variables

Before presenting empirical results of the ARDL model, we apply the following econometric steps of the stationary and non-stationary Tests of the time series data by Augmented Dickey-Fuller (1979) (ADF) & Philips-Perron (1988) (PP). (Phillips, P., Perron, P, 1988) (Dickey, D.A. & W.A. Fuller, 1979) Test.

The Augmented Dickey-Fuller (ADF) and Philips-Perron test results for the time series variables are presented in Tables (2, 3) below.

Table (2): results of unit root test (The Augmented Dickey-Fuller test)

Variables	At level		At First Difference		Results
	ADF statistical	Result	ADF statistical	Result	
GDP	-6.613774	stationary	---	---	I(0)
INF	-2.048335	No stationary	-8.191157	stationary	I(1)
INDEXCRISIS	-5.102483	stationary	----	-----	I(0)

Source: Author's Computation with E-view 09

In the results shown in **Table (2)** above, The Augmented Dickey-Fuller (ADF) test statistic of the inflation variable (**INF**) are greater than the respective critical values. Thus, we accept the hypothesis of unit roots of this latter, and not significant at 1%, 5%, 10 % level with (*MacKinnon 1996*).

In our final evaluation, all the variables witch are (**GDP** and **index crisis**) became stationary in at level $I(0)$, excepting the variable inflation is integrated of order $I(1)$,

To make sure and check the results, we will use the test (**Phillips and Perron**), Where we get the same results as shown in the table below.

Therefore, to study the long-term relationship between the variables of the study, we will use the autoregressive distributed lag(ARDL) method, because of a combination of stable time series between, $I(0)$ and order $I(1)$.

Table (3): results of unit root test (Phillips-Perron Test)

Variables	At level		At First Difference		results
	(pp) statistical	Result	(pp) statistical	Result	
GDP	-6.613615	stationary	----	----	I(0)
INF	-1.959986	Non stationary	-8.377596	stationary	I(1)
INDEXCRISIS	-5.058470	stationary	---	-----	I(0)

Source: Author's Computation with E-view 09

Before estimating the ARDL model, we must determine the optimum degrees delays for the model. The choice of the degree of delay according to the following criteria: Akaike, Schwarz and Hannan-Quinn, depending on the lowest statistical value for the criteria that correspond to the acceptable.

Table (4): VAR Lag Order Selection Criteria

Lag	Logl	LR	FRE	AIC	SC	HQ
0	-404.4594	NA	22187.32	18.52088	18.64253	18.56600
1	-375.2184	53.16555*	8854.799*	17.60084*	18.08743*	17.78129*
2	-367.5680	12.86656	9477.999	17.66218	18.51373	17.97798
3	-363.2108	6.733862	11894.38	17.87322	19.08971	18.32435
4	-357.3311	8.284980	14127.60	18.01505	19.59649	18.60153

Source: Author's Computation with E-view 09

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

After examining the number of the degrees of delays, the results indicate that the number of delay intervals followed by variables is **P =one** and this is because it corresponds to the smallest value for most standards.

b) ARDL Bounds test estimation results

To determine the existence of long run relationship among the variables of the study, the (Pesaran, M. H., Shin, Y., & Smith, R. J, 2001)

Bound test procedure was used. The bound test results were presented in Table (5) below.

Table (5): ARDL Bounds test results

Test Statistic	Value	K
F-statistic	18.77871	2
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	3.17	4.14

5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Source: Author's Computation with E-view 09

The result reveals that F-Statistics is ($F=18.77871$), which is greater than the upper $I(1)$ and lower $I(0)$ critical bound of 6.36 at 1% level, 5.52 at 2.5% level, 4.85 at 5% level and 4.14 at 10% level. Thus, the null hypothesis can be rejected.

This suggests that there is long run relationship among GDP, index crisis and INF over the period of the study (1970 to 2017).

c) Estimated Coefficients using the ARDL approach

The next step of the ARDL approach would be to estimate the coefficients long run relationship of the variables.

The results of the long run estimated coefficients are presented in Table (6)

Table (6): ARDL Cointegrating and Long Run Form (Dependent Variable: GDP)

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	P.Value
Short- Run Coefficients				
D(INF)	-0.049144	0.018596	-2.642669	0.0114
D(INDEXCRISIS)	-1.010340	0.395843	-2.552378	0.0143
CointEq(-1)	-0.990893	0.137493	-7.206863	0.0000
Cointeq = GDP - (-0.0496*INF - 1.0196*INDEXCRISIS + 6.1452)				
Long -Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	P.Value
INF	-0.049595	0.018624	-2.662959	0.0109
INDEXCRISIS	-1.019626	0.450533	-2.263154	0.0287
C	6.145195	0.913313	6.728467	0.0000

Source: Author's Computation with E-view 09

The results of our estimates show that the coefficient of the index crisis indicator is a very predictable and important sign.

These results show that the crisis index (currency crisis) to be significantly negative, Where it appears to decrease economic growth by about 1 percentage point per year.

As such currency crises coefficient suggest a negative related to economic growth (GDP)and the relationship is strongly significant with latter, This result conforms with a priori expectation because currency crisis is a situation for which an attack of the currency leads to a depreciation of the same currency and his has a significant negative effect on economic growth.

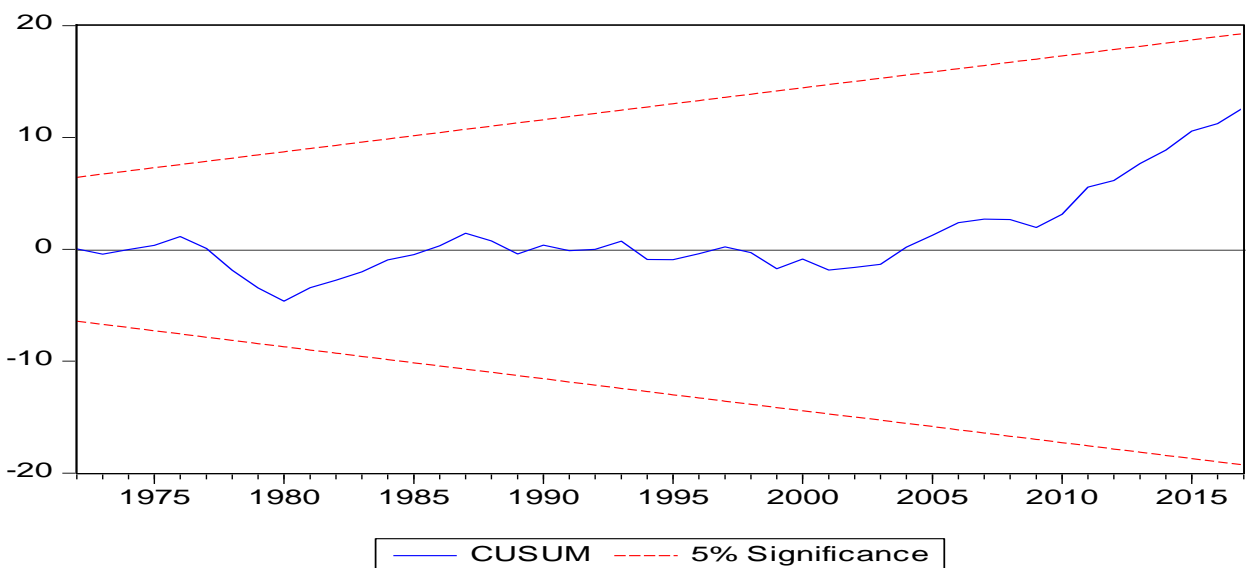
d) Stability test of the model

To make sure, that the data used in this study, does not contain any structural changes, we should use one of the appropriate tests **CUSUM**, and **CUSUM OF SQUARES**.

which (Brown , Robert L ,Durbin,James,& EVANS ,James M, 1975), developed in order to clarify the structural change in data ,and the extent of stability and consistency ,of long-term parameters with short-term parameters.

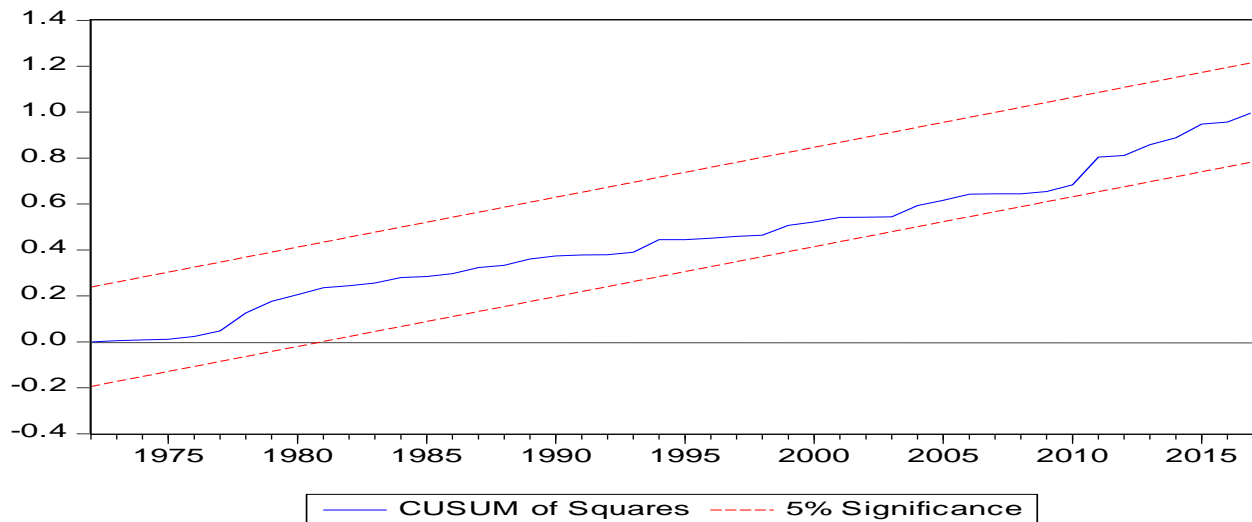
If the plot of CUSUM-SQ and CUSUM statistic stays within **5%** significance level, then the estimated coefficients are said to be stable. A graphical presentation of this test for our **ARDL** model is provided in Figures1, 2 below.

Figure 1: Plot of CUSUM showing stability of the Model



Source: Author's Computation with E-view 09

Figure 2: Plot of CUSUM-SQ showing stability of the Model



Source: Author's Computation with E-view 09

The result in The Figure shows that the curve (**CUSUM**)within critical limits is 5%, as well as for the curve (**CUSUM OF SQUARES**) located within the critical area, which explains that the model is stable at 5%.

Thus, we can say that the model are statistically acceptable and stable over time. Between 1970 and 2017.

IV. Concluding remarks

This research paper aims to investigate the effect of currency crisis on economic growth in turkey. *The Autoregressive Distributed Lag (ARDL)* newly developed approach *has* been employed to capture the short-run and long-run cointegration between currency crisis indicator and economic growth variable. Annual time series data from 1970 to 2017 has been used for analysis.

The study employed newly developed **ARDL** bound testing to capture long-run cointegration between financial innovation, market-based financial development, and economic growth.

Both variables are tested for unit root and before cointegration test, bound test has employed. Both variables are stationary at first difference and level, which are desirable for running **ARDL** model, as shown in table 1 and 2. Several test has be conducted for stability analysis of model and diagnostic test as shown in table 6, the plots of **CUSUM** and **CUSUM-SQ** test also performed for model stability, results are statistically significant at **5%** significance level, shown in figure 1 and 2.

Table 5 shows the bound test results, these results are statistically significant at 1%, 2.5%, 5%, and 10% significances levels, which shows that suggested there is long run relationship among GDP, index crisis and INF over the period of the study (1970 to 2017). After bound test, we estimate short-run and long-run cointegration tested, our results are showing in table 6. As for ardl model, we found

that currency crises negatively affect economic growth. Which implies that economic decreases as crisis index level increase.

The coefficients are of expected signs that are consistent with the theories, which consolidate our choice of model and our measure of episodes of currency crisis in Turkish emerging country.

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