Timeseries Analysis of the Financial Liberalization and

Pre-Crisis Indicators in Turkish Economy

Ömer Uğur Bulut[1*] & Sadık Rıdvan Karluk[2]

[1] Philosophy of Doctorate in Economics, Ankara, Turkey

[2] Professor, Antalya AKEV University, Antalya, Turkey

[*] Ömer Uğur Bulut, E-mail: bulut.o.u@gmail.com

Abstract

In our study, the selected financial liberalization and pre-crisis indicators which is inspired by the work of Kaminsky, Lizondo and Reinhart known as KLR approach is analyzed. For Turkish economy, the completion of the financial liberalization process in the time interval after 1989, the effects of shock, causality relationship and interact with each of these indicators is surveyed through the VAR model and Toda-Yamamoto test. The purpose of this study to show that financial liberalization indicators of hot money movements, real interest rates and credit growth triggered the crisis which were experienced in Turkey after 1989 by adversely effecting the pre-crisis indicators. In addition to this purpose, the most effective indicators of financial liberalization on pre-crisis indicators will be determined for Turkish economy. According to VAR model and Toda-Yamamoto causality test, the negative impact on the pre-crisis indicators, description of these indicators percentage and the causality relationship of hot money movements and real interest rates are more than the credit growth. The results will give ideas on policy makers in Turkey about the effectiveness of the financial liberalization in economic crises.

Keywords

financial liberalization, pre-crises indicators, KLR approach, VAR model, Toda-Yamamoto causality test

1. Introduction

The financial liberalization is one of the important stages of globalization movements in 1980s. This concept is the result of abolition of restrictions on movement of capital and the other restrictions in financial sector. From this point of view, it would not be wrong to state that financial liberalization affects the economies of countries in two ways. The first one is the "increasing foreign capital impact", with the abolition of restrictions on the movement of capital. The second one is the "increasing credit volume impact" by enabling freedom to excess to the banking sector with the abolition or reduction of restrictions on the banking sector and interest rates.

The theoretical essentials of the concept of financial liberalization have been founded in the beginning of 1970s by McKinnon (1973) and Shaw (1973) as a reaction to the intervention of State to the economy (Tuncay & Yılmaz, 2012). According to McKinnon (1973) and Shaw (1973) the problem in world economies and specifically in the developing countries is, the insufficient savings and the implemented financial pressure policies. Together with the financial pressure, the caps put on the

interest rates prevent the banking sector to take risks and cause the banks to direct their credits to low income projects (McKinnon, 1973; Shaw, 1973).

In economic literature; there are some criticisms of the ideas of McKinnon (1973) and Shaw (1973). According to structuralist economist Taylor (1998) if the funds that are transferred to the banking sector are from informal markets, the banks will have difficulty in holding the reserves so the credit volume will shrink. In this case, the savings will decrease and there will be an economic slowdown. On the other hand, according to Post Keynesian Minsky (1992), increasing capital collection with the financial liberalization is a fundamental problem (Tokucu, 2012). In the light of these ideas, the financial liberalization is mostly criticized by examining the movement of capital, the real interest rates and the credit volume items.

In the Turkish economy, together with the Stabilization Program, the financial liberalization policies have been put in effect and applied for the realization of 24th January 1980 dated Stand by Arrangement which includes major reforms (Güloğlu & Altunoğlu, 2002).

Following the abolition of restrictions on foreign capital in 1989, the crisis in Turkish economy increased and the Turkish economy became more vulnerable to the instabilities of the foreign world. The first example of this effect occurred in 1994 year crisis. Following the crisis occurred in 1998, November 2000 and February 2001. Turkey also affected from the crisis of 2008, which was a global economic crisis. These crises all have a common feature that, they all occurred in the exiting level of hot money movement which have high risk and a speculative character arising from the financial liberalization (Karluk, 2014).

In this study we will explore the effects of financial liberalization on pre-crisis indicators of the crisis in Turkish economy rather than the reasons of economic crisis that occurred after the completion of the financial liberalization. As emphasized by some researches—such as Kaminsky's et al. (1998) research on KLR approach—if the pre-crisis indicators have the signaling or warning feature to assess the economic or financial crisis before they occur, the determination of the effect of financial liberation on pre-crisis indicators and the determination of financial liberation on pre-crisis indicators of financial and economic crisis in Turkey would be significant and meaningful. The determination of the effect of financial liberation on pre-crisis indicators will provide hints to the policy makers in management of the Turkish economic crisis. For this purpose, after mentioning the empirical literature about financial liberalization and pre-crisis indicators, the data set and method is provided. And then, econometric findings are reported.

2. The Emprical Studies on Finacial Liberalization and the Pre-Crisis Indicators in Related Literature

Among the empirical studies on financial liberalization implementations in Turkish economy, Kaya and Yılmaz (2005), by using the monthly data of years of between 1990 and 2002, revealed that the financial liberation money crisis in Turkish economy has 10 percent level importance in Granger cause. Örnek (2006) also has determined that, the short term capital entries have a positive effect on economic growth. One of the studies in which capital entries and exits are used as a financial gap indicator, Özel (2012) presented that the financial gap, affects the economic growth negatively. In the study performed by Akıncı et al. (2014) by using the 1986-2012 yearly data with VAR model, revealed that the in the aforementioned period, the factors that increase the vulnerability are growth, portfolio investments, savings rate, real interest rates, inflation rates and current account balance.

Among the studies on the determination of pre-crisis indicators, the most important and extensive one is the Kamisnky et al. (1998) approach (KLR) which is performed by using the signaling method. The mentioned study has been performed by using the data of years between 1975 and 1995 of fifteen developing and five developed countries. According to KLR study, when one of the macroeconomic indicators is above the threshold, it is a sign that indicates a possible financial crisis in the following 24 months. The international reserve level, the currency rate, the export growth rate, the credit growth rate and inflation, the money supply and current account balance are named as important indicators of crises (Kaminsky et al., 1998).

In the economic literature, there have been some studies performed on analysis of pre-crisis indicators focusing on Turkish economy. In most of these studies the signaling approach has been used and the KLR model been tested for Turkish economy. Kibritçioğlu (2004), in order to determine the pre-crisis indicators of money crisis, tested Turkish economy with KLR model by using the data between years of 1986 and 2004. In the study, he revealed that the export/import, real interest rate change, the foreign trade balance/GNP, short term capital entry/GNP variables are succesfull in prediciting the financial crises.

In their study Altıntaş ve Öz (2007), targeting the predicition of 1994 and 2001 crises with signaling approach, also include industrial production index, capital exit and M2/reserves to their list of pre-crisis indicators. Oktar ve Dalyancı (2010), in their study performed to predict the financial crisis and present policy suggestions; revealed that the current account balance, international reserves and real US dollar exchange rate are the pre-crisis indicators.

The empirical studies in literature researched the financial liberalization, financial span, level of financial development related to the operation of financial system in Turkish economy. In most of these studies, the research been performed on economic growth, savings and investment by using the time-series and Granger causality analysis. Many different methods have been used in researches. In order to see the effects of deterioration in macroeconomic indicators, the signaling approach has been used and in order to see the effects of speculative attacks the logit and probit models have been used.

However, all these empirical research came to different conclusions on which of the macro economical indicators caused the economic and financial crisis. Thus, the studies on the pre-crisis indicators and financial liberalization would not been able to propose any clear policy suggestions to economic decision makers to prevent crisis. In our study, our objectives are as follows: (1) How is the impact of financial liberalization on pre-crisis indicators (positive or negative)? (2) Which financial liberalization indicators is the most effective and stable on pre-crisis indicators? (3) Are there any causality relationship between the financial liberalization and the pre-crisis indicators?

3. The Data Set and the Method

Inspired by the Kamisky et al. (1998) study; the pre-crisis indicators as well as financial liberalization indicators prepared are presented below in Table 1. The indicators and their performance in economic crisis been chosen by considering the number of studies performed and the meaning of them. Among the pre-crisis indicators, the industrial production index represents the economic growth. In the study of Kaminsky, Lizondo and Reinhart (1998) the foreign trade deficit which is the difference between the import and export, is a pre-crisis indicator for the current account.

Table 1. The Financial Liberalization and Pre-Crisis Indicators

The Real Sector Pre-crisis Indicators	Current Account Pre-crisis Indicators	Capital Account Pre-crisis Indicators	The Debt Structure Pre-crisis Indicators	Other Financial Variables Pre-crisis Indicators	Financial Liberalization Indicator
Industrial Producton Index (IPI)	Current Account Balance (cab)	International Reserve (irz)	The Foreign Debt (fd)	M2 Money Supply (m2)	Hot Money Movement (hmm)
	The Foreign Currency exchange (e)				The Growth of Credit (dbc)
	The Foregin Trade Deficit (open)				Real Interest Rate (rir)

According to Williamson and Mahar (2002), the abolition of the restrictions on the credit and the freedom of international capital movement are among the elements of financial liberalization. According to Siva (2002); the movement of capital as the indicators financial liberalization and M2 money supply as a sign of financial progress should be discussed as the fundemantal macroeconomic variables. In addition, the credit growth which is presented in Kaminsky's study is also remarkable as an indicator of financial liberalization.

Further to these approaches, according to Boratav (2001); in the literature of financial crisis and financial liberalization the mostly accepted approach is that the interaction between these two-sourced by the movement of capital and the important part of moving capital; the short term capital movement named as hot money-increase the vulnerability in economy.

In our study as an indicator of financial liberalization representing capital movement, hot money flow will be used. The hot money flow is the short term capital flows, short term bank credits and portfolio investments that enters into the economy in a certain period of time. Thus, since it would be not proper to limit the financial liberalization with a single indicator, the real interest rates and credit growth from Kaminsky vd. (1998), Williamson and Mahar (2002) studies, would also be used as other indicators of financial liberalization.

Regarding our study's purpose, the most suitable econometric method is the VAR model in which the cause and effect functions and causal relationships are designated. To this end, in order to determine the effect of financial liberalization on pre-crisis indicators, the time series analysis will be performed with the three month period data between the years of 1991 and 2014. In this context, for the Turkish economy, time series effect of pre-crisis indicators after year of 1989 (the year which Turkish economy completed the financial liberalization) will be analyzed.

In addition, in order to examine the causal relationship, Toda-Yamamoto test will be used. The data will be collected from the web sites of Turkish Central Bank, Turkish Statistical Institute, Ministry of Development and International Financial Statistics. In analysis Eviews 8.0 Computer programme will be used. The year 1989 is chosen since it is the year that the restrictions on capital movement been removed and by that the final stage, the financial liberalization been realized. However, because of the absence of database in Turkish Central Bank and International Financial Statistics web sites, under the econometric analysis, the timeline starts in the fourth quarter of 1991 and finishes in the second quarter of year 2014.

Our study's purpose is to be able to make a political analysis by examining the interaction between the pre-crisis indicators and financial liberalization and the shocks. The VAR model is suitable since it is widely used in crisis economy and the our purpose is political analysis. The shocks in the variables and their effects on other variables are measured. Since we are interested in shocks, the equality of stability

levels of variables is not at importance (Enders, 1995). In order to see the shocks clearly and to prevent the series to loose their own qualities, it is important to provide stabilization (Sevüktekin & Nargeleçekenler, 2010).

However, in econometric models; if the time periods are long, structural breaks occur in the model arising out of the crisis, policy changes, political problems that occurred during that period. To test the stability of the variables in our study, we will use Zivot-Andrews Test which designates the structural breaks of variables internally (Zivot & Andrews, 2002). In addition, the reason we use Toda-Yamamoto Test is the use of level values of the series and they are not sensitive to the unit root unification qualities (Lütkepohl & Kratzig, 2004). In summary, the econometric model that will be used are; "Zivot-Andrews Unit Root Test", "VAR Model" and "Toda-Yamamoto Causality Test".

4. The Econometric Findings

Before the analysis with the VAR model, the time series of variables been transferred into logarithmic form. However, since the "cab", "dbc", "hmm", "open" and "rir" variables became negative in some periods, their logarithmic transformation has not been performed. In the following phase, the Zivot-Andrews Unit Root Test has been applied to determine whether the variables are stable or not.

Table 2. Zivot-Andrews Unit Root Test

The Variables	Break in Intercept	Break in Trend	Break in Trend and Intercept
Industrial Production Index (ipi)	-4.161204 (2003Q3)	-3.824282 (2001Q3)	-4.287675 (2003Q3)
Current Account Balance (cab)	-4.837518 (2010Q3)	-5.393278 (2002Q1)	-5.459620 (2001Q1)
International Reserve (irz)	-3.087495 (2004Q4)	-2.185676 (2008Q2)	-3.466241 (2005Q4)
Hot Money Movement (hmm)	-5.071076 (2010Q1)	-4.047595 (2001Q2)	-5.207956 (2010Q1)
The Foreign Trade Deficit (open)	-4.786335 (2010Q3)	-4.852872 (2002Q3)	-5.144399 (2001Q1)
Credit Growth (dbc)	-4.096806 (1998Q3)	-3.381810 (2002Q1)	-4.357079 (1998Q3)
M2 Money Supply (m2)	-4.570300 (2005Q1)	-2.328930 (2010Q4)	-3.885659 (2005Q4)
The Foreign Currency Exchange (e)	-2.551592 (1995Q4)	-4.860742 (2001Q3)	-4.633020 (2001Q1)
Foreign Debt Volume (fd)	-4.539204 (2006Q1)	-3.384930 (1997Q2)	-4.435346 (2006Q1)
Real Interest Rate (rir)	-8.738814 (200Q4)	-7.217481 (2001Q2)	-8.686311 (200Q4)

According to Table 2 results, in the model that includes the stability and trend on the 5% sematic level "cab", "hmm", "open" and "rir" variables level values are high so they are stable. The other variables become stable in the first difference. In the VAR model, after the determining whether the variables are stable or not, the proper time lag is found. According to the results the convenient time lag is 7. However, in this time lag, varying variation and auto-corrolation problems have been encountered. The time lag that these problems do not exist is 2. In the phase after, the characteristic roots been examined to define whether the VAR (2) model is consistent or not. According to findings, VAR (2) model is consistent and stable since all the roots are within the unit circle.

In Figure 1, Figure 2 and Figure 3, the pre-crisis indicators reactions to the shocks of financial liberalization indicators of hot money movement, credit growth and real interest rates can been seen. In order to determine how these shocks occure; their movement analyzed in 10 terms. The reactions of the financial liberalization indicators to shocks, generalized in 1 percent standard error deviation been analyzed and laid out in the Figures.

The results of the VAR (2) model cause and effect functions demonstrate; the effect of financial liberalization indicators on the pre-crisis indicators (either positively or negatively), which of the financial liberalization indicators cause the most permanent affect and in crisis economy which of the financial liberalization indicators should be considered as a policy tool.
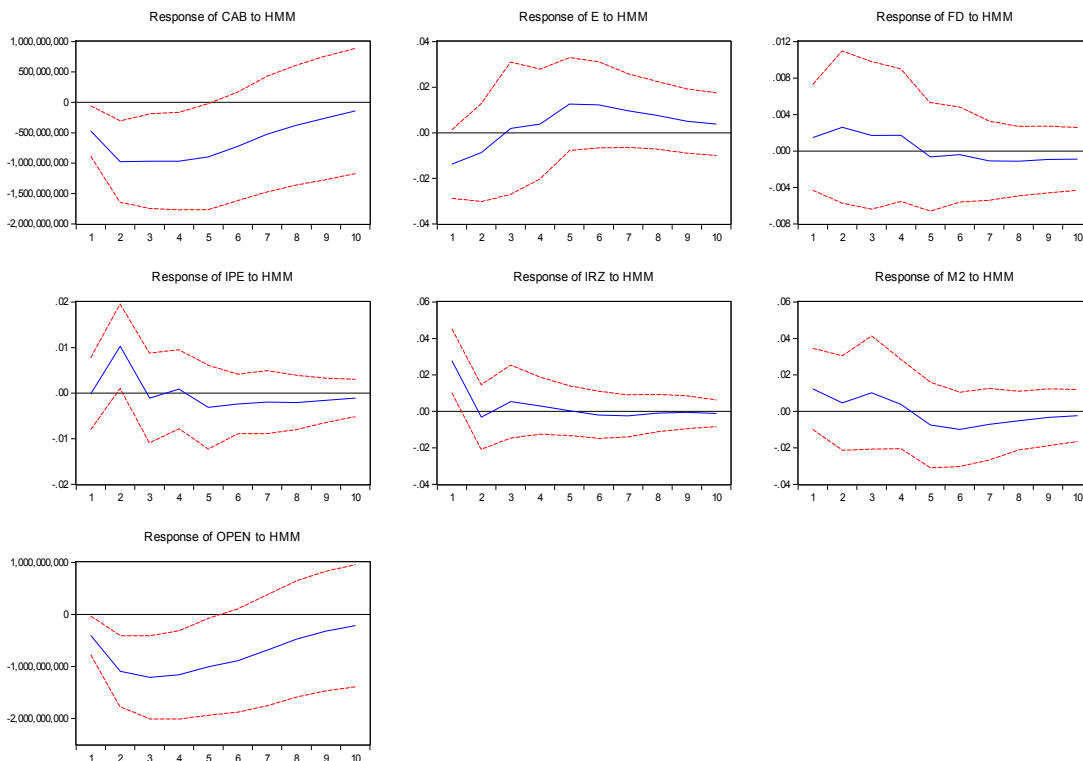

Figure 1. The Reaction of Pre-Crisis Indicators to Shocks That Are Generalized One Standard Deviated Hot Money Movement (± 2 S.E.)

In Figure 1, it can be seen that the reaction of "cab" and "open" to "hmm" is almost same and negative during 10 periods. The negative effect continues during all of the period. The reaction of "e" to "hmm" is negative at the beginning but, this effect is lost in the second period as similar to the other current balance pre-crisis indicators (cab and open). If we look at the reactions of the foreign debt, the capital account, the real sector and other financial pre-indicators to "hmm"; from fifth period to tenth period the shocks occurring in "hmm" affects the "ipe" negatively and cause it to decrease. The positive reaction given by "fd" and "m2" in the beginning becomes negative after the completion of five period and this effect continues until the tenth period. No important increase or decrease is seen in the variables of "ipe", "m2" and "fd" following the negative effect occurring during five periods.

The capital account pre-crisis indicator "irz" is in the beginning reacts positively to "hmm" however, after in the second period, the reaction becomes negative. On the third period, the reaction of "irz" returns to its old situation. In the fifth period, its reaction lose its effect.

In Figure 2 it can be seen that the reaction of "cab" and open to "dbc" is negative in the first period and do not encounter any important increase and decrease during the 10 periods. The reaction of "e" (the other pre-crisis indicator) to "hmm" is positive in the first period and it continues as positive during the ten following periods.
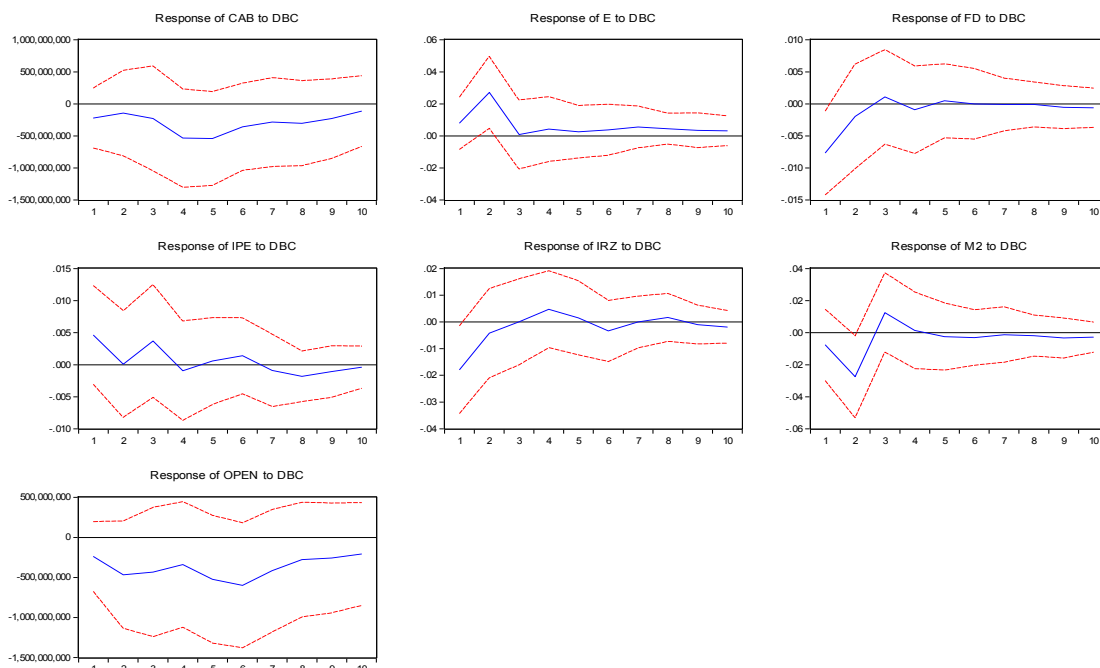
Figure 2. The Reaction of Pre-Crisis Indicators to Shocks That Are Generalized One Standard Deviated Credit Growth (± 2 S.E.)

In Figure 2, the reaction of pre-crisis indicator of reel sector "ipe" to "dbc" is positive at the beginning but after an increasing and decreasing reaction during seven periods, a negative effect occurs. The financial variable pre-crisis indicator "m2" reacts to "dbc" negatively in the first two periods. This positive effect in the third and fourth periods changes into negative in the fifth period. The capital account pre-crisis indicator "irz" reacts negatively in the first two periods however after that period an increasing and decreasing reaction occurs. This reaction ends with a negative effect on the tenth period. The "fd" reacts negatively in the first two periods to "dbc" after that, its increasing and decreasing reaction in the third and fourth periods, loses its effect.
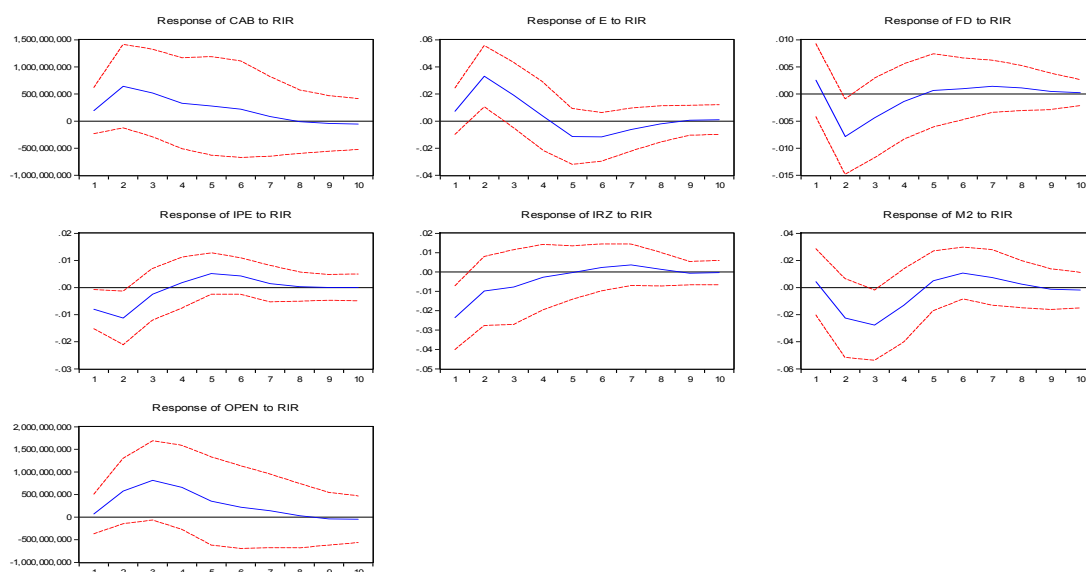

Figure 3. The Reaction of Pre-Crisis Indicators to Shocks That Are Generalized One Standard Deviated Real Interest Rates (± 2 S.E.)

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In Figure 3, the reaction of "cab" and "open" to shocks that occur in "rir" is positive at the beginning. This positive effect continues for eight periods for "cab" and continues for nine periods for "open" and after it returns to negative. The reaction of "e" is positive in the first period. This positive affect is lost in the fourth period and returns to its status at the begining at the nineth period. The reaction of pre-crisis indicator of reel sector "ipe" to "rir" is negative at the first three periods and together with the fourth period, it turns into positive and after it loses its effect. While the first effect of "rir" shocks to "m2" and "fd" is positive, it loses its effect after ten periods. As similar, first effect of "rir" to "irz" is negative but it loses its effect after some time. Pre-crisis indicator capital account "irz" reacts negatively to real interest rate in the first five and last two periods.

Variance separation results are presented to display the percentage effect of the financial liberalization and other pre-crisis indicators in total change in pre-crisis indicators and to lay out the relation of them. When Appendix 1 is examined, it can be seen that the change in the current account balance (cab) variance occurred mostly by (in order) hot money movements (hmm), foreign trade deficit (open), the foreign currency exchange rate (e) and the real interests (rir). If we interpret this result in causality, the reasons of change in the current account balance are hot money movements, foreign trade deficit, the foreign currency exchange rate and the real interests. In Appendix 2, the most effective indicator on the foreign currency exchange rate (other then itself) after ten periods is the financial variable pre-crisis indicator "money supply (m2)". The most effective variables on foreign currency exchange rate other then itself and money supply (m2) are (in order); real interest rates (rir), international reserves (irz) and credit growth (dbc). The reason of change in the foreign currency exchange rate is in order, money supply, real interest rates international reserves and credit growth.

Appendix 3 presents that the foreign debt (fd), following itself, is mostly effected by (in order), foreign trade deficit (open), real interest rates (rir), money supply (m2) and credit growth. The indicators that mostly affected the change in the foreign debt are; foreign trade deficit, real interest rates and credit growth. In Appendix 4, according to the variance separation results of industrial production index variance, the industrial production index following itself mostly effected by real interest rates (rir), money supply (m2), international reserves (irz) foreign currency exchange and foreign trade deficit, in the last period.

The industrial production index is mostly affected by the real interest rates. In Appendix 5, the international reserves are explained mostly by (other than itself) the real interest rates, hot money movement, credit growth and foreign trade.

Appendix 6 presents that the change in the money supply variance, following itself, is mostly effected (in order), real interest rates, credit growth, current balance account, foreign trade deficit and hot money movement at the end of ten periods. The most effective indicators to the change in the foreign debt are; foreign trade deficit, real interest rates and credit growth.

The changes in foreign trade deficit (open) variance explained mostly by-following itself—(in order) hot money movement, real interest rates, foreign currency exchange rate, industrial production index and credit growth in Appendix 7. Based on the causal relationship, the reasons of changes in foreign trade deficit are (in order); the hot money movement, real interest rates, foreign currency exchange rate, the industrial production index and credit growth.

In our study, we have used Toda-Yamamoto causality test to determine the reasonability relations between the financial liberalization and pre-crisis indicators. As the first phase of Toda-Yamamoto causality test procedure, we have created the standard VAR models by using the levels in the variances.

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During the creation of VAR model for Toda-Yamamoto causality test, while selecting the proper time lag, it can be seen that 7 is the most proper one among the criterias.

We have encountered several problems of aforementioned changing time lags variance and autocorrolation. The time lags that do not have these problems is time-lag period 2. Hence, we established the VAR model for time lag period 2 (k=2).

The standart VAR model for time lag period 2 (k=2) has been designated for the first phase of Toda-Yamamoto causality test. In the second phase; based on the Zivot-Andrews Unit Root Test results, the maximum unification of variances "dmax" has been designated as 1. This value is smaller than the VAR models' real degree of 2.

Following, by artificially adding maximum unification degree to the VAR model degree, the VAR models' degree increased to 3 (by 2+1=3). Autocorrelation problem occured in the guessed VAR (3) model. While applying the Toda-Yamamoto method, the autocorrolation and/or variation number could be corrected by "Newey-West" model so, to overcome the autocorrelation problem, the time lag number has not been changed. In next phase, the dependent variable of regression models of the pre-crisis indicators in VAR (3) model has been guessed and with "Newey-West" Method the autocorrelation problem has been solved. In addition, while implementing the causality test the restriction has been implemented on the first 2 parameters (k=2).

The results of Toda-Yamamoto Causality Test of the cause and effect relationship of chosen financial liberalization indicators and pre-crisis indicators are presented in Table 3. If the calculated statistics is higher than the Chi-Square or the probability value is smaller than significance level, then there is causal relationship. According to Table 3, the financial liberalization indicators which are the current account balance, industrial production index and international reserves, do not have any direct causal relationship with pre-crisis indicators.

On the other hand, the financial liberalization indicator of hot money movement in the significance level of 0.10 can cause the foreign trade deficit with pre-crisis indicator current account balance. There is also causal relationship between the financial liberalization indicator real interest rate and current balance account pre-crisis indicator the foreign currency exchange rate in significance level of 0.10.

The Table 3 presents the financial liberalization indicators of real interest rates and credit growth that cause the pre-crisis indicator of the money supply. These two financial liberalization indicators causes the money supply in 0.01 and 0.05 significance levels. In addition, the real interest rates causes foreign debt in 0.01 and 0.05 significance levels.

Looking at the causal relationship of pre-crisis indicators, the outstanding indicator is the international reserve. According to Table 3 there is direct causal relationship of the international reserve with foreign trade deficit, current account balance, foreign currency exchange rate and industrial production index.

Table 3. The Toda-Yamamoto Causality Test Results of Financial Liberalization and Other Pre-Crisis Indicators

Zero Hypothesis	Test Statistics	The Value	Degree of Freedom	Probability
No causality from irz to ipe	K-Square	6.278	2	0.0433
No causality from irz to cab	K-Square	4.633	2	0.0986
No causality from irz to open	K-Square	6.625	2	0.0364
No causality from cab to open	K-Square	4.953	2	0.0840
No causality from ipe to open	K-Square	4.741	2	0.0934
No causality from hmm to open	K-Square	4.997	2	0.0822

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No causality from rir to e	K-Square	5.637	2	0.0597
No causality from M2 to e	K-Square	17.927	2	0.0001
No causality from dbc to M2	K-Square	7.418	2	0.0245
No causality from rir to M2	K-Square	7.749	2	0.0208
No causality from rir to fd	K-Square	6.115	2	0.0470
No causality from ipe to fd	K-Square	7.270	2	0.0264

5. The Conclusion and the Discussion

The VAR (2) model in our study asses that; based on the results of the cause and effect functions, the hot money flow and the credit growth are the financial liberalization indicators that negatively affect the current account balance and foreign trade deficit. According to the variance separation study, the effect of hot money movement is higher than the credit growth and real interest rates. In the Toda Yamamoto Causality Test it has been designated that the hot money movement has direct causal relationship with foreign trade deficit.

Based on these results, the hot money flows are the most effective financial liberalization indicator that triggers economic and financial crisis by affecting the pre-crisis indicators of current account balance and foreign trade deficit.

This result reveals that the decision making mechanism in Turkish economy crisis management should consider hot money flow as a policy tool. The results of VAR (2) model cause and effect functions and variance separation; the negative effect of the real interest rates (as a financial liberalization indicator) on the pre-crisis indicators of foreign currency exchange rate, international reserves, foreign debt and money supply is more than the effect of hot money flow and credit growth as an explanation of these indicators as percentage.

Considering the ten periods, the real interest rates have more of increasing effect in money supply and foreign debt and reducing effect in foreign currency exchange rate and international reserves. This consequence is also supported by the results of the Toda Yamamoto Causality Test which states that there is a direct causal effect from interest rates, to the foreign currency exchange rate, money supply and foreign debt.

According to the Toda Yamamoto Causality Test that performed in our study; there is no causality relationship between the financial liberalization indicators and the pre-crisis indicator "industrial production index".

The results in VAR (2) model reveal that; the real sector pre-crisis indicator industrial production index is more effected by the financial liberalization indicator of hot money flow. Also the beginning positive effect of real interest rates on industrial production index is lost by the elapse of time. The credit growth has an up and down effect. According to the cause and effect functions, the financial liberalization indicators affect the real sector negatively on industrial index. While the hot money movement creates the most negative effect in the cause and effect functions, the result of variance separation reveal that; the most effective variance on production index is real interest rates. Although; the real interest rates are the most explanatory indicator of industrial production index, in the cause and effect functions the positive effect of real interest rates on industrial production index transform into negative by the elapse of time.

As a result, the econometric analysis in our study reveals that the chosen three financial liberalization indicators effects the pre-crisis indicators mostly negatively and causes the economy to drag into a dead end. The hot money movement the real interest rates and the changes in credit growth are the indicators

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that increase the vulnerability and possibility of crisis in Turkish economy. According to the results of VAR (2) model cause and effect, variance separation and the results of Toda Yamamoto Causality Test; the negative effect of financial liberalization indicators of hot money movement and real interest rates on pre-crisis indicators and their explanation percentage and causal relationship is higher than the effect of credit growth.

If we analyze the pre-crisis indicators effects on each other, their explanatory percentage and casual relationships, the prominent indicators are; the variable pre-crisis indicator the money supply and capital account and the other pre-crisis indicator international reserve are the ones that outsand.

These results reveal that the real interest rates, the hot money movement which consists the major part of capital movement, the money supply (the indicator of financial liberalization) and the international reserves are more effective on the financial and economic crisis in Turkish economy after the year of 1989, the year which the capital movement in economy is liberalized.

It can be seen that the problem in Turkish economy is more related to the financial liberalization and capital account. In addition, the decision makers in Turkish economic crisis management should more gravitate on hot money movements, real interest rates, money supply and international reserves for tools of policy and propose alternative policy tools.

In addition, according to the results of VAR (2) models, compared with the other financial liberalization indicators, since the credit growth effects the pre-crisis indicators more positively, it would be more proper for the Turkish policy makers to create policies to prevent the probable negative effects of increasing hot money movement and real interest rates.

Together with financial liberalization, the abolition of restrictions on the movement of capital, foreign currency exchange and interest rate, the increasing tendency towards foreign currency occurred. This increasing tendency towards foreign currency causes serious problems in Turkish economy.

When the liquidity benchmark money supply is high, it is a sign that the monetary obligations are increasing and financial system is defenseless to the probable shocks. In addition to the increasing monetary obligations, the insufficient level of international reserves increases the financial vulnerability. In the environment of uncertainty and risk, the investors or the depositors want to exchange their financial assets to foreign currency. For that kind of situation and the shocks of that sort, the Turkish economy should have a policy to keep and collect necessary level of reserves. As a policy tool the international reserve is an important indicator in prevention of financial crisis such as; crisis of foreign currency.

The foreign capital movement is a financial indicator which positively effects the increasing real interests in Turkey. The foreign capital enter to the Turkish economy with high interest rate and low exchange rate expectation and the most part of it consists of hot money movement. However, the crisis in Turkey occurs when this foreign capital leaves the economy. Thus, in order to reduce the real interest rates to increase the investments and economic activity, there should be an environment without uncertainty, risk and unstability.

From the year 2002 to year 2008 the low interest rates in Turkey increased the investments. However, the level of investment that has been reached was as the levels reached before. The savings were not enough both in the past and the mentioned 2002-2008 period. Hence, the political tool of deciding on raising or reducing the interest rates depends on some other conditions. First of all, in order to decrease the dependence on foreign capital, policies should be implemented to increase domestic savings and production.

The savings should be increased; by performing public spending to increase the national income and employment or by promoting the foreign investment to directly invest to the country. In addition, since the direct foreign investment supports the savings needed for the economic growth, share of the direct foreign investment in the capital movement should be increased. The banking sector should also be more careful in providing credits and to support that end, the mutual share of information should be effective.

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Appendix 1

Variance Decomposition of Current Account Balance

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	40.06341	0.682282	.892277	0.000000	4.689231	0.000000	0.000000	2.448171	46.28467	0.939959
2	29.32833	0.399290	4.133013	0.609385	11.04836	1.544410	1.887683	4.038587	40.95284	6.058098
3	22.76968	0.460799	5.850924	0.464032	15.60374	4.480928	1.759073	4.560123	36.69308	7.357623
4	18.97088	1.853873	7.100258	0.949349	20.03173	5.941941	1.486900	4.118248	32.52031	7.026511
5	17.20932	3.019113	7.595843	1.840335	23.17893	6.239586	1.314744	3.641402	29.16109	6.799634
6	16.27032	3.311416	7.812684	2.525798	25.02818	6.275120	1.378634	3.488779	27.22679	6.682290
7	15.56517	3.470036	7.971684	2.973156	25.81864	6.216913	1.754111	3.715388	26.07450	6.440409
8	15.09976	3.741900	8.032453	3.242323	26.07595	6.083937	2.015756	4.180905	25.29426	6.232745
9	14.82709	3.896084	8.032434	3.383016	26.14619	5.978126	2.148821	4.544326	24.91359	6.130326
10	14.69795	3.909251	8.019727	3.438224	26.11756	5.925907	2.276360	4.749858	24.76823	6.096921

Appendix 2

Variance Decomposition of Foreign Currency Exchange

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	0.000000	1.893621	61.35635	0.000000	2.894713	0.000000	0.000000	32.76767	0.000000	1.087647
2	3.684672	8.807770	36.00982	0.062457	1.830161	0.311583	10.24048	24.15618	1.408599	13.48829
3	3.562775	7.884034	32.17457	0.058167	2.602076	0.552344	9.186559	22.61201	5.511162	15.85631
4	4.044507	7.798237	31.44671	0.059011	2.845442	0.539426	9.036985	22.28463	6.346229	15.59883
5	3.916756	7.551242	30.71790	0.113892	3.533053	0.756766	8.784273	21.59388	6.686430	16.34580
6	3.827292	7.428694	29.93585	0.144568	4.135572	0.864479	8.659880	21.17728	6.621975	17.20442
7	3.777068	7.528846	29.52514	0.167819	4.665210	0.976155	8.562497	20.89077	6.563888	17.34260
8	3.746030	7.581714	29.31182	0.201428	5.120447	1.024400	8.517682	20.73435	6.520313	17.24182
9	3.729063	7.601289	29.17421	0.246294	5.394714	1.047637	8.526090	20.64621	6.484332	17.15015
10	3.717922	7.622676	29.08010	0.296441	5.554269	1.052745	8.536882	20.60044	6.455544	17.08298

Appendix 3

Variance Decomposition of Foreign Debt

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	2.059560	8.129868	2.909079	69.98879	0.813265	0.000000	0.000000	0.965218	14.35408	0.780141
2	1.951591	7.250463	2.544833	60.38677	0.707878	1.202381	2.755122	3.824682	12.35552	7.020756
3	1.727994	6.543444	4.246580	54.73469	0.625242	3.116636	3.721550	6.389888	10.92157	7.972409
4	1.871125	6.555523	4.189243	54.13361	0.768393	3.072568	4.042444	6.542383	10.79166	8.033054
5	1.995042	6.498540	4.157397	53.52507	0.776118	3.057926	4.248333	6.704246	11.06271	7.974616
6	2.015777	6.457227	4.192569	53.22915	0.771477	3.038720	4.282497	6.883221	11.12604	8.003330
7	2.038402	6.427451	4.173102	52.99383	0.800828	3.044110	4.280508	6.913221	11.18855	8.139996
8	2.031627	6.406140	4.160142	52.81818	0.850629	3.060261	4.290598	6.964943	11.19790	8.219584
9	2.029252	6.412649	4.155361	52.74072	0.910095	3.080474	4.284177	6.961651	11.19929	8.226327
10	2.027123	6.426805	4.156451	52.68458	0.972675	3.088106	4.279038	6.953176	11.19086	8.221181

Appendix 4

Variance Decomposition of Industrial Production Index

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	0.312281	3.190502	12.47814	0.001938	1.153763	57.47307	1.898213	12.45949	4.210880	6.821730
2	0.716972	2.431237	9.664782	0.936624	4.356449	43.81490	8.213112	11.24349	3.201529	15.42090
3	3.724057	3.276285	9.632033	2.400376	4.041079	38.82183	8.831379	9.628374	6.072962	13.57162
4	3.895960	3.295202	9.413578	2.406550	4.101120	37.81245	9.061315	10.46355	6.138780	13.41150
5	4.309904	3.164681	9.096900	2.353127	4.023941	36.08626	9.207238	10.57912	6.677303	14.50152
6	4.323924	3.201959	8.868343	2.318525	3.975874	35.26295	9.154979	11.00050	6.664431	15.22851
7	4.309785	3.211958	8.822918	2.305568	4.105704	35.20031	9.095849	10.95253	6.746279	15.24910
8	4.282584	3.336667	8.813879	2.315897	4.352520	35.05842	9.047836	10.88363	6.750612	15.15796
9	4.295870	3.367432	8.802547	2.350767	4.518819	34.96208	9.017525	10.84810	6.729712	15.10714
10	4.291326	3.364198	8.805283	2.383398	4.596952	34.90164	9.031919	10.83122	6.717224	15.07684

Appendix 5

Variance Decomposition of International Reserves

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	1.030158	8.082284	1.548337	7.399184	8.128471	0.000000	52.64056	10.13127	0.086509	10.95323
2	1.278036	7.529385	1.771821	7.067837	8.398905	0.183853	48.26112	10.53384	3.210389	11.76482
3	2.195890	7.046332	3.243687	7.648012	7.978292	1.025049	45.95417	9.871966	3.005483	12.03112
4	2.174726	7.267702	3.237460	7.565293	7.919921	1.144969	46.01511	9.742896	2.995544	11.93638
5	2.469018	7.202175	3.423852	7.463640	7.809444	1.128914	45.48214	10.03628	3.214062	11.77048
6	2.512822	7.348363	3.414226	7.426122	7.791420	1.136885	45.33972	9.984015	3.244320	11.80211
7	2.657416	7.310427	3.399584	7.388076	7.777929	1.132300	45.17835	9.963878	3.233012	11.95903
8	2.654227	7.347181	3.397349	7.377778	7.770340	1.142648	45.12080	9.986586	3.228926	11.97417
9	2.684836	7.350291	3.400188	7.369930	7.773450	1.154011	45.08684	9.981818	3.231948	11.96669
10	2.682059	7.388497	3.403015	7.368890	7.795797	1.155562	45.04346	9.977727	3.229462	11.95553

Appendix 6

Variance Decomposition of M2

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	0.000000	1.184043	0.000000	0.000000	2.432568	0.000000	0.000000	96.18998	0.000000	0.193410
2	0.780403	7.538978	1.587971	0.206990	2.199127	0.387857	0.751907	81.58723	0.037412	4.922126
3	4.949735	7.779185	1.349470	0.295674	1.837880	0.850698	0.783256	68.65924	3.330318	10.16455
4	5.356926	7.544200	1.404087	0.299748	1.782549	0.899343	1.009706	66.47248	4.113670	11.11729
5	5.217626	7.339732	2.488635	0.381116	2.007801	1.094292	1.416270	64.52262	4.574224	10.95768
6	5.212261	7.227822	2.591319	0.443478	2.260817	1.160792	1.729241	63.32248	4.515227	11.53656
7	5.331604	7.170719	2.601667	0.465752	2.401071	1.215592	1.719425	62.78398	4.481339	11.82886
8	5.313285	7.157696	2.623548	0.479650	2.545385	1.261174	1.744454	62.57713	4.466902	11.83078
9	5.303887	7.188243	2.644810	0.500054	2.657334	1.280668	1.758579	62.41145	4.452036	11.80294
10	5.291080	7.208110	2.662992	0.526274	2.727736	1.281131	1.766461	62.29183	4.443717	11.80067

Appendix 7

Variance Decomposition of Foreign Trade Deficit

Period	CAB	DBC	E	FD	HMM	IPE	IRZ	M2	OPEN	RIR
1	0.000000	1.062487	8.892972	0.000000	5.305903	0.000000	0.000000	5.343595	79.24142	0.153620
2	3.632950	2.196533	5.446142	0.606064	15.01180	1.093084	1.545193	4.608591	61.06381	4.795837
3	5.391420	2.407078	4.531338	0.471853	18.92849	2.645830	2.650418	5.763932	47.85327	9.356364
4	4.736905	2.311101	4.961676	0.606989	22.79758	4.552697	2.168164	5.711299	41.28809	10.86549
5	4.163360	3.087983	5.614080	1.241734	25.96377	5.441787	1.954712	5.079335	37.06809	10.38514
6	3.819655	4.223164	5.902318	1.983362	28.19320	5.635030	1.872156	4.786828	33.83556	9.748729
7	3.651983	4.594165	6.085068	2.547802	29.39950	5.566628	1.973284	4.802529	32.04019	9.338855
8	3.535412	4.679767	6.169468	2.886109	29.79902	5.468720	2.336189	5.037940	31.05005	9.037319
9	3.495868	4.796626	6.219729	3.066058	29.80911	5.363344	2.603952	5.417718	30.39353	8.834072
10	3.466066	4.887007	6.231490	3.151515	29.76415	5.293618	2.708170	5.707552	30.06038	8.730051