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Financial Development and Economic Growth: The Case of Turkey and Romania

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Abstract
In this study, the role of inflation threshold effect in the relationship between financial development and economic growth has been investigated for Turkey and Romania in period 1999:Q1 - 2015:Q1 and 2002:Q4 -2015Q2 respectively. At the first stage, inflation threshold value has been detected and after that financial development-economic growth relation has been examined for both countries using threshold autoregressive (TAR) model. Results indicate that there is one threshold value in Turkey, whereas there are two in Romania. Previous studies support that financial development may promote economic growth. However, the findings of this study suggest that it can only be achieved under low and moderate inflation. In addition, under the first regime which is below the threshold level, financial development significantly promotes growth. Threshold value is estimated at 9.83 % for Turkey and 6.69 % for Romania. In this regard, it is important to achieve sustainable growth which plays a crucial role in increasing the efficiency of implemented monetary policies and assuring stability. Therefore, political and economic decision-makers in these economies do not ignore the concept of threshold within the scope of monetary policy while determining the target inflation rate in their efforts to deal with inflation.
Keywords: Inflation Threshold, Financial Development, Economic Growth, Threshold Autoregressive Model

Introduction

Our world witnessed important economic and political changes in the last quarter of the last century. Monetarist policies and new liberal policies started to be adopted in capitalist economies. The Soviet bloc switched from centralized planned system to market economy system. Financial liberalization taking place as a result of this development eliminated the pressure in the system and facilitated transformation into operationally efficient financial

structures. The acceleration of financial globalization in the 1990s especially as a result of advancements in information technology liberalized the intercountry movement of capital and increased the variety of financial institutions. Also, as new financial instruments emerged, financial markets developed and gained depth. The importance of financial stability in economies increased more. It was observed with the 2008 global crisis that the problems that may come out in the financial system can severely affect the real economy. Financial stability, which allows an efficient transfer of funds required for savers and investors to conduct their activities productively, reduces the fragility of economy by ensuring a balanced distribution of risks. In a contrary situation, production in the real sector may be disrupted and decreased; macroeconomic indicators such as inflation and unemployment rate may deteriorate; and even economic crisis may emerge.

Turkey, which switched to market economy in 1980 and is a candidate country for the European Union (EU) now, and Romania, which started its process of switch to market economy after 1989 and became member of EU in 2007, have been affected by global developments more and more due to the openness of their economies and the freedom of capital movements. The 2000 and 2001 crises, which left deep marks in the Turkish economy, resulted from early and excessive liberalization of financial markets accompanied by the effects of external factors. Romania, which became a member of EU after a long and handwringing process, was expected to have an improvement in economic and social situation and safety following its membership. However, the negative effects of the 2008 global economic crisis on EU countries, which constitute the largest market of Romania, disrupted the macroeconomic balances of the Romanian economy.

In this regard, this study aims to determine the role of inflation threshold in the financial development-economic growth relationship in Turkey and Romania in the 1999:Q1 - 2015:Q1 and 2002:Q4 -2015Q2 periods respectively. To this end, a two-regime threshold autoregressive (TAR) model is employed to test the inflation-economic growth relationship. In this way, the study is expected to make a considerable contribution to the literature dealing with the investigation of the foundations of economic development in Turkey and Romania. In addition, this study intends to contribute to grounding the inflation-growth debates, which are mostly built on incorrect theoretical and empirical bases in these two countries, on right bases. This paper firstly focuses on the possible effects of inflation on economic growth. Then it explores the inflation-growth interaction in both countries and whether or not there is a threshold of inflation in this interaction. Finally, the consistency of the empirical findings concerning the analysis with the current literature will be evaluated.

A Theoretical Perspective

The uncertainty caused by high inflation rates causes banks and other financial institutions to go for extra return in order to be protected from risks by preventing individuals and companies from making long-term consumption, saving, and investment decisions. As a result, it leads to a rise in real interest rates. Rise in interest rates affects capital market trading volume by changing the return of securities. On the other hand, increase in cost of borrowing and uses of savings in unprofitable areas have a negative effect on investments and thus growth (CBRT, 2004: 6). The macroeconomic conditions economies go through affect the size of this effect.

Inflation and Financial Development

Financial development refers to proliferation of the channels that turn savings into investments and thus increase of the number and diversity of financial instruments in economies. Financial institutions increase the efficiency of resource allocation in economies by making idle funds active and turning small-scale funds into large-scale funds through mediating between demand for funds and supply of funds in economies.

Financial theories that emphasize the importance of information asymmetry in credit markets highlight that inflation rates reaching a specific critical threshold value will have a negative effect on the performance of financial institutions (banks and capital markets). In this regard, high inflation rates affect banks and other financial institutions in terms of the amount of loans they make available and capital markets in terms of the change in the return of stocks (Boyd et al., 2001: 223).

Inflation and Growth

Whether inflation is influential on growth has been discussed by economists for a long time. As growth rates were high in the 1970s when there were high inflation rates in many economies, it was argued that inflation had a positive effect on growth. Increase in instability in periods of hyperinflation in Latin American economies in the post-1980 period gave birth to and strengthened the arguments that inflation had a negative effect on growth. Views in favor of the positive effect of inflation on growth are generally based on the perspective that inflation increases required reserves. As economic units cannot consume as much as they desire due to increases in prices in case of inflation, they will reduce purchases and retrench. As inflation mostly depends on the excessiveness of investments, overinvestments will temporarily be financed by these savings (Parasız, 2009: 409). Views in favor of the negative effect of inflation on growth, on the other hand, basically depend on the negative influence of inflation on future expectations and thus on investments and growth (Berber and Artan, 2004: 105).

Financial Development and Growth

Another common research topic of economists is the determiners of economic growth. Growth models in which internal growth is identified with financial development stress that a self-feeding growth is not possible without internal technical progress, and financial development contributes to economic growth. Financial development contributes to economic growth by directing savings to investments and making resource allocation efficient (Pagano, 1993: 615-616). Internal growth theories emphasize that increased efficiency in the financial system will bring about a long-term growth effect. It is argued that efficiency increase can be achieved through the factors held by financial institutions themselves (e.g. effective management, trained staff, use of modern technologies) (Ağır, 2010: 46). In general, “demand-following” and “supply-leading” hypotheses are taken into account in explaining the direction of the relationship between financial development and growth. According to the “demand-following” hypothesis, investors’ and savers’ demands for modern financial services promote financial development in the real economy. According to the “supply-leading” hypothesis, on the other hand, transfer of funds from underdeveloped sectors to modern sectors through financial intermediation and encouragement of entrepreneurs in modern sectors contribute to economic growth (Patrick, 1966: 175-176).

Literature

The literature involves a lot of studies focusing on the relationships between inflation, financial development, and economic growth. The studies dealing with the mechanisms through which inflation affects economic growth level indicate financial development as an important channel. Some of the studies in which threshold effects on the inflation-financial development relationship and on the inflation-growth relationship are investigated and some (fewer) studies in which inflation threshold effect on the financial development-economic growth relationship is investigated are summarized below.

Kulyk (2002) investigated the relationship between financial depth and inflation for 16 transition economies including Romania in the 1994-2000 period via bootstrap technique and concluded that financial depth is not affected negatively below the inflation threshold values of 9-10.5%.

Khan and Senhadji (2000) investigated the existence of threshold effects in the relationship between inflation and growth in 140 industrialized and developing countries including Turkey and Romania in the 1960-1998 period via bootstrap method and panel model. They concluded that estimated inflation threshold values that slow down growth are 1 to 3% for industrialized countries and 11 to 12% for developing countries.

Khan, Senhadji, and Smith (2001) investigated the relationship between inflation and financial depth for 168 industrialized and generally developing countries including Turkey and Romania in the 1960-1999 period via non-linear least squares (NLLS) method. They concluded that an estimated inflation threshold value that prevents financial depth is 3 to 6%.

Rousseau and Wachtel (2002) aimed to determine inflation threshold values in the financial depth-growth relationship for 84 countries including Turkey in the 1960-1995 period through panel data analysis. They detected a series of inflation threshold values. They concluded that financial depth positively affects growth when inflation rates are below the threshold values of 6 to 8% and inflation negatively affects financial depth when it is below the threshold values of approximately 15 to 20%.

Lee and Wong (2005) investigated the existence of inflation threshold effects in the financial development-economic growth relationship for Taiwan and Japan in the 1965-2002 period through threshold autoregressive (TAR) approach. They concluded that there are two threshold values for Japan and one threshold value for Taiwan, and that financial development below the threshold value of 7.25% may promote growth for Taiwan and financial development below the threshold value of 9.66% may promote growth for Japan.

Akgül and Özdemir (2012) investigated the non-linear relationship between inflation rate and economic growth for Turkey in the 2003-2009 period and the effects of economic crises on this relationship through threshold autoregressive (TAR) model. They found monthly inflation threshold value to be 1.261% and concluded that any inflation rate below this value has a positive effect on growth.

Aydın, Akıncı and Yılmaz (2016) investigated the effect of inflation threshold level in the relationship between inflation and economic growth for 24 emerging market countries in period 1980-2013 through dynamic panel threshold approach. They found that there is a non-linear relationship between inflation and economic growth in the countries. Besides, inflation has a statistically significant and positive effect on economic growth below the threshold level (13.68%) while significant and negative effect above the threshold level.

Aydın, Esen and Bayrak (2016) investigated the influence of inflation on economic growth for five Turkish Republics (Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, and Turkmenistan) that are in the transition process in the 1992-2013 period based on dynamic panel threshold

approach. They concluded that there is a nonlinear relationship between inflation and growth rate; the threshold for the influence of inflation on economic growth is 7.97%, and an inflation rate above this threshold has a negative influence on economic growth while an inflation rate below this threshold has a positive influence on economic growth.

Model, Methodology And Data

Econometric Model

To examine the relationship between financial development and economic growth, a growth model was developed via the model used by Odedokun (1996) and Lee and Wong (2005) in their studies. The model is described in Equation (1):

$$Y_t = f(K_t, L_t, FD_t, Z_t) \quad (1)$$

In Equation (1), Y_t stands for real output level and K_t, L_t, FD_t and Z_t stand for capital stock, labor, financial development level, and other factors affecting total output, respectively. The production function in Equation 1 may be rearranged after its derivative is taken, yielding a neo-classical growth model. The growth model is shown in Equation (2);

$$\dot{Y}_t = \beta_0 + \beta_1 \left(\frac{I}{Y}\right)_t + \beta_2 \dot{L}_t + \beta_3 \dot{FD}_t + \beta_4 \dot{Z}_t + e_t \quad (2)$$

In Equation (2), $(I/Y)_t$ stands for the share of real gross investment in total GDP and $\dot{Y}_t$, $\dot{L}_t$, $\dot{FD}_t$ and $\dot{Z}_t$ stand for real GDP, labor force participation rate, financial development rate, and growth rates related to other factors affecting total output, respectively. In the model, e_t is the error term and β_0 is the constant term, while β_1, β_2 , β_3 and β_4 are coefficients for the variables. The inflation rate ($\dot{\pi}_t$) is incorporated into the neoclassical growth model as another factor affecting total output by taking into account the growth model used by Kremer et al. (2013) and Vinayagathasan (2013) in their studies.

Methodology

Problems such as economic or political crises in both domestic and international markets give rise to breaks in time series (Akgül and Özdemir, 2012: 91). As breaks may lead to the formation of a nonlinear structure in econometric models, nonlinear models which represent regime changes and estimation methods for these models have been developed.

One of the most commonly used methods for estimating nonlinear models is the Threshold Autoregressive (TAR) model proposed by Tong (1978) and developed by Tsay (1989) and Hansen (1996, 1999 and 2000). The model inherently allows for the estimation of different linear models for different regimes via the determination of one or more threshold values. In this model, the values representing the regime change are defined as the threshold, while the variable causing the regime change is defined as the threshold variable.

The linear model obtained in Equation (2) provides a structure for estimating the effects of financial development level on economic growth. However, it does not provide information on how changes occurring at the level of financial development may affect the relationship between two variables. This may indicate the existence of a nonlinear relationship between economic growth and financial development. Thus, the TAR model can be used in determining a nonlinear relationship. This model allows determining the existence of a nonlinear relationship between two variables and differences, if any, in the effect of this relationship on economic growth performance can be demonstrated.

The two- and three-regime TAR models which examine the nonlinear relationship between economic growth and financial development are expressed in Equations (3) and (4), respectively (Hansen, 1996):

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i Y_{t-i} + \varepsilon_{1t}\ if\ [s_{t-d} \le \theta]$$
$$Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i Y_{t-i} + \varepsilon_{2t}\ if\ [s_{t-d} > \theta] \quad (3)$$

In the model given in Equation (3), Y_t is the dependent variable, s_{t-d} is the threshold variable causing the regime change, θ is the threshold value, *d* is the delay parameter, *p* is the proper delay length, and ε_{1t} and ε_{2t} are the independent and identical random error terms, respectively. In the model, s_{t-d} follows an autoregressive process with parameters α_0 and α_i where the threshold variable is less than or equal to the threshold value θ, while it follows a different autoregressive process with β_0 and β_i where the the threshold variable is greater than θ.

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i Y_{t-i} + \varepsilon_{1t}\ if\ [s_{t-d} \le \theta_1]$$
$$Y_t = \beta_0 + \sum_{i=1}^{p} \beta_i Y_{t-i} + \varepsilon_{2t}\ if\ [\theta_1 < s_{t-d} \le \theta_2] \quad (4)$$
$$Y_t = \gamma_0 + \sum_{i=1}^{p} \gamma_i Y_{t-i} + \varepsilon_{3t}\ if\ [s_{t-d} > \theta_2]$$

In Equation (4), s_{t-d} follows an autoregressive process with α_0 and α_i when the threshold variable is less than or equal to the threshold value θ_1 while following a different autoregressive process with β_0 and β_i where the the threshold variable is greater than θ_1 and less than or equal to the threshold value θ_2. It follows a different autoregressive process with γ_0 and γ_i when the threshold variable is greater than the threshold value θ_2.

The linear model in Equation (2) estimates the effect of inflation on economic growth. It may be transformed into a two-regime TAR model and expressed as in Equation (5):

$$\begin{aligned} Growth_t = {} & (\delta_{10} + \delta_{11} InvGr_t + \delta_{12} LabGr_t + \delta_{13} FD_t)\ I[\pi_{t-d} \le \theta] \\ & + (\delta_{20} + \delta_{21} InvGr_t + \delta_{22} LabGr_t + \delta_{23} FD_t)\ I[\pi_{t-d} > \theta] + \varepsilon_t \end{aligned} \quad (5)$$

In the model in Equation (5), $Growth_t$ is the dependent variable, FD_t is the independent variable, δ_{10} and δ_{20} are the constant parameters, $InvGr_t$, $LabGr_t$ and π_t are the control variables, $I_t(\theta)$ is the indicator function, and ε_t is the independent and identical random error term. The indicator function takes a value of 1 where $I_t(\theta) = [\pi_{t-d} \le \theta]$, $\pi_{t-d} \le \theta$, and takes a value of 0 otherwise.

When the linear model in Equation (2) is transformed into a three-regime TAR model, it is expressed as in Equation (6):

$$\begin{aligned} Growth_t = {} & (\delta_{10} + \delta_{11} InvGr_t + \delta_{12} LabGr_t + \delta_{13} FD_t + \delta_{14} \pi_t)\ I[\pi_{t-d} \le \theta_1] \\ & + (\delta_{20} + \delta_{21} InvGr_t + \delta_{22} LabGr_t + \delta_{23} FD_t + \delta_{24} \pi_t)\ I[\theta_1 < \pi_{t-d} \le \theta_2] \\ & + (\delta_{30} + \delta_{31} InvGr_t + \delta_{32} LabGr_t + \delta_{33} FD_t + \delta_{34} \pi_t)\ I[\pi_{t-d} > \theta_2] + \varepsilon_t \end{aligned} \quad (6)$$

In creating the TAR model, the proper delay time (*p*) of the threshold variable is first selected for the linear AR model through an information criterion such as Akaike or Schwarz. The delay parameter (*d*) is then selected as a result of a nonlinearity test separately performed for each delay, while the non-rejection of the null hypothesis stands for nonlinearity. The threshold number and threshold values are later determined. Finally, different linear models are created for different regimes and these models are estimated (Akgül & Özdemir: 2012: 92).

The statistic $\hat{\mathrm{F}}(\mathrm{p}, \mathrm{d})$ with an *F* distribution is used to conduct the linearity test. The formula for the statistic $\hat{\mathrm{F}}(\mathrm{p}, \mathrm{d})$ is shown in Equation (7):

$$\hat{F}(p,d) = \frac{(\sum \hat{e}_t^2 - \sum \hat{\varepsilon}_t^2)/(p+1)}{\sum \hat{\varepsilon}_t^2/(n-d-b-p-h)} \quad (7)$$

In Equation (7), $\hat{e}_t^2$ represents the residual sum of squares (RSS) obtained through the recursive least squares (RLS) algorithm from the autoregressive process arranged as AR(*p*) for the observation number *n* while $\hat{\varepsilon}_t^2$ represents the RSS derived from the linear regression model through the method of least squares. In this formula, *p* is the proper delay and *d* is the delay parameter. Then, *b* and *h* are computed through *b = (n/10) + p* and *h = p+1-d,* respectively (Tsay, 1989:233). For testing the existence of the threshold value, as the threshold value is unknown, the likelihood ratio (LR) and bootstrap method are used (Hansen,

2000:582). The equality of coefficients in different regimes in the LR testing is tested under a null hypothesis formulated as $H_0: \alpha_i = \beta_i \ , \ i = 0,1, \dots, p$ that indicates no threshold effect for Equation (3). The test statistic *LR₁* is calculated with the formula described in Equation (8):

$$LR_1 = \frac{\sigma_0 - \sigma_1(\hat{\theta})}{\hat{\sigma}^2} \quad (8)$$

In Equation (8), σ_0 and σ_1 stand for the RSS values estimated under the null hypothesis (H_0) and the alternative hypothesis (H_a), respectively. $\hat{\sigma}^2$ is the variance of error terms. In case the null hypothesis is rejected, the new hypothesis for threshold value is formulated as $H_0: \theta = \theta_0$ and the test statistic *LR₁* in Equation (8) becomes the one in Equation (9):

$$LR_2 = \frac{\sigma_1(\theta) - \sigma_1(\hat{\theta})}{\sigma_1(\hat{\theta})} \quad (9)$$

The threshold value (θ) is estimated through the method of ordinary least squares (OLS) in Equation (3) and the optimal threshold value is determined through $\hat{\theta} = argmin\sigma_1(\theta)$ (Hansen, 2000: 578). After the threshold value is computed, the appropriate TAR model is constructed.

Data

This study aims to reveal the relationship between financial development and economic growth in Turkey and Romania based on the quarterly data of the periods from 1999: Q1 to 2015:Q1 and from 2002:Q4 to 2015:Q2. The study uses GDP growth rate (*Growth*) to measure the growth rate. The independent variable of the model is the money supply growth rate *M₃* which represents the level of financial development (*FD*). To determine to check the effects of other macroeconomic variables on economic growth along with the level of financial development, the share of gross domestic fixed capital formation in GDP (*Investment*), the labor force growth rate (*LabGr)*, and the inflation growth rate (π) have been used as control variables based on the theoretical model.

Data on Turkey were obtained from the Electronic Data Delivery System (EDDS) of Central Bank of the Republic of Turkey (CBRT) and the Turkish Statistical Institute (TurkStat), while data on Romania were obtained from the International Financial Statistics (IFS) and the European Statistics (EuroStat). To eliminate seasonality, the growth rates of the variables were computed in such a way as to reflect the change in the quarterly period compared to the corresponding period of the previous year. Table 1 shows basic information on the variables.

Table 1.
Basic Information on the Variables

Variables	Descriptions	Unit
Growth	Annual growth rate of Gross Domestic Product (GDP) (Constant)	%
Investment	The share of Gross Domestic Fixed Capital Formation in GDP	%
LabGr	The annual labor force growth rate	%
π	The annual percentage change of the CPI index	%
FD	The annual growth rate of *M₃* money supply	%

Empirical Results

Testing the Existence of Threshold Effect

The present study begins the analysis by first calculating a set of statistics on the variables used in the model. The results are presented in Table 2.

Table 2.
Descriptive Statistics

Turkey	***Growth***	***Investment***	***LabGr***	***π***	***FD***
Mean	3.897	22.424	0.804	20.781	7.563
Max	12.592	28.100	5.494	70.327	74.000
Min	-14.738	13.784	-3.250	4.344	0.000
Std. Dev.	5.624	3.288	1.582	0.845	9.719
Skewness	-1.075	-0.577	0.682	0.913	5.142
Kurtosis	4.085	2.626	3.539	2.254	34.920
Jarque Bera p-value	0.000	0.137	0.054	0.005	0.000
Romania	***Growth***	***Investment***	***LabGr***	***π***	***FD***
Mean	3.338	25.818	-0.996	6.761	15.770
Max	10.180	47.700	4.200	18.417	45.777
Min	-8.677	15.500	-11.400	0.088	2.515
Std. Dev.	4.393	6.949	2.520	0.974	12.402
Skewness	-0.899	0.949	-1.807	-1.793	0.910
Kurtosis	3.693	4.107	8.055	7.466	2.544
Jarque Bera p-value	0.019	0.006	0.000	0.000	0.024

As seen in Table 2, the highest values for the money supply growth rate M_3, representing the level of financial development in Turkey and Romania, are 74% and 45%, respectively, while the lowest values are 0.01% and 2.51%. The mean values of the money supply growth rate M_3 are 7.56% and 15.77%.

The correlation matrix related to the explanatory variables used in the model is shown in Table 3. Based on the correlation matrix, the highest negative correlation in Turkey is 0.670 between *Investment* and π, while the lowest negative correlation is 0.048 between *Investment* and *FD*. On the other hand, the highest positive correlation in Romania is 0.547 between *FD* and π, while the lowest negative correlation is 0.010 between *Investment* and *FD*.

Table 3.
Correlation Matrix

Turkey	*Investment*	*LabGr*	π	*FD*
Investment	1.000			
LabGr	0.136	1.000		
π	-0.670	-0.346	1.000	
FD	-0.048	-0.208	0.207	1.000
Romania	*Investment*	*LabGr*	π	*FD*
Investment	1.000			
LabGr	0.080	1.000		
π	0.129	0.014	1.000	
FD	-0.010	-0.017	0.547	1.000

An Augmented Dickey-Fuller (ADF) stationarity test was conducted to demonstrate that the variables used in the model were stationary at level. Table 4 shows the test results. Based on the ADF test statistics, all the variables used in the model are stationary.

Table 4.
Unit Root Test Results

Turkey	***Intercept***	***Intercept and Trend***
Growth	-3.931*	-3.886**
Investment	-2.661***	-3.276***
LabGr	-0.228	-5.577*
π	-2.051	-3.173***
FD	-7.163*	-7.949*
Romania	***Intercept***	***Intercept and Trend***
Growth	-2.984**	-3.330***
Investment	-2.803***	-2.772
LabGr	-6.242*	-6.621*
π	-2.370	-3.692*
FD	-2.221	-3.549***

***, **, and * represent 1%, 5% and 10% significant levels, respectively.

After the variables were found to be stationary, the approach developed by Tsay (1989) was used to reveal the nonlinear structure between the level of financial development and economic growth. Table 5 shows the results of the linearity test conducted for different delay lengths of the level of financial development.

Table 5.
Linearity Test Results for the Inflation Variable (*π*)

Turkey	*d=1*	*d=2*	*d=3*	*d=4*
F-stat	**19.549**	18.548	19.141	17.158
p-value	**0.005**	0.006	0.004	0.012
Romania	***d=1***	*d=2*	*d=3*	*d=4*
F-stat	**89.028**	88.111	57.830	88.014
p-value	**0.000**	0.000	0.000	0.000

According to the probability and F-statistic values in Table 5, linearity was most strongly rejected for *π* in the first delay in Turkey and Romania. Thus, the delay parameter (*d*) was determined to be 1 for *π* in both Turkey and Romania. The results show that inflation implies a regime switching one period in advance in both countries. In that case, the threshold value for *π* is $\pi_{t-1.}$

The present study takes the next step to find out whether there is any threshold value causing regime-switching in the series concerning inflation in both countries; and if any, to determine the threshold number and value. The approach developed by Hansen (1996, 2000) is used to determine the existence of the threshold causing regime-switching in the series and estimate the threshold value. The *LR* statistics estimated for both countries with RATS 8.0 software and MATLAB 7.0.4 software, as well as the threshold values concerning these statistics, are shown in Table 6 for π_{t-1}. *LR* statistics were obtained using 5000 bootstrap replications.

Table 6.
Threshold Test Results

Threshold variable: (π_{t-1})		Threshold Value (%)	LR stat	Bootstrap p-value
Turkey				
1. Threshold Value (H_0^1: *No threshold value exists*)		% 9.83	19.549	0.013
2. Threshold Value (H_0^2: *A threshold value exist*)		-	7.345	0.145
Romania				
1. Threshold Value (H_0^1: *No threshold value exists*)		% 4.76	89.028	0.000
2. Threshold Value (H_0^2: *A threshold value exist*)		%4.07 ve % 6.69	145.376	0.000
3. Threshold Value (H_0^3: *Two threshold value exist*)		-	17.438	0.196

As seen in Table 6, for the delay parameter of the inflation rate in Turkey *d=1*, the *LR* statistics value was computed to be 19.549 and the bootstrap probability value was 0.013. The null hypothesis H_0^1 that the series has no threshold value at a significance level of 5% was rejected for inflation. A new hypothesis was formulated to test the existence of a second threshold value. The *LR* statistics value was computed to be 7.345 and bootstrap probability value was 0.145. Accordingly, the null hypothesis H_0^2 that the series has a threshold value at a significance level of 5% was not rejected. Thus, the test results indicated that the series had one threshold effect. On the other hand, for the delay parameter of the inflation rate in Romania *d=1*, the *LR* statistics value was computed to be89.028 and the bootstrap probability value was 0.000. The null hypothesis H_0^1 that the series has no threshold value at a significance level of 5% was rejected. A new hypothesis was constructed to test the existence of a second threshold value. The *LR* statistics value was found to be 145.376 and the bootstrap probability value was 0.000. Thus, the null hypothesis H_0^2 that the series has no threshold value at a significance level of 5% was rejected. Consequently, another hypothesis was constructed to test the existence of a third threshold value. The *LR* statistics values were determined and the bootstrap probability value was 0.196. Accordingly, the null hypothesis H_0^3 that the series has three threshold values at a significance level of 5% was not rejected. Thus, the test results indicated that the series had two threshold effects. As a result of the analysis, the relationship between the level of financial development and economic growth was found to be nonlinear in both countries. The single threshold value for inflation was computed to be 9.83% in Turkey and the two threshold values were 4.07% and 6.69% in Romania. This particular result seems to be consistent with the inflationary thresholds found to be 11-12% by Khan and Senhadji (2001), 10.63% by Akgül and Koç (2008) using annual data, and 1.26 % by Akgül and Özdemir (2012) using monthly data.

The Relationship between Financial Development and Economic Growth

The TAR model was estimated for Turkey and Romania to determine whether the effects of the level of financial development on economic growth differed above and below the threshold value and to detect the direction of the effect. The TAR model showing the relationship between the level of financial development and economic growth above and

below the inflationary thresholds was obtained for both countries through Equations (3) and (4), respectively.

Table 7 shows the estimation results concerning the two-regime TAR model. revealing the relationship between the level of financial development and economic growth below and above the inflationary threshold in Turkey.

Table 7.
Regression Results (*Dependent Variable: Growth*)

Threshold Variable (π_{t-1})	**Linear Model**	**Regime 1 <= % 9.83**	**Regime 2 > % 9.83**
Investment	0.644**	0.655**	0.531
	(0.368)	(0.321)	(0.338)
LabGr	-0.671	-0.177	-5.459***
	(0.461)	(0.299)	(1.428)
π	-0.969	1.380	-1.454***
	(1.455)	(4.041)	(0.394)
FD	0.035	0.072**	-0.091
	(0.034)	(0.030)	(0.147)
C	-7.746	-13.192	-1.797
	(1.747)	(12.032)	(9.671)
Observations	**65**	**38**	**26**
R^2	**0.24**	**0.21**	**0.44**

***, **, and * indicate significant at 1%, 5%, and 10% levels respectively. Values in parentheses are standard errors.

The linear model in Table 7 represents the linear relationship between the level of financial development and economic growth, while Regime 1 and Regime 2 represent the relationship between the level of financial development and economic growth when the inflation rate is below and above the threshold value, respectively. The linear model results show no statistically significant relationship between the level of financial development and economic growth. For Regime 1, which shows the inflation rate is below the threshold value, there is a statistically significant positive relationship between the level of financial development and economic growth at a significance level of 5% when the inflation rate is below 9.83%. For Regime 2, the inflation rate is above the threshold value, there is no statistically significant relationship between the level of financial development and economic growth. In other words, when the inflation rate is below the threshold value, the level of financial development has a positive effect on economic growth.

According to the linear model in Table 7 and Regime 1, which shows the inflation rate is below the threshold value, there is no statistically significant relationship between inflation and economic growth. However, according to Regime 2 which shows the inflation rate is above the threshold value, there is a statistically significant negative relationship between inflation and economic growth at a significance level of 1%. This indicates that inflation in a high-inflation environment has an adverse effect on economic growth.

Table 8 shows the estimation results concerning the three-regime TAR model, revealing the relationship between the level of financial development and economic growth with respect to the inflationary threshold in Romania.

Table 8.
Regression Results (*Dependent Variable: Growth*)

Threshold Variable (π_{t-1})	**Linear Model**	**Regime 1 ≤ % 4.07**	**Regime 2 > 4.07 and ≥ 6.69**	**Regime 3 > % 6.69**
Investment	0.111**	0.017	-0.288	0.299***
	(0.053)	(0.051)	(0.185)	(0.086)
LabGr	0.412***	0.506***	2.933**	0.899*
	(0.138)	(0.109)	(0.887)	(0.515)
π	-0.796**	0.090	-2.154	5.516
	(0.342)	(0.235)	(3.534)	(3.232)
FD	0.209***	0.309*	0.274**	0.133***
	(0.041)	(0.163)	(0.086)	(0.040)
C	-1.146	1.371	11.331	-18.077*
	(1.486)	(1.484)	(6.557)	(9.880)
Observations	**51**	**13**	**13**	**24**
R^2	**0.34**	**0.60**	**0.59**	**0.50**

The results of the linear model in Table 8 indicate a statistically significant positive relationship between the level of financial development and economic growth at a significance level of 1%. As Regime 1 shows an inflation rate below the first threshold value, there is a statistically significant positive relationship between the level of financial development and economic growth at a significance level of 10% when the inflation rate is below 4.07%. As Regime 2 shows the inflation rate is between two of the thresholds, there is a statistically significant positive relationship between the level of financial development and economic growth at a significance level of 5% when the inflation rate ranges between 4.07% and 6.69%. Regime 2 that shows the inflation rate is above the second threshold value, demonstrating a statistically significant positive relationship between the level of financial development and economic growth at a significance level of 5%. In other words, the level of financial development shows a positive effect on economic growth in all three regimes. Considering the size of the regime coefficients, the effect of the level of financial development on economic growth is below the first threshold value of the inflation rate, becoming stronger in a low-inflation regime, and weaker in the moderate- and high-inflation regimes.

According to the linear model in Table 8, there is a statistically significant negative relationship between inflation and economic growth. However, based on inflationary thresholds, there is a statistically significant relationship between inflation and economic growth in all three regimes.

In conclusion, the results concerning the estimated model can be summarized as follows: a) the analysis of the periods of 1999:Q1-2015:Q1 and 2002:Q4-2015 Q2, respectively, indicates that the regime change in the series with respect to inflation rate may be predicted one period in advance in both countries. In other words, a change that may occur in inflation rate signals one period in advance. b) The results show that the relationship between the level of financial development and economic growth is nonlinear, following a one-threshold and two-regime course in Turkey and a two-threshold and three-regime course in Romania. c) Data on Turkey demonstrates that the effect of the level of financial development on economic growth differs below and above the threshold value and that the level of financial development has a positive and significant effect on economic growth when it is below the threshold value; however, it has a negative and insignificant effect when it is above the threshold value. On

the other hand, data on Romania indicates that the effects of the level of financial development on economic growth do not differ by the threshold value. However, such effects are stronger in a low-inflation environment than in moderate- and high-inflation environments.

Conclusion

The models created with linearity assumption in most of the studies dealing with the financial development-economic growth relationship in the literature focus on causality, cointegration, or panel data analysis. The analyses and comments made based on the assumption that the relationship is linear imply that the absolute effect of financial development level on growth is the same (i.e. there is a symmetrically developing relationship). However, the absolute effect of financial development level on growth may change in a country that goes through an inflationary process. Considering that this kind of an asymmetry has a non-linear character, the present study attempted to determine whether or not there has been a non-linear relationship, contrary to what is believed, between financial development level and economic growth in recent years and whether or not such non-linear relationship is true for Turkey and Romania. The analysis made in the study was based on the quarterly data from the 1999: Q1-2015: Q1 and 2002: Q4-2015: Q2 periods for Turkey and Romania. The analysis started with the analysis of the relationship between quarterly GDP growth rate and financial development level. It was indicated that the series determined to be stationary were not linear. Testing through Hansen's (1996, 1999, 2000) approach showed that there is a single threshold for inflation in Turkey and there are two thresholds for inflation in Romania. Then an appropriate TAR model was created for inflation, and the models were estimated. For the entire analysis period, the single threshold value for inflation rate was found to be 3.99% for Turkey while the two threshold values for inflation rate were found to be 4.07% and 6.69% for Romania. It was determined that the relationship between financial development level and economic growth differs depending on whether the inflation rate is below or above the threshold in Turkey whereas such relationship does not differ but weakens in moderate and high inflation regimes in Romania. It was detected that when inflation rate is below the threshold value in Turkey, financial development level has a statistically significant positive effect on economic growth; however, such effect is not statistically significant when the inflation rate is above the threshold value. As to Romania, it was found that financial development level has a statistically significant positive effect on economic growth when inflation rate is below the first threshold value, between the two threshold values, or above the second threshold value.

The findings of this study, which aimed to contribute to the applied literature dealing with the relationships between inflation, financial development, and economic growth, indicate that there are specific thresholds of inflation in Turkey and Romania; inflation is an important obstacle to the financial development-economic growth relationship when these thresholds are exceeded; and financial stability must be achieved for a balanced and sustainable growth performance. In this regard, threshold values play a leading role in identifying the optimal inflation rate that promotes financial development and increases growth. Accordingly, threshold values should also be taken into consideration as a reference in determining target rates within the scope of inflation targeting strategies starting to be implemented to ensure price stability in Romania in 2005 and in Turkey in 2006.

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