THE RELATIONSHIP BETWEEN BANK LOANS and ECONOMIC GROWTH in TURKEY: 1995-2010*

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Abstract

In this study, we aim to determine the direction of the relationship between the economic growth and total credits of Turkish Banks. In our study, we analyzed this relationship for the period 1995-2010, by using quarterly data analysis. In the analyses, change in the volume of real credits is used to represent the variable, total credits; and real growth in GDP represents the variable, growth. This study uses Unit Root Test and Todo-Yamamoto Causality Analysis as econometric methods. As a result of the analysis and evaluations, it is found that from the growth to the credits there has been a uni-directional causality relation.

Keywords: Bank Loan (BL), Economic Growth (EG), Ziwot Andrews Breakpoint test (ZABT), Todo-Yamamoto test (TYT).

1. Introduction

The role of finance and bank credit over the influence of economic growth was well known by economists but the issue has been neglected for a long time. 1970s are the period when the importance of credit and finance were rediscovered and emphasized by economists**.**

The essential function of financial system has realized the funding transfer from overfunding units into the units which needs funding. In this context, the financial system performs its function by means of legal regulations which shapes the behaviors of these units and via financial mediators (Pınar and Ardıç, 2006). The increase and development of financial mediators, the creation of new financial mediators and stable restructuring the financial system with new legal regulations are required to consolidate the reel economy.

In this framework, financial sector or banking sector has significance and critical role in attempting the economic development and growth and the constitution of the capital accumulation because these instruments makes the canalization of the funds derived from these savings into the real investments (Kandır and İskenderoğlu, 2007).

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However, it is compulsory to have parallel development of financial sector with real sector of economy for economic development in any economy. The transfer of usable funds for the investors with indirect way and minimum cost depends upon the healthy operation of financial sector. The finance and placement patterns of real sector, in general meaning, are basic parameters determining the financial architect (Aslan and Korap, 2006).

Hence, the role of financial development and bank credit availability on economic growth has been investigated extensively by researchers. However, the relationship between these two variables has not been resolved and there has been controversy among researchers. It is argued that the role of financial institutions in developed countries is very different from the one they play in developing countries (Arestis and Basu, 2008).

There exists a meaningful effect of financial development on economic growth is questioned in the literature. The relationship between financial development (bank credit is usually used as a proxy) and economic growth involves analytically important and critical policy issues of great relevance. The causality between bank credit and economic growth may run in various directions, depending on how the economists view the working of the economic system at macro level**.**

There are four basic views to explain the relations between the financial development and economic growth. First view asserts that economic growth leads to the financial development. Here there is "demand following" relations. Firstly economic growth will be realized and funding requirement of economic growth leads the development of financial markets. According to the second view, financial development supports the economic growth. This relation has been defined a relation which "supply leading". The developed character of the financial institutions accelerates and facilitates to convert into the savings for the economy. Thus, an economic development by supporting the financial systems. According to the third view, there is a mutual relation between the financial development and economic growth. The last view is that there is a not remarkable and considerable mutual relation between the financial development and economic growth (Altıntaş and Ayrıçay, 2010).

As a result of our analysis, we will try to determine the direction of relation between the bank credits and economic growth for a concerned period. This study follows the below-mentioned trajectory: In next section will be presented the literature review, and then the data resources, variables and econometric methodology. The empirical results consist of two different tests of

the time series data. The first consists of unit root tests for the stationary properties of the time series data. These are followed by a causality test to indicate the direction of causality between variables. In the last section reveals the concluding remarks.

2. Literature Review

The banking sector credit volume and economic growth interaction theoretically and empirically are discussed and especially financial development-economic growth relation is overemphasized. In this line with the increase of the financial means and institutions, a financial development-economic growth relation has been strengthening. For this respect, the developed financial structure shortens the transformation period of savings into the investment and the provision of fund is facilitated by presenting the effective financial means (Ceylan and Durkaya, 2010).

Over the past few years the relationship between bank loans and economic growth has been extensively researched. Yet, there seems to be no consensus regarding the direction of causality between bank loans and economic growth. The reasons for this situation are the differences of methods used in analysis of country/countries groups. Below you can find some empirical examples:

Arestis at all (2001) analyzed the financial development-economic growth relations among the German USA, Japan, Britain and France between 1970-1999 by the method of co-integration and error correction patterns. In analysis, it is concluded that the developments in banking and stock certificates markets increases the economic growth.

Al-Yousif (2002) for the period analyzed 1970-1999 financial development-economic growth relations by using 30 developing countries with panel method and Granger causality test. In research findings, the causality for financial development-economic growth is bidirectional.

Müslümov and Aras (2002) between 1982-2000 in 22 OECD countries analyzed the relations between the development of capital market and economic growth by using panel method and Granger causality test. In this study, the capitalizations of capital market as the measurement of development for capital market and liquidity indicators have been used. As a result of panel method and Granger causality test, it is concluded that development for capital market is directly relevant with the economic growth.

Shahbaz at all (2008) between 1971-2006 in study for Pakistan analyzed the relations between the development in stock certificate market and economic growth by using the cointegration

method. According to the result of analysis, there are the relations between the development in stock certificate market and economic growth and bidirectional causality.

Abu-Bader and Abu-Qarn (2008) between 1960-2004 analyzed the relations between the financial development and economic growth in Middle Eastern and North African countries including Algeria, Egypt, Israel, Morocco, Syria and Tunisia by using the VAR method and Granger causality tests. In study, one country of the six is exceptional, in all of them, it is arrived that supply priority hypothesis which claims the relations between the development in financial market and economic growth. Just only there is direct causality for Israel to financial market from economic growth..

Enisan and Olufisayo (2009) in seven sub-Sahara countries between the development in stock certificate market and economic growth has been analyzed by the method of ARDL bound test. In this study, between the development in stock certificate market and economic relations, there is a cointegration relation and between the developments in stock certificate market on economic growth has positive effect. In Granger causality tests Egypt and South Africa the development in stock certificate market leads to the economic growth.

There have been some studies in literature the relations between the development in stock certificate market and economic for respect of Turkey;

Kandır, İskenderoğlu and Önal (2007) in their studies for Turkey between years 1988–2004 by using per three months data related with co-integration analysis. The ratio for the credits given by private sector to nominal gross domestic product (GDP) as the variable expressing the financial development, the ratios of GDP per person as the growth variable has been used. As a result, they determined that, for related period, the direction of the relation form economic growth to financial system.

Acaravcı at all (2007) in Turkey for 1986-2006 used quarterly data between the financial development and economic growth it is studied with the co-integration method. As a result of analysis, it is found the long term period relation between the financial development and economic growth. As a result of causality, there is one-dimensional/directional causality from the financial development to economic growth.

Aslan and Korap (2006) in Turkey the relationship between the financial development and economic growth for the period 1987-2004: VI has been analyzed by using the co-integration and Granger causality techniques. In this study, it is discovered the long period relation

between financial development indicators and economic growth used. On the other hand, it is concluded that direction of causality between financial development and economic growth varies in accordance with the indicators for financial development.

Aslan and Küçükaksoy (2006) annually data of 1970-2004 period in Turkey financial development and economic growth has been analyzed and it is concluded the existence of causality from financial development and economic growth.

In this context, the main aim is to analyze and examine the relationship between bank credit and economic growth is tested by time-series techniques using quarterly data between 1995Q1 and 2010Q4 for Turkey.

3. Data Econometric Methodology and Empirical Results

3.1. The Data

The data used in the empirical tests of this study is consisting of the quarterly frequency for the period 1995-Q1 to 2010-Q4: Real percentage changes in GDP, percentage changes in (RGDP) and percentage changes in Volume of Real Credit (RVC) . All data is obtained from the Turkish Statistical Institute (TUİK) and the Central Bank of Republic of Turkey (TCMB). The variable "credit" used in analysis implies the proportional changes in the volume of real credits used by customers and variable "income" implies the proportional changes in GDP.

3.2. Econometric Methodology and Empirical Results

The period when the analysis has been committed includes the periods of global crises suffered October 2000 in Turkish economy and 2008 in World economy. Impliedly, it is decided to use a test which emphasizes the brake in data in determining the properties of stability of the related variable and to consider the structural brake in possible changes over the Gross Domestic Product (GDP) and credit usage (RVC)

In response to the test Perron(1990) recommended, it is considered as suitable in Zivot and Andrews test which the structural brake has been accepted endogenous is seen more suitable. Hence, Zivot and Andrews test has advantages in comparing with the Peron test. Because of this superiority in the study, Zivot and Andrews test has been preferred in determining the unit-root.

Zivot and Andrews (ZA) proceed with three models to test for a unit root: (1) model A, which permits a one-time change in the level of the series; (2) model B, which allows for a one-time change in the slope of the trend function, and (3) model C, which combines one-time changes

in the level and the slope of the trend function of the series. Hence, to test for a unit root against the alternative of a one-time structural break, Zivot and Andrews use the following regression equations corresponding to the above three models;

$$\Delta y_t = c + \alpha y_{t-1} + \beta t + \gamma DU_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t \qquad \text{(Model A)}$$

$$\Delta y_t = c + \alpha y_{t-1} + \beta t + \theta DT_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t \qquad \text{(Model B)}$$

$$\Delta y_t = c + \alpha y_{t-1} + \beta t + \theta DU_t + \gamma DT_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t \qquad \text{(Model C)}$$

where; DU_t is an indicator dummy variable for a mean shift occurring at each possible break-date (TB) while DT_t is corresponding trend shift variable. Formally,

$$DU_t = \begin{cases} 1 \ldots\ldots\ldots & if\ t > TB \\ 0 \ldots\ldots\ldots & otherwise \end{cases}$$

$$DT_t = \begin{cases} t - TB \ldots\ldots\ldots & if\ t > TB \\ 0 \ldots\ldots\ldots\ldots & otherwise \end{cases}$$

The null hypothesis in all the three models is α=0, which implies that the series {yt} contains a unit root with a drift that excludes any structural break, while the alternative hypothesis α<0 implies that the series is a trend-stationary process with a one-time break occurring at an unknown point in time. The Zivot and Andrews method regards every point as a potential break-date (TB) and runs a regression for every possible break-date sequentially. From amongst all possible break-points (TB), the procedure selects as its choice of break-date ($\overline{TB}$) the date which minimizes the one-sided t-statistic for testing $\hat{\alpha}(= \alpha - 1) = 1$. According to Zivot and Andrews, the presence of the end points cause the asymptotic distribution of the statistics to diverges towards infinity. Therefore, some region must be chosen such that the end points of the sample are not included. Zivot and Andrews suggest the 'trimming region' be specified as (0.15T, 0.85T), which we follow. Perron suggested that most economic time series can be adequately modeled using either model A or model C. As a result, the subsequent literature has primarily applied model A and/or model C. In similar with the other unit-root tests, ZA test is sensitive for the length of lag.

As it is mentioned above, because of the suffering the economic development led to the structural break in 1995-2010 period, the Zivot and Andrews unit-root test has been implemented in variables of credit usage (RVC) and Gross Domestic Product (RGDP).

Table 1. ZA Test Results for One Breakpoint

k=8	**RGDP** **Model C**	**RVC** **Model A**
TB	**2000:Q4** **($\hat{\lambda}$=0.67)**	**2008:Q4** **($\hat{\lambda}$=0.52)**
α	**-0.8904 (-6.1456)**	**-1.5469 (-5.0994)**
θ	**-0.3465 (-4.1454)**	**-0.5468 (-4.1258)**
γ	**0.0338 (4.3222)**	**–**
k^*	**4**	**6**
Critical Values	**–**	**–**
%1	**-4.75**	**-4.45**
%2.5	**-4.44**	**-4.09**
%5	**-4.18**	**-3.76**

Note :*(k*) shows the selected length of lag. The values within the bracket are t-statistics. The critical values were quoted by Zivot-Andrews (1992) Table2 and Table 4.*

Model C has been estimated for both variables. According to the estimated results of Model C implemented for Gross Domestic Product (RGDP), it is found significant statistically the estimations of both the parameters γ and parameter θ. The result of ZA test depended upon the Model C refers the existence of the break in fourth quarter of 2000 when Turkey suffered from the October 2000 crises. In comparing α parameter with the critical values of Zivot-Andrews (1992), the unit root null hypothesis within level of 1% significance has been rejected. According to this result, there is not stable effect of October 2000 crisis over GDP. In estimation of Model C for credit usage (RVC), it is determined that the parameter related with the dummy variable (DT) reflected to the trend is not statistically significant. The results of estimations for Model A for the credit usage show the structural break within the last quarter of 2008. Really, it is seen that the proportion for the credit usage for the periods within the last quarter of 2008 and the first two quarters of 2009 decreases. Nevertheless, within the level of 1% significance for RVC variable, the null hypothesis of unit root has been rejected.

ZA test for the period of 1995Q1-2010Q4 Gross Domestic Product (RGDP) and credit usage (RVC) show that the trend of variables is stable with the break. Çil Yavuz (2006), in order to provide the stability, in similar cases, it is not suitable to take the difference of variables and the results of the may be spurious applied to the causality to the first differences. Çil Yavuz (2006) determined to provide with the below regression estimation regarded the estimated point of break for the stable series:

$$y_t = \mu + \theta DU_t + \beta_t + \gamma DT_t + \tilde{y}_t \qquad (1)$$

In above equation $\tilde{y}_t$ has the property of stable series been de-trending.

4. Toda-Yamamoto Linear Granger type Causality Test

In order to the results for the causality relations between the proportional usage of credit and economic growth be robust, it will be tested by the approach of Toda and Yamamoto (1995) which was frequently preferred in recent years implementations. The F test is generally used in Granger causality analysis depending upon the estimations of VAR and VEC models. Toda and Yamamoto(1995) showed that the traditional F-statistic will not be suitable with the Standard spread within the case of the series are not stable in the system, for this reason the result of this test used for the Granger causality test may not be valid. According to Toda and Yamamoto (1995) VAR model placed in level values of series even though series are not stable can be estimated and standard Wald test may be practicable. In this method, for Granger causality test, within the degree of [*k*+(*dmax*)] VAR model had been estimated and Wald test for the first *k* item of the coefficient matrix has been implemented. Toda and Yamamoto (1995) show that this test with k freedom degree and asymptotic χ 2 distribution by ignoring whether the concerned series is stable and stable around the trend and cointegrated. Here *k,* refers suitable length of lag of estimated VAR model and dmax implies the level of maximum integration for the variables in model. Thus, the first stage of the method is the determination of level of integration taking place in the system and second stage is the system estimation. In accordance with this, the achievement of the method is directly relevant with the *dmax* implies the level of maximum integration for the variables in model and the *k,* refers suitable length of lag. The most important property of this method offered by Toda and Yamamoto is that it doesn't need the preliminary tests with potential tendency used in determining the unit root and cointegration. Thus, the risk may be arisen from the wrong determination of integration degree for series with the using of the concerned

method. According to the Toda- Yamamoto approach, the equations taking place the level degree of data related with RGDP and RVC variables to search the causality as below:

$$RGDP_t = \lambda_t + \sum_{i=1}^{k} \alpha_{1i} RGDP_{t-i} + \sum_{j=k+1}^{d_{max}} \alpha_{2j} RGDP_{t-j} + \sum_{i=1}^{k} \beta_{1i} RVC_{t-i} + \sum_{j=k+1}^{d_{max}} \beta_{2j} RVC_{t-j} + \varepsilon_{1t}$$

(2)

$$RVC_t = \lambda_t + \sum_{i=1}^{k} \alpha_{1i} RGDP_{t-i} + \sum_{j=k+1}^{d_{max}} \alpha_{2j} RGDP_{t-j} + \sum_{i=1}^{k} \beta_{1i} RVC_{t-i} + \sum_{j=k+1}^{d_{max}} \beta_{2j} RVC_{t-j} + \varepsilon_{2t}$$

(3)

It can be concluded that in $\forall_i \beta_{1i} \neq 0$ there is causality from the proportional credit usage to the economic growth in Equation 2. In a similar way in Equation 3, in $\forall_i \alpha_{2i} = 0$ the reason of the economic growth is the increase in using credit. Model is estimated by using the seemingly unrelated regression (SUR).

Table 2: Results of Toda-Yamamoto (1995) Granger Causality

Hypothesis	**Lag Length** $k + d_{max}$	X^2 **-test**	**p-value**	**Conclusion**
RVC ≠>RGDP	5* (4+1)	2.624	0.1608	Do not Rject
RGDP ≠> RVC		8.713	0.0012	Reject

Note: **denotes lag length chosen by according to Schwarz criterion. The notation RGDP ≠> RVC implies that RGDP does not Granger cause RVC.*

In Table 2, according to the results obtained by the Equation 2 and 3 estimated in accordance with the Toda-Yamamoto, the null hypothesis claiming the GDP is not the reason of credit using has been rejected; the null hypothesis is not the reason of the GDP for the usage of credit is accepted. Thus, for the period of 1995:Q1 and 2010:Q4 between the credit usage and economic growth from the income to the credit using there is uni-directional causality relations.

Concluding Remarks

In this study, the direction of relation between the credits used by banks and growth is accepted as the most important factor of Turkish financial system. Turkish banking sector has arrived the strong structure by means of the precautions taken after 2001 local crises, in respect of both financial and institutional structure. The operation of banking sector without any problem is one of the most important inputs of the strong economic structure. The essential problem which disrupts the operation of the credit channel in Turkey is the financial deficit in public sector.

According to the results of analyses, it is seen that February 2001 and 2008 global crises affected in Turkey negatively in terms of usage credit. On the other hand, according to the results of analyses used in Todo-Yamamato causality approach, the hypothesis claiming that the causality from RGDP changes to credit using has not been rejected. Thus, it is found that there is uni-directional causality from RGDP to RVC for a related period.

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