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Re-examining the impact of financial intermediation on economic growth: evidence from Turkey

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Abstract

Purpose – This study seeks to investigate the impact of financial intermediation on economic growth in Turkey using annual data spanning 1970–2017.

Design/methodology/approach – Based on the results of the augmented Dickey–Fuller and Phillips–Perron unit root tests for stationarity, the authors employ the Autoregressive Distributed Lag (ARDL) bounds testing to cointegration to establish the long-run impact of financial intermediation alongside other control factors on economic growth. The study also examines the short-run relationship between financial intermediation and economic growth by estimating the Error Correction Model (ECM).

Findings – The authors' findings indicate that financial intermediation significantly influences economic growth in both short and long run. However, the effect is positive only in the short run, lending support to the supply-leading hypothesis. Regarding the control variables, the authors observe that while financial openness shows a positive significant impact on economic growth in the long run, gross fixed capital formation matters only in the short run. The results further infer that regardless of the time period, inflation impedes economic growth.

Originality/value – In the empirical analysis of the relationship between financial intermediation and economic growth, financial intermediation is always measured using a single variable. The authors argue that such studies could produce bias and misleading results given that a single proxy does not adequately reflect financial intermediation activities. Likewise, such findings may delude policy implementation. To provide a more vivid and robust analysis, the authors employ the Principal Component Analysis (PCA) to construct a composite index for financial intermediation based on three broad measures. The researchers' are unaware of any study on the financial intermediation–economic growth nexus using a composite index of financial intermediation. Thus, this paper fills this lacuna in the literature.

Keywords Financial intermediation, Economic growth, ARDL framework, Turkey

Paper type Research paper

1. Introduction

In every economy, financial resources are pertinent for enhancing growth through efficient financial intermediation (Sulaiman and Aluko, 2015). Financial intermediaries particularly banks play a crucial role in a country's overall financial system by embarking on several activities vital for economic growth (Aziakpono, 2005; Ünvan and Yakubu, 2020). For instance, financial intermediaries serve as a conduit by which financial resources move from surplus to deficit economic units. They aid in maturity transformation, thus ensuring sufficient liquidity.

JEL Classification — G10, G21, O11

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Financial intermediaries also ensure risk management by providing mechanisms for diversification and risk-sharing.

Efficient financial intermediation as opined by Agbada and Osuji (2013) creates a lively financial system, improves employment and output level, as well as income. Greenwood and Jovanovic (1990) argued that through financial intermediation, individuals and firms earn higher returns on investment, contributing to economic well-being. According to McKinnon (1973) and Shaw (1973), economic growth is mainly driven by financial intermediation. They both infer that investment level influenced by growth in savings directly affects economic growth. A surge in savings triggers more investments, which increase capital formation rate, with a consequent positive impact on economic growth. Conversely, finance can sometimes inhibit economic growth. King and Levine (1993) argued that the financial system may experience a sluggish development with a subsequent effect on economic growth as a result of certain constraints imposed on the banking system by the government. For instance, high mandatory reserves and interest rate ceilings may hurt the competitiveness of the financial sector.

For the past decades, the effect of financial intermediation on economic growth has received significant research attention. Nevertheless, the link between these variables remains unsettled. While some studies established that financial intermediation matters for economic growth (see Ventura, 2008; Murty *et al.*, 2012; Sahoo, 2014; Türsoy and Faisal, 2018), others evidenced an inimical impact of finance on growth (Acha, 2011; Zaghdoudi *et al.*, 2013; Sulaiman and Aluko, 2015; John and Nwekemezie, 2019). Despite the pool of research on the subject matter, studies in Turkey (for instance, Kar *et al.*, 2008; Yucel, 2009; Demirhan *et al.*, 2011; Kapusuzoglu, 2013; Ak *et al.*, 2016) focus largely on examining the impact of financial development on growth using the notable "bank credit to private sector" as a proxy of financial development. How the other facets of financial intermediation (e.g. deposit and money supply) affect growth is scarcely discussed. Consequently, we seek to contribute to the global debate on financial intermediation–growth nexus in the context of Turkey.

Undoubtedly, extant studies are largely based on single proxies of financial intermediation. The most commonly employed individual indicators include broad money, credit to private sector, savings, interest rates and so on. Using a single measure is quite narrowed and does not fully reflect financial intermediation activities. To differ from prior studies and to provide a more comprehensive analysis, we construct an index of financial intermediation relying on three broad indicators (broad money, bank deposit and domestic credit by the financial sector).

We contribute to the financial intermediation–economic growth literature in two ways. First, we are unaware of any existing study employing an index of financial intermediation to investigate its impact on economic growth, particularly in Turkey. Thus, we present a pioneering attempt in this context. Apart from this, we seek to examine the short- and long-run impact of financial intermediation on economic growth by applying the autoregressive distributed lag (ARDL) framework on recent data.

The paper is further organized as follows: Section 2 presents the literature review. Section 3 outlines our data and analytical strategy. Section 4 discusses the findings, and Section 5 concludes with implications.

2. Literature review

The seminal work of Patrick (1966) examined the finance–economic growth relationship in terms of supply-leading hypothesis and demand-following hypothesis. For the supply-leading hypothesis, the pivotal argument is that economic growth is caused by financial deepening. It postulates that financial sector development leads to optimal resource allocation (Hurlin and Venet, 2008). A developed and sound financial sector creates financial services and provides easy access to these services in anticipation to the demand for them by

economic units. The supply-leading hypothesis infers that the economy rapidly responds to real sector growth driven by the development of the financial sector. The demand-following hypothesis, on the other hand, presumes that financial development is induced by economic growth. The growth in the real economy spurs the demand for financial services leading to the creation and improvement of financial institutions to meet the increasing demand for these services (Demetriades and Hussein, 1996).

At the empirical front, the effect of financial intermediation on economic growth has been investigated at both cross-country and country-specific level with inconclusive findings. For instance, in a cross-country analysis, Levine *et al.* (2000) investigated the impact of financial intermediation on economic growth using data of 71 countries while applying different panel approaches. The authors found that economic growth is positively driven by financial intermediation across countries. Using West African countries within the Economic Community of West African States (ECOWAS), Atindéhou *et al.* (2005) empirically assessed the relationship between financial intermediation and economic growth. Results from the panel vector autoregressive (VAR) model showed that for most of the sampled countries, financial intermediation has a direct impact on economic growth. In a multicountry analysis, Adusei and Afrane (2013) assessed how the intermediation of credit unions impacts on economic growth. Applying the generalized method of moments panel technique on data spanning 1995–2011, the authors established a significant positive impact of financial intermediation on economic growth. Employing data of 28 countries for the period 2001–2010 in both developed and developing countries, Bogdan and Opris (2013) applied different econometric approaches to evaluate the impact of financial intermediation on economic growth. Using different measures of intermediation, the authors generalized that growth is positively driven by the level of financial intermediation. Contrary to the positive effect of intermediation, Zaghdoudi *et al.* (2013) found that banking intermediation negatively affects economic growth in the Middle East and North Africa (MENA) countries.

At the country-specific level, Ventura (2008) investigated how financial intermediation affects economic growth in Colombia. Using the ARDL approach, the author established a positive significant impact of intermediation on economic growth in both short- and long-run periods. Murty *et al.* (2012) assessed the long-run effect of financial intermediation on growth in Ethiopia using the Johansen cointegration approach. The results revealed that bank credit to private sector as an indicator of financial intermediation exerts a positive significant long-run effect on economic growth. Invoking the VAR technique, Amaira and Amairya (2014) reported that financial intermediation has a positive impact on economic growth in Tunisia. Sahoo's (2014) Granger causality test evidenced that economic growth in India is driven positively by financial intermediation. Türsoy and Faisal (2018) using the ARDL model showed that economic growth is influenced by deposit growth (a measure of financial depth) in Cyprus. In contrast to the preceding results, Acha (2011) evidenced no direct impact of financial intermediation on economic growth in Nigeria. Similarly, Sulaiman and Aluko (2015) and John and Nwekemezie (2019) found that financial intermediation does not motivate growth in Nigeria.

From the literature review, the financial intermediation–economic growth relationship remains unsettled as findings differ at both country-level and cross-country studies. We seek to contribute to the inconclusive debate by assessing how financial intermediation affects growth in Turkey.

3. Methodology

3.1 Data and sources

In this study, we use annual data covering the period 1970–2017. Our main independent variable is financial intermediation. We control for the effect of financial openness, gross

fixed capital formation and inflation on growth. Data for all the variables except for financial openness are sourced from the World Development Indicators of the World Bank. The data for financial openness is gleaned from the Chinn and Ito Financial Openness Index.

3.2 Description of variables

3.2.1 Economic growth (GDPG). Economic growth serves as the dependent variable. This is measured by gross domestic product (GDP) per capita.

3.2.2 Financial intermediation (FINT). We construct an index of financial intermediation based on three measures (broad money, bank deposit and domestic credit by the financial sector) using the Principal Component Analysis (PCA). These indicators are chosen given their significance in the literature. The effect of financial intermediation on growth is inconclusive, hence a positive or a negative relationship is expected.

3.2.3 Financial openness (FOP). The KAOPEN index by Chinn and Ito is employed as a proxy of financial openness. According to economic theory, economic growth should be positively influenced by financial openness (Estrada *et al.*, 2015). Countries that are opened to the global markets experience more capital flows. The inflows of foreign direct investment (FDI) can drive economic growth through several channels such as advanced technology, competitiveness in the domestic market and managerial skills. Given this, we expect financial openness to positively correlate with economic growth.

3.2.4 Gross fixed capital formation (GFCF). GFCF indicates domestic investment. Keynes posits that a country's aggregate demand is boosted by domestic investments (Tobin, 1965). A boom in domestic investment is expected to create more employment opportunities and enhance output. Theoretically, domestic investment and economic growth exhibit a bidirectional relationship. Prior studies have demonstrated a positive effect of domestic investment on economic growth (Bakare, 2011; Kanu and Ozurumba, 2014; Ncanywa and Makhenyane, 2016). Given the aforementioned premise, we hypothesize a positive influence of GFCF on economic growth.

3.2.5 Inflation (INF). Inflation is measured by consumer prices (annual percentage). In the literature, the relationship between inflation and economic growth is inconclusive (i.e. a positive, negative and sometimes neutral relationship). Given that an increasing level of inflation is associated with a high cost of living where investable resources are channeled to consumption, we expect inflation to decrease growth.

3.3 Model specification

To analyze the effect of financial intermediation and the control variables on economic growth, the empirical model following the work of Levine *et al.* (2000) is clearly presented as:

$$\mathrm{GDPG}_t = \alpha_0 + \beta_1 \mathrm{FINT}_t + \beta_2 \mathrm{FOP}_t + \beta_3 \mathrm{GFCF}_t + \beta_4 \mathrm{INF}_t + \varepsilon_t \quad (1)$$

where GDPG, FINT, FOP, GFCF and INF are explained previously. ε and t denote the error term and sample period, respectively. α_0 represents the intercept, and β_1 to β_4 connote the coefficients of the independent variables.

3.4 Analytical approach

We seek to examine the short-run and long-run impact of financial intermediation on economic growth while controlling for the effect of other factors. The study employs the ARDL model by Pesaran and Shin (1998) and Pesaran *et al.* (2001). The ARDL model is applicable in different contexts, rendering it advantageous over other methods. For instance, the model is suitable for studies with a small sample size. It also takes on variables that are stationary at different levels. Under this model, variables can assume different lag lengths.

To investigate the long-run and short-run effect of our variables on economic growth, the ARDL model is specified as:

$$\begin{aligned}\text{GDPG}_t = {} & \alpha_0 + \sum_{i=0}^{n} \alpha_{1i} \Delta \text{GDPG}_{t-1} + \sum_{i=0}^{n} \alpha_{2i} \Delta \text{FINT}_{t-1} + \sum_{i=0}^{n} \alpha_{3i} \Delta \text{FOP}_{t-1} \\ & + \sum_{i=0}^{n} \alpha_{4i} \Delta \text{GFCF}_{t-1} + \sum_{i=0}^{n} \alpha_{5i} \Delta \text{INF}_{t-1} + \delta_1 \text{GDPG}_{t-1} + \delta_2 \text{FINT}_{t-1} \\ & + \delta_3 \text{FOP}_{t-1} + \delta_4 \text{GFCF}_{t-1} + \delta_5 \text{INF}_{t-1} + \rho \text{ECT}_{t-1} + \varepsilon_t \end{aligned} \tag{2}$$

where α_0 is the intercept; Δ denotes the difference operator; $\alpha_1 - \alpha_5$ and $\delta_1 - \delta_5$ are short-run and long-run coefficients, respectively; ε is the error term; n is the lag length; ρ is the coefficient of ECT, where ECT_{t-1} symbolizes the error correction term lagged by one period.

We perform a bound testing to examine the long-run relationship among the variables. In doing so, the null hypothesis that specifies there is no long-run relationship among the variables is tested against the alternative hypothesis as follows:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0 \tag{3}$$

$$H_1: \text{At least one } \delta i \neq 0,\ i = 1, 2, 3, 4, 5 \tag{4}$$

To test for the existence of cointegration, we use the two critical bounds, the upper and lower bounds. A long-run relationship is established when the *F*-statistics is greater than the upper critical bound I(1), and no cointegration is assumed when the *F*-statistics is less than the lower bound critical value I(0).

3.5 Principal Component Analysis (PCA)

The study reduces the dimensions of the financial intermediation variables into principal components that are linearly uncorrelated. Generally, the PCA is a data analysis tool that is normally adopted to reduce the dimensionality – number of variables of a large number of interrelated variables, while retaining as much information – variations as possible. PCA calculates an uncorrelated set of variables – Principal Components (PCs). These factors are ordered in a manner that the first few principally composed factors preserve most of the variations present in all of the original variables (Hardle and Simar, 2015).

The aim of PCA is to identify $k < n$ (*usually* $k = 2$ *or* 3) new variables that will turn out to be the PCs that determine a large portion of the information stored in the data by accounting for the highest covariations possible in it (Abdi and Williams, 2010). The transformations in the data set are defined in a way such that the preceding PC has the leading possible variance and subsequent components in turn have the highest variance possible in that order, under the constraint that they are all orthogonal or uncorrelated with preceding components (Jolliffe, 2002). PCs are orthogonal or uncorrelated because they are the eigenvectors of the covariance matrix, which is symmetric (Sharma, 1996).

Based on the selected financial intermediation variables (broad money, bank deposit and domestic credit by the financial sector), according to this PCA technique, the *j*th factor index can be specified as:

$$\text{FINT}_j = W_{J1}X_1 + W_{J2}X_2 + W_{J3}X_3 + \ldots + W_{JP}X_P \tag{5}$$

where FINT_j is the Financial Intermediation Index; W_j is the weight of the parameter of the factor score; X is the original figure of the respective components; while P is the number of variables in the equation.

4. Empirical results

4.1 Descriptive statistics and correlation analysis

In Table 1, the descriptive statistics and the correlation matrices for all the variables are presented. GDP per capita growth, a proxy of economic growth, has a mean value of 2.76% ranging from −7.36% to 9.42%. Inflation has the highest SD indicating higher volatility. Economic growth and capital formation show a negative skewness with the rest of the factors being positively skewed. As depicted by the Jarque–Bera probability values, we observe that the variables are normally distributed at 5% except for financial intermediation. Table 1 further illustrates that there is no multicollinearity issue in our study given that the variables have weak correlation coefficients based on the 0.80 correlation threshold recommend by Kennedy (2003). To further verify the nonexistence of multicollinearity, we conduct the variance inflation factor (VIF) analysis. The VIF analysis specifies that for variables to be free from multicollinearity problems, they must show a VIF value below 10 and the tolerance value exceeding 0.10. Our analysis satisfies these presumptions.

4.2 Unit root tests

From Table 2, the unit root test results based on the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) are presented. For both ADF and PP tests, GDP per capita growth shows stationarity at level (I(0)) at 1% level of significance. The rest of our variables become stationary at first difference (I(1)) at 1% significance level for both tests. Given the mixed results, our study fulfills the preconditions for the application of the ARDL model.

4.3 Bounds testing for cointegration

From the bounds-testing results in Table 3, the *F*-statistics is greater than the upper critical bound value at 1% significance level. This signifies the existence of cointegration among our variables. Hence, we estimate the long-run relationship between economic growth and our independent factors relying on the Akaike Information Criterion (AIC).

4.4 Long-run estimation

We present the long-run estimates in Table 4. Our results evidence a significant negative impact of financial intermediation on economic growth. This suggests that banks'

	GDPG [1]	FINT [2]	FOP [3]	GFCF [4]	INF [5]
Mean	2.755	0.851	−0.891	21.730	38.095
Maximum	9.424	3.544	−0.004	29.997	105.215
Minimum	−7.357	−2.036	−1.917	12.577	6.251
Std. Dev	4.044	1.700	0.663	5.298	29.160
Skewness	−0.774	0.888	0.196	−0.113	0.554
Kurtosis	2.996	2.357	1.721	1.638	2.048
Jarque–Bera	4.791	7.133	3.580	3.815	4.271
Probability	0.091	0.028	0.167	0.148	0.118
Observations	48	48	48	48	48
Correlation and multicollinearity analysis					
[1]	1.000				
[2]	0.168	1.000			
[3]	0.141	0.590	1.000		
[4]	0.297	0.677	0.656	1.000	
[5]	−0.357	−0.580	−0.150	−0.127	1.000
VIF		3.69	1.91	2.63	1.90
Tolerance		0.271	0.523	0.381	0.525

Table 1.
Descriptive statistics and correlation matrix

intermediation does not enhance growth in the long run. The negative relationship can be ascribed to the episodes of macroeconomic instability the country encounters. These macroeconomic shocks negatively affect banks' intermediation activities. For instance, in a volatile economy, bank deposits growth declines, which reduces banks' vaults, and thus less funds are available for channeling into productive sectors through lending. The negative finding contradicts the presumptions of the supply-leading hypothesis.

Financial openness indicates a positive significant effect on economic growth. This suggests that openness to the global capital market is imperative for growth in the long run. Liberalizing the financial sector enhances competition in the domestic market, which contributes to stability as postulated by the "competition-stability hypothesis." The hypothesis infers that competition in the domestic banking sector spurs demand for bank credit as banks tend to offer lower interest rates on borrowing. In this case, banks lend to productive sectors and thus enhance output. Our finding conforms to prior studies (Edwards, 2001; Oyovwi and Eshenake, 2013).

Gross fixed capital formation positively affects economic growth albeit insignificantly. This implies that an increase in domestic investment enhances domestic output. Although the effect is insignificant, our result corroborates with the findings of Bakare (2011) and Kanu and Ozurumba (2014).

Table 2.
Unit root test

	ADF		PP	
Variables	*t*-statistics	Order	*t*-statistics	Order
GDPG	−6.565***	I(0)	−6.566***	I(0)
FINT	−7.070***	I(1)	−7.180***	I(1)
FOP	−7.282***	I(1)	−7.307***	I(1)
GFCF	−6.378***	I(1)	−6.684***	I(1)
INF	−7.336***	I(1)	−7.383***	I(1)

Note(s): ***denotes stationary at 1% significance level

Table 3.
Bounds test for cointegration relationship

Test Statistics	Value	Level	Critical values	
			I(0)	*I*(1)
F-Statistics	6.300***	10%	2.20	3.09
k	4	5%	2.56	3.49
		1%	3.29	4.37

Note(s): *k* is the number of the explanatory variables and *** denotes 1% level of significance

Table 4.
Results of long-run estimation

ARDL (4, 2, 4, 4, 4)			Model selection method: AIC	
Variable	Coefficient	Std. Error	*t*-Statistic	Prob. Value
Long-run estimates				
$FINT_t$	−0.963	0.386	−2.493	0.021**
FOP_t	2.041	0.764	2.672	0.014**
$GFCF_t$	0.092	0.113	0.812	0.426
INF_t	−0.060	0.018	−3.377	0.003***
Constant	4.768	2.750	1.734	0.098*

Note(s): ***, ** and * denote significance at the 1, 5 and 10% levels, respectively

Consistent with our hypothesis and Fischer (1993), the result evidences a negative significant impact of inflation on economic growth. As inflation magnifies, growth is inhibited. Domestic macroeconomic instability deters investors from committing their investable funds in the domestic market given the surrounded uncertainties. Also, in periods of high inflation, investable resources are diverted to consumption, contributing to low domestic output.

4.5 Short-run estimation

Table 5 contains the short-run estimates of our variables. The coefficient of the error correction term of −1.830 is significant at 1% level. This shows a high convergence rate to the equilibrium and implies that the disturbance in our model reduces by 183% annually toward the equilibrium. The adjusted R^2 value of 90.8% indicates that our included factors largely predict economic growth.

In the short run, financial intermediation positively and significantly drives economic growth supporting the supply-leading hypothesis. This suggests that the financial sector in Turkey particularly banks in the short run can absorb shocks from the macroeconomic environment and can efficiently carry out their intermediation activities. Our short-run finding is similar to most prior studies (Ventura, 2008; Murty *et al.*, 2012; Sahoo, 2014; Türsoy and Faisal, 2018). Contrary to the long run, financial openness exhibits a negative insignificant effect on economic growth. This indicates that financial sector liberalization does not matter for growth in the short run. Consistent with the long-run finding, gross fixed capital formation exerts a positive significant effect on economic growth in the short run indicating the relevance of domestic investment on output growth in Turkey. Likewise, inflation in the short run is detrimental to economic growth, which conforms to the long-run result.

4.6 Diagnostic tests results

From the results of the diagnostic tests in Table 6, we can infer that there are no serial correlation and heteroscedasticity issues in our model. The Jarque–Bera test and the Ramsey RESET also signify normal distribution and no functional form misspecification, respectively.

The CUSUM and CUSUM of square plots in Figure 1 and Figure 2 respectively confirm the stability of our estimated model given that at 5% significance level the CUSUM lines are within the critical boundaries.

ARDL (4, 2, 4, 4, 4)		Model selection method: AIC		
Variable	Coefficient	Std. Error	*t*-Statistic	Prob. Value
$\Delta GDPG_{t-3}$	0.184	0.086	2.127	0.045**
$\Delta FINT_{t-1}$	2.100	0.851	2.468	0.022**
ΔFOP_{t-3}	−1.303	1.027	−1.269	0.218
$\Delta GFCF_{t-3}$	0.750	0.225	3.335	0.003***
ΔINF_{t-3}	−0.062	0.023	−2.633	0.016**
ECT_{t-1}	−1.830	0.268	−6.841	0.000***
R^2	0.944			
Adjusted R^2	0.908			
Durbin–Watson stat	2.101			
F-Statistic	7.877			
Prob. (*F*-Statistic)	0.000			

Note(s): ***, ** and * denote significance at the 1, 5 and 10% levels, respectively

Table 5.
Results of short-run estimation

5. Conclusion and recommendations

In the endogenous growth literature, economic growth is significantly motivated by financial intermediation. For the literature on banking crisis, financial intermediation activities may slow economic growth particularly in episodes of financial crises. This study assesses the impact of financial intermediation on economic growth in Turkey while controlling for the effect of financial openness, gross fixed capital formation and inflation. From the ARDL estimation, the results indicate that financial intermediation significantly affects economic growth. The effect, however, is negative in the long run. Financial openness positively and significantly determines growth only in the long run. Gross fixed capital formation (a measure of domestic investment) positively influences growth though with an insignificant impact in the long run. Inflation generally shows a negative significant effect on economic growth in both periods. This suggests that inflation is detrimental to growth in Turkey.

We present some policy implications in light of our findings. To enhance stability in the financial sector, which affects banks' intermediation activities, the regulatory framework overseeing financial services must be strengthened. The liberalization of the financial sector is essential for sustaining growth. Allowing more banks into the country will increase competition leading to innovation and efficiency of the banking sector, with a consequent effect on the real sector. We recommend that the government must provide incentives for domestic investors to create and boost domestic investments in order to enhance growth. Finally, policymakers must enact workable policies to keep inflation at an optimal level. This will help in improving economic growth in both short and long run.

Table 6.
Diagnostic tests

Specification	*F*-statistics	Prob. Value
Breusch–Godfrey (Serial Correlation LM test)	0.478	0.627
Breusch-Pagan (Heteroscedasticity)	0.948	0.550
Jarque–Bera (Normality)	0.181	0.914
Ramsey RESET	0.024	0.879

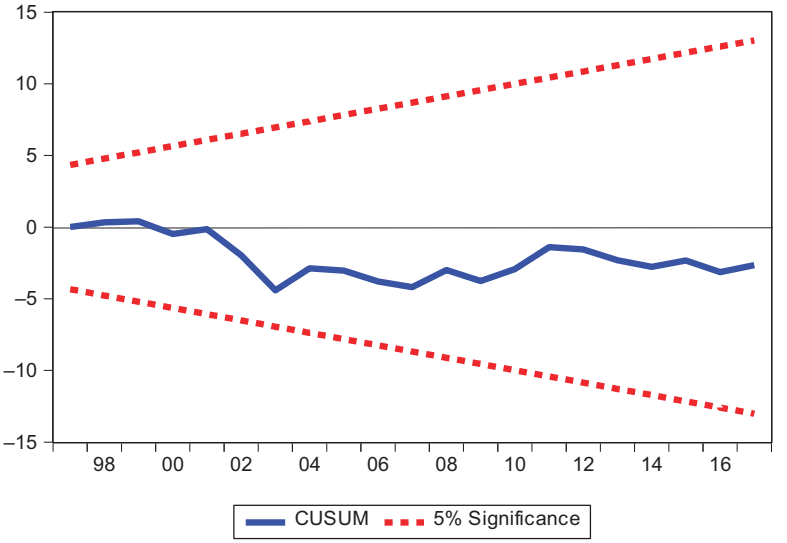

Figure 1.
Plots of CUSUM

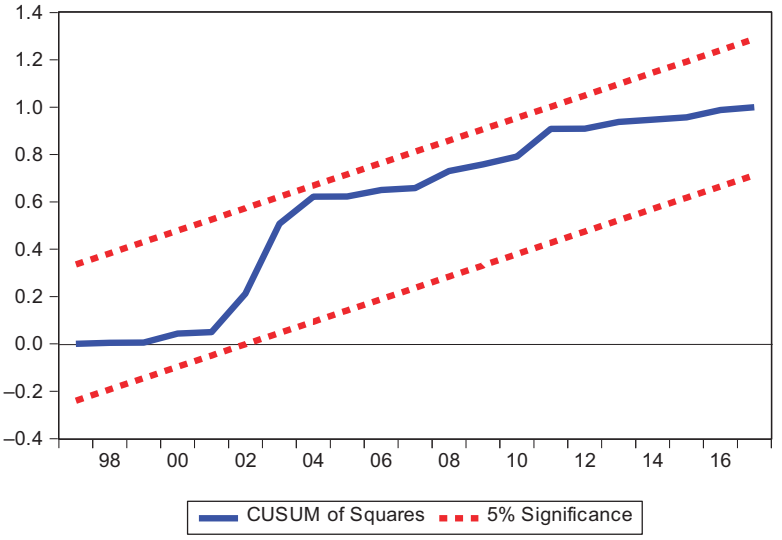

Figure 2.
Plots of CUSUM of squares

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