



THE RELATIONSHIP BETWEEN EXTERNAL DEBT, INTERNAL DEBT AND
ECONOMIC GROWTH: AN EMPIRICAL ANALYSIS ON BRICS-TM COUNTRIES
DIŞ BORÇ, İÇ BORÇ VE EKONOMİK BÜYÜME ARASINDAKİ İLİŞKİ: BRICS-TM
ÜLKELERİ ÜZERİNE AMPİRİK BİR ANALİZ

Mehmet Vahit EREN¹

1. Dr. Öğr. Üyesi, Kilis 7 Aralık Üniversitesi,
İktisadi ve İdari Bilimler Fakültesi, İktisat
Bölümü, mvahiteren@gmail.com,
<https://orcid.org/0000-0003-0348-0137>

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Abstract

Private sector deficit, budget deficit and current account deficit can be counted among the main reasons for external and internal borrowing. In reducing the developmental differences of countries, governments can intervene in the market by borrowing. Therefore, it is important to investigate the existence of external and internal borrowing in the BRICS-TM countries, which have high growth rates. The aim of this study is to investigate the relationship between external and internal debts and economic growth in the BRICS-TM countries by data from the period 2000-2016. For the empirical analysis of the research, panel data analysis method is used. According to the findings obtained from the analysis, no co-integration and causality relationship are found between external and internal debts and economic growth. These results indicate that the high growth rates do not supported by the external and internal debts in the BRICS-TM countries.

Keywords: *External and Internal Debt, Economic Growth, Development, BRICS-TM Countries,*

Öz

Özel kesim açığı, bütçe açığı ve cari açık, iç ve dış borçlanmanın temel nedenleri arasında yer almaktadır. Ülkelerin gelişmişlik farklarının azaltılmasında devlet piyasaya müdahale ederek, borçlanma yoluna gidebilmektedir. Bu nedenle, BRICS-TM ülkelerinin yüksek büyüme hızlarına sahip olmasında dış ve iç borçlanmanın varlığının araştırılması önem arz etmektedir. Bu çalışmanın amacı, BRICS-TM ülkelerinde 2000-2016 dönemine ait verilerle dış ve iç borç ile ekonomik büyüme arasındaki ilişkinin araştırılmasıdır. Araştırmanın ampirik analizi için panel veri analizi yöntemi kullanılmıştır. Analizden elde edilen bulgulara göre, dış ve iç borç ile ekonomik büyüme arasında eşbütünleşme ve nedensellik ilişkisi bulunamamıştır. Bu sonuçlar, BRICS-TM ülkelerinin yüksek büyüme oranlarına sahip olmasının iç ve dış borçlanma ile desteklenmediğini göstermektedir.

Anahtar Kelimeler: *Dış ve İç Borç, Ekonomik Büyüme, Kalkınma, BRICS-TM Ülkeleri,*

GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı

Brezilya, Rusya, Hindistan, Çin, Güney Afrika, Türkiye ve Meksika ülkelerinin son dönemde yüksek büyüme hızları ve sahip olduğu genç nüfus yapısıyla uzun vadede dünya ekonomisinde önemli bir yeri olacağı düşünülmektedir. Yüksek büyüme hızlarına sahip olan BRICS-TM ülkelerinin gelişmelerinde, kamunun iç ve dış borçlarının etkisi, araştırmanın konusunu oluşturmaktadır. Bu çalışmada, BRICS-TM ülkelerinde 2000-2016 yıllarına ait yıllık frekansta veriler kullanılarak iç ve dış borç ile ekonomik büyüme arasındaki ilişki ekonometrik yöntemlerle analiz edilmektedir.

Araştırma Soruları

Ekonomik büyümenin finansmanında borçlanmanın önemi nedir? BRICS-TM ülkelerinin ekonomik büyüme performansı üzerinde iç ve dış borçlanmanın etkisi var mıdır? Literatürdeki çalışmalardan elde edilen bulgular borçlanma ile ekonomik büyüme arasında bir ilişkinin var olduğunu göstermekte midir?

Bulgular

Yatay kesit bağımlılığı testi sonucuna göre ülkeler arasında yatay kesit bağımlılığı bulunmaktadır. Ülkelerden birine gelen bir birimlik şok diğer ülkeleri de etkilemektedir. Yatay kesit bağımlılığı tespit edildiği için ikinci nesil birim kök testlerinden MADF testi kullanılmıştır. EXT değişkeni düzey değerinde, lnGDP ve EXT değişkenleri ise birinci farkı alındığında durağandır. Değişkenlerin eğim katsayılarının birimler arasında değişip değişmediğini tespit etmek amacıyla heterojenlik testi uygulanmış, test sonucunda uzun dönemde birimler arasında eğim katsayılarının değişmediği tespit edilmiştir. Durbin-Hausman eşbütünleşme testinden elde edilen bulgulara göre değişkenler arasında uzun dönemli bir ilişkinin olmadığı görülmektedir. Dumitrescu-Hurlin nedensellik testi sonuçları ise değişkenler arasında herhangi bir nedensellik ilişkisinin olmadığını belirtmektedir. Elde edilen bu sonuçlar, Ademola vd. (2018) ve Daud (2016)'un çalışmalarıyla benzerlik gösterirken, Onakoya ve Ogunade (2017); Burhanudin vd. (2017); Nantwi ve Erickson (2016); Lau ve Kon (2014); Brini vd. (2016); Favour vd. (2017); Stauskas (2017)'ın eserleriyle çelişmektedir. Söz konusu çelişkilerin oluşmasında kullanılan değişkenlerin yapısı, uygulanan yöntemin, ülke ya da ülke grubunun ve veri setinin farklı olmasının etkili olduğu belirtilebilir.

Yöntem

Çalışmanın analizinde panel veri analizi yöntemi kullanılmıştır. Son yıllarda panel veri analizlerinde birimler arasındaki bağımlılığın test edilmesi, sonuçların daha tutarlı olması için önem arz etmektedir. Çalışmanın, hem panel veri analizi yöntemiyle daha çok ülkenin verilerinin kullanılması hem de yatay kesit bağımlılığı dikkate alınarak hazırlanması nedeniyle literatürdeki diğer çalışmalardan farklı olduğu düşünülmektedir. Bu kapsamda, analizde ilk önce, değişkenlerin yatay kesitleri arasında bağımlılığın varlığı Pesaran vd. (2008)'nin LMadj testi ile araştırılmış, serilerin durağanlığı ise Taylor ve Sarno (1998)'nin MADF birim kök testi ile analiz edilmiştir. Eğim katsayılarının birimler arasında

değişip değişmediğini tespit edebilmek amacıyla Pesaran ve Yagamata (2008) Delta testi uygulanmıştır. Değişkenler arasında uzun dönemli ilişkinin tespiti için ise Durbin-Hausman (2008) eşbütünleşme testi kullanılmış, nedensellik testi için ise Dumitrescu-Hurlin (2012) panel nedensellik testi yapılmıştır.

Sonuç ve Değerlendirme

BRICS-TM ülkelerinde ele alınan dönemde dış ve iç borçların boyutu ekonomik büyümeyi olumlu ya da olumsuz etkileyecek boyutta değildir. Başka bir ifadeyle, BRICS-TM ülkelerinin borçlarla büyüyen ülkeler olmadığı görülmektedir. Bu sebeple değişkenler arasında herhangi bir eşbütünleşme ve nedensellik ilişkilerinin tespit edilemediği belirtilebilir. Bu çalışmanın, BRICS-TM ülkelerinin elde ettiği ekonomik büyüme performansının gerçekleştirilmesinde farklı değişkenlerin ele alındığı, farklı yöntemlerin uygulandığı başka çalışmalara örnek olabileceği düşünülmektedir.

1. INTRODUCTION

Today, when the global competition is increasing continuously, accelerating economic activities cause emerging developmental differences among countries. Governments have a significant role in eliminating these developmental differences. States endeavour to activate the economic activities by intervening in the economy via the public finance policies. Lack of savings and fiscal deficit out of the current deficit are the most significant reasons for borrowing. Public expenditures cannot be met by the public revenues through expansionary policies. Thus, borrowing becomes an important fiscal policy tool in public deficit financing. Borrowing which is an ordinary intervention tool of governments to the economy via Keynesian policies affects the economy negatively or positively as an internal or external debt. The money borrowed should be used in proper areas to enable a positive impact on the economy. Otherwise, the principal and interest payments put the national economy in a difficult situation as well as the removal of debt sustainability. Therefore, the success of debt management becomes more of an issue.

It is thought that Brazil, Russia, India, China, South Africa, Turkey and Mexico will have a remarkable place in the world economy in the long run due to their high rates of growth and young population. ‘BRICS-TM’ expression in the literature is composed of the English initials of the countries mentioned. The effect of internal and external debts of the public in the development process of these countries is the subject of current study. This study analyzed the relationship between internal debt, external debt and economic growth by econometrical methods through using the data in annual frequency regarding the period of 2000-2016 in BRICS-TM countries. Panel data analysis was utilized in the analysis of the data. Testing the dependency between the units in panel data analyses is significant to provide more consistent results.

The relationship between internal debt, external debt and economic growth in BRICS-TM has not been researched so far, which brings originality to this study. Moreover, the analysis in this study was conducted via new generation tests by testing the cross-sectional dependence. Our survey differs from other studies due to these reasons. It is seen in previous studies that the hypothesis of “there is a relationship between the internal debt, external debt and the economic growth” is valid. In the study, we first present a theoretical and conceptual framework relating to the issue; later, a literature review is provided. Findings obtained from the analyses are discussed in the last section.

2. INTERNAL AND EXTERNAL BORROWING IN FINANCING OF ECONOMIC GROWTH

Internal debt is defined as “obtained finance from domestic sources by the government through issuing domestic government bonds”. In other words, a part of the national income is transferred from individuals and public enterprises to the governments. Governments prefer internal borrowing because of reasons such as paying the maturing liability, removing the imbalances in the economy, public

deficits, economic and social difficulties arising from new taxes and increasing tax rates (Bayraktar, 2011:2). Keynesian view mentions that internal debt will stimulate investments, and productivity will increase when governments reserve the sources that have come from internal borrowing for the investments that support private sector investments. The positive effect of internal debt on the private sector investments via public expenditures is known as the “crowding-in effect” in the literature (Çevik and Cural, 2013:117). Using the sources obtained through internal borrowing so as to contribute to the economic growth is important in paying the debts.

There is not an addition to the available sources of a country via the internal borrowing; however, a transfer is actualized in the economy. Especially the internal borrowing which aims to enable bringing nonexpendable funds in the economy contributes to economic growth. Internal borrowing may cause negative outputs in economy in an environment in which productivity and general economic structure are not considered (Çiçek et al., 2010:143). The size of an internal debt stock is effective on inflation and income distribution. Since an increasing internal debt brings along high interests which will be paid for the savings, it creates a destructive effect on price stability. High inflation will affect the purchasing power of the society, notably the fixed-income employees negatively. Moreover, since the high-interest rates will decrease the private sector investments, the “crowding out effect” will emerge. It is also known that this high internal borrowing rate will increase interest rates and rollover risk by shaking the confidence in the economy (Çoban et al., 2008:249; Berkay and Ağcakaya, 2017:3). The level of internal borrowing is significant in the financing of economic growth. While internal borrowing contributes to economic growth up to a certain point, it may damage economic growth after exceeding that certain point.

External debt is defined as “the debts that are borrowed by a country from external resources under the condition of repaying them with the capital and interests at the end of a given period” (Egeli, 2003:124). External borrowing is preferred due to reasons such as closing the current deficit, lack of domestic savings, budget deficits, global interest rates, lack of financial sources for development thrusts, paying off the external debts by the external debts, lack of enough foreign currency reserve (Peker and Bölükbaş, 2013:289-290). Since external borrowing provides an input entrance into the borrowing country, the investments will be stimulated, and this will contribute to economic growth. Marginal proceeds of the investments which are realized by the external debts need to be higher than the cost of the external debts. An increase in national income can be observed after increasing the production capacity if this condition is guaranteed (Çiçek et al., 2010:143).

The credibility score of the countries in external borrowing is highly important. Problems such as borrowing at a higher interest and unavailability of new sources may occur when confidence to that country is lost. External debts are discharged by the foreign currency, which differentiates external debt from internal debt. Any changes that occur on the exchange rate will cause more effect on external debt in comparison to internal debt. In addition to this, while a country can pay off its internal debts by

seigniorage revenues, there should be practical policies to increase the amount of foreign currency because there is no possibility of making foreign money in a similar way (Esener, 2013:14).

The most important advantage of external borrowing is that there is a lower “crowding out effect” risk in comparison with internal borrowing. Moreover, governments decrease their real debt burden by external borrowing without having inflation problem stemming from internal borrowing. In the inflationary environment, external borrowing enables long term debt due to its lower interest rates in comparison with the higher interest rates of internal borrowing. The disadvantage of external debt is that it creates a “crowding out effect” on private investments by the nominal exchange rate effect. Meanwhile, external borrowing increases the sensitivity to the developments in other countries (Berkay and Ağcakaya, 2017: 4).

Expansionary policies that are applied in underdeveloped and developing countries to increase the rate of capacity utilization provide a positive contribution to the economic output in the short term. However, economic growth will occur in the long term via the policies that can increase production capacity. The factors that affect economic growth are as follows; technology, human and real capital, and political and economic stability. An increase in the level of these factors cannot affect the long-term economic growth at the level desired. This is because borrowing may appeal to countries to stimulate investments and economic growth.

3. THE SOCIO-ECONOMIC STATUS OF BRICS-TM COUNTRIES

Definition of BRIC was first used by an economist, Jim O’Neill, in 2001. These countries are accepted as the fastest-growing “emerging markets” in the world economy. BRIC countries have common characteristics such as large square measure, overpopulation, high economic growth, a large number of consumers, and the possibility of collaborating in several areas (O’Neill, 2001; Ağır and Yıldırım, 2015:41).

South Africa, which started its efforts to participate in BRIC group in 2010, became a member of the group on 24 December 2010. The group was called as BRICS. With reference to the World Bank Statistics, BRICS countries have more than 40% of the world population and also occupy the one-fourth of the world area. In conclusion, Brazil, Russia, India, China, and South Africa are important economic forces (Nistor, 2015:982). Long term estimations show that South Africa will grow with an average of 3.5% in the next 50 years. As the population growth rate decreases, there will be a faster increase in per capita income. It is estimated in the light of these projections that South African economy will be smaller than the economy of BRIC (US \$1.2 billion for Russia in comparison with the US \$5.9); however, the per capita income will be higher (Wilson and Purushothaman, 2003:11).

Turkey and Mexico have become the locomotive of the world economy due to their high economic growth rates and young population structures. Therefore, Turkey and Mexico have been added to BRICS countries and they are now called “BRICS-TM” countries. While Turkey got involved in this group by means of 9.2% and 8.8% developmental performance obtained in the years of 2010 and 2011

respectively, Mexico was attached to this group by 5% of growth rate obtained in the same years (Dam and Yıldız, 2016:224). Positive demographic structure of Mexico refers that it can be officially accepted as a BRIC country until 2050 in terms of the economic size (O'Neill et al., 2005:4). Table 1 and 2 show the data about per income capita, population and debt structures of BRICS-TM countries.

Table 1. The Socio-Economic Structure of BRICS-TM Countries

Country	Variable	1990-1999	2000-2009	2010-2017
<i>Brazil</i>	Per Capita Real Income (\$)	8320.208	9539.999	10150.35
	Population Growth Rate (%)	1.635639	1.205671	0.791628
<i>China</i>	Per Capita Real Income (\$)	1172.141	2771.699	5268.692
	Population Growth Rate (%)	1.132066	0.607967	0.4509
<i>India</i>	Per Capita Real Income (\$)	616.5344	964.2851	1446.38
	Population Growth Rate (%)	1.93808	1.601871	1.087938
<i>Mexico</i>	Per Capita Real Income (\$)	8005.34	9013.989	8455.85
	Population Growth Rate (%)	1.809577	1.411443	1.241795
<i>Russia</i>	Per Capita Real Income (\$)	6833.749	8713.775	10117.5
	Population Growth Rate (%)	-0.03435	-0.30548	0.132253
<i>South Africa</i>	Per Capita Real Income (\$)	5628.043	6544.358	6657.954
	Population Growth Rate (%)	2.040776	1.232855	1.186927
<i>Turkey</i>	Per Capita Real Income (\$)	7396.995	9236.978	11504.08
	Population Growth Rate (%)	1.616089	1.356878	1.376117

Source: World Bank

As seen in the data of per capita income, the highest values based on the averages of the years of 2010-2017 belong to Turkey, and Brazil is on the second rank. The country that has the lowest income is India with 1446 dollars, and China is on the second rank with 5268 dollars. According to 1990-2017 data, China has the highest increase by 8.3% as the income level, and India has the second highest increase by 4.7% as the income level. Regressing the population growth in China and India is one of the most important reasons for the high growth rate in spite of their low-income level. The population growth takes positive value in all the countries except for Russia. In other words, the population has decreased in Russia though it continues to increase in other countries.

Table 2. The Ratio of Internal and External Debt to Gross Domestic Product in BRICS-TM Countries (%)

Country	Variable	2000-2009	2010-2016
<i>Brazil</i>	Internal Debt/GDP	68.38	65.72
	External Debt/GDP	28.71	21.71
<i>China</i>	Internal Debt/GDP	26.75	37.71
	External Debt/GDP	11.50	13.73
<i>India</i>	Internal Debt/GDP	78.19	68.72
	External Debt/GDP	18.88	20.81
<i>Mexico</i>	Internal Debt/GDP	40.48	47.42

	External Debt/GDP	20.17	31.18
<i>Russia</i>	Internal Debt/GDP	23.64	13.26
	External Debt/GDP	37.67	30.21
<i>South Africa</i>	Internal Debt/GDP	33.82	43.70
	External Debt/GDP	22.25	37.83
<i>Turkey</i>	Internal Debt/GDP	53.88	32.20
	External Debt/GDP	43.17	41.67

Source: World Bank and IMF.

The debt structures of BRICS-TM countries reveal that the share of the internal and external debt from the gross domestic product has increased in China, Mexico and South Africa while the same share has decreased in Brazil, Russia and Turkey. Even though India has reduced its internal debt, it is still in the position with the highest debt. The country which has the lowest debt is Russia. While the country which has the highest ratio in terms of the external debt is Turkey, the country that has the lowest ratio about the same issue is China. The internal debt is more than the external debt in all the countries except for Russia and Turkey. The reason of high external debt in comparison with the internal debt in Russia and Turkey is that the cost of the external borrowing is lower than the cost of the internal borrowing in these countries.

4. LITERATURE REVIEW

The relationship between economic growth and public debt, which is the sum of internal and external debts, is the leading issue that has been researched for many years. Debt crises that emerged in Latin American countries in the 1980s affected the economic performances of those countries. It is pointed out that meeting the financing demands of countries by internal and external borrowing will negatively affect economic growth. The relationship between internal and external debt was analyzed in the literature by considering underdeveloped and developing countries or country groups. Besides, the literature includes studies that survey the relationship of public debt with respect to internal and external debt.

Schclarek and Ballester (2005), Erataş and Nur (2013), Zouhaier and Fatma (2014), Shkolnyk and Koilo (2018) and Kharusi and Ada (2018) researched the relationship between external debt and economic growth by analysing a specific group of countries. While these researchers found a negative relationship between the variables, Mensah et al., (2018) found a positive relationship between them. Lau and Kon (2014) pointed out that there was a unidirectional causality relationship from the external debt to the national income. Malik et al., (2010), Ezeabasili et al. (2011), Çöğürçü and Çoban (2011), Nwannebuike (2016) and Ademola et al. (2018) surveyed only one country and found a negative relationship between external debt and economic growth. Ijirshar et al. (2016), Uchenna et al. (2017) and Öztürk and Çınar (2018) identified a positive relationship between the same variables. Saad (2012)

conducted a study and expressed that there was a bidirectional causality between external debt and economic growth.

Simic and Mustra (2012) tried to explain the relationship between internal debt, external debt and economic growth by a group of countries. With reference to their research findings, it can be argued that external and internal debt negatively affect the economic growth. Atique and Malik (2012), Anning (2016) and Favour et al. (2017) researched the relationship between these variables by analysing only a single country, and they found out that there was a negative relationship between internal debt, external debt and economic growth. According to Çevik and Cural (2013), there is not a causality relation between internal debt and national income when there is a unidirectional causality from external debt to national income. Aminu et al. (2013) argue that there is not a causality between internal debt and economic growth when there is a bidirectional causality between external debt and economic growth. In addition, while external debt negatively affects growth, internal debt affects the growth in a positive direction. Ntshakala (2015) mentioned that while there was not a relationship between external debt and national income, internal debt positively affected national income. Onakoya and Ogunade (2017) found a unidirectional relationship from the external debt to national income and a bidirectional causality relation between internal debt and national income. Sheikh et al. (2010) pointed out that internal debt positively affected national income. According to Pegkas (2018), the effect of internal debt on national income is negative.

Afonso and Alves (2015), Mıynat and Bostan (2015) and Stauskas (2017) tried to explain the relationship between public debt and economic growth and found a negative relationship between the variables. Juarez and Almada (2016), Spilioti (2015) and Jakobo and Jalile (2017) researched the same relationship and found a positive relationship between the variables mentioned. Mohanty et al. (2016) expressed that there was a bidirectional causality relation between public debt and economic growth. Burhanudin et al. (2017), Belguith and Omrane (2017), Nantwi and Erickson (2016), Brini et al. (2016) and Daud (2016) surveyed the relationship between these variables for only a single country and determined that public debt positively affected economic growth. According to Balassone et al. (2011), the effect of public debt on economic growth is negative.

The other studies which found a causality relation between external debt, internal debt or public debt and economic growth include Onakoya and Ogunade (2017), Burhanudin et al. (2017), Nantwi and Erickson (2016), Lau and Kon (2014), Brini et al. (2016), Favour et al. (2017) and Stauskas (2017). On the other hand, there are also studies that could not determine a causality relationship between these variables (Ezeabasili et al., 2011; Ademola et al., 2018; Daud, 2016).

Much as there are different results about the direction of the relationship between internal debt, external debt and economic growth; it is pointed out that internal and external debt negatively affect economic growth. We see that the general run of the studies was employed time series methods, OLS, and the first-generation tests by considering the data of a single country. Only one of the studies (Erataş

and Nur, 2013) was performed by panel data analysis methods which considers the cross-sectional dependence.

It can be thought that our research study differs from the other studies in literature due to using data from more countries and considering the cross-sectional dependence.

5. EMPIRICAL ANALYSIS

5.1. Data Set and Model

This research study included the data of 2000-2016 period by reaching the equal number of observations regarding the BRICS-TM countries. The ratio of per capita real income (GDP) and the ratio of external debt to gross domestic product (EXT) were obtained from the World Bank database. The ratio of internal debt to the gross domestic product (INT) was obtained from the International Monetary Fund (IMF). Since the GDP data prevent the changes in variance and do not allow extreme values to affect the estimators, the GDP data were attached to the analysis in a logarithmic form. Other variables are the ratios because they were used in the analysis by their level values. The model below which shows the relationship between internal debt, external debt and economic growth was established based on the studies of Onakoya and Ogunade (2017), Çevik and Cural (2013), Simic and Mustra (2012) and Schclarek and Ballaster (2005):

$$\ln GDP_t = \beta_0 + \beta_1 INT_{it} + \beta_2 EXT_{it} + \varepsilon_{it} \quad (1)$$

$i=1, 2, 3, \dots, N$ shows the cross-section data in the equation, $t=1, 2, 3, \dots, T$ refers to the time dimension, and ε shows the error term.

5.2. Method

The panel data analysis was used to investigate the relationships between the internal-external debts and the economic growth in BRICS-TM countries. The existence of the dependence between the cross sections of the variables was scrutinized by the LM_{adj} test of Pesaran et al. (2008). The stationarity of the series was analyzed by the MADF unit root test of Taylor and Sarno (1998). The Delta test of Pesaran and Yagamata (2008) was utilized to determine whether the slope coefficient changes between the units. The Durbin-Hausman (2008) cointegration test specified the long-term relationship between the variables. The Dumitrescu-Hurlin (2012) panel causality test was used to find the causality between the variables.

5.2.1. The Cross-Sectional Dependence

In the cross-sectional dependence (CD), it is determined whether the panel units are affected by the shock at the same degree when a specific shock comes to the variables in the panel data analysis. The cross-sectional dependence should be tested in studies because it is a determinant in the reliability of estimations or selection of estimation methods (Ün, 2018: 88). Researching the cross-sectional dependence in the panel data analysis contributes to the results of studies to be more consistent. It is assumed that the units are not affected by each other in the tests which do not consider the cross-sectional

dependence. Countries/regions are integrated with each other and they are also involved in an interaction because of the globalization process. Therefore, researching the cross-sectional dependence enables analyses to give more reliable results.

The presence of the cross-sectional dependence between the series is controlled by the Breusch-Pagan (1980) CD_{lm1} test if the time dimension is bigger than the cross-section dimension ($T > N$). The presence of the cross-sectional dependence between the series is controlled by the Pesaran (2004) CD_{lm2} test when the time dimension is equal to the cross-section dimension ($T = N$). The presence of the cross-sectional dependence between the series is controlled by the Pesaran (2004) CD test when the time dimension is smaller than the cross-section dimension ($T < N$). The Breusch-Pagan (1980) LM test becomes biased when the group average is zero, but the individual average is different from zero. Pesaran et al. (2008) corrected this deviance by adding variance and mean to the test statistics. Therefore, the name of the test was corrected, and it is now called the LM test (LM_{adj}) today (Yıldırım et al., 2013: 86-87).

While the main hypothesis shows that there is no cross-sectional dependence, the alternative hypothesis proves the presence of the cross-sectional dependence. If the test statistics computed are smaller than 0.1 at 10% significance level; 0.05 at 5% significance level; and 0.01 at 1% significance level, the main hypothesis is rejected. Accordingly, the alternative hypothesis that accepts the presence of the cross-sectional dependence is accepted.

5.2.2. The MADF Unit Root Test

Spurious regression problems may occur when the analyses are applied in nonstationary panel data models. Therefore, it is important to test the stationarity of variables before the estimation and analyzing the presence of the relationships between the variables when the time dimension increases in the panel data (Tatoğlu, 2017: 4). Since there may be a correlation (dependence) between the units in panel series, different unit root tests have been developed based on the presence of the correlation between the units. The unit root tests applied are called as the first-generation tests if there is no correlation between the units; the unit root tests applied are called as the second-generation tests if there is a correlation between the units (Şak, 2018: 262).

One of the second-generation unit root tests used in case of CD is the broadened ADF (MADF) unit root test, developed by Taylor and Sarno (1998). It estimates the system by an approach that recalls the ADF equations and establishes test statistics for the whole panel. It can also be used when the time dimension is bigger than the cross-section.

While the main hypothesis shows that the variable has a unit root, which means it is nonstationary, the alternative hypothesis assumes that the variable does not have a unit root, which means it is stationary. If the t statistics are bigger than the critical value at 5% significance level, the main hypothesis is rejected, and the alternative hypothesis is accepted assuming that the variable is stationary. If the t statistics are smaller than the critical value, the main hypothesis cannot be rejected because the variable is not stationary.

5.2.3. The Homogeneity Test

Before researching the long-term relationship between the variables, it should be determined whether the slope coefficients are homogeneous or heterogeneous to provide consistent results. While the homogeneity shows that the slope coefficients are the same for all units, heterogeneity proves that slope coefficients of at least one of the units are different. To this end, the homogeneity test which was developed by Pesaran and Yamagata (2008) was applied. Two results were obtained from this test. Delta_tilde statistics are offered for big samples, and Delta_tilde_adj statistics are offered for small samples (Küçükaksoy and Akalın, 2017: 27).

While the main hypothesis shows that the slope coefficients are homogeneous, the alternative hypothesis assumes that the slope coefficients are heterogeneous. The main hypothesis is rejected if t statistics computed are smaller than 0.1 at 10% significance level; 0.05 at 5% significance level; 0.01 at 1% significance level. Accordingly, the alternative hypothesis is accepted, which means that the slope coefficients are heterogeneous.

5.2.4. The Durbin-Hausman Cointegration Test

The Durbin-Hausman cointegration test, which was developed by Westerlund (2008), was utilized to carry out the analysis of cointegration relation between the variables. This method enables the cointegration analysis to be realized in cases when the explanatory variables are stationary at the level value or the first degree on condition that the dependent variable is stationary at the first degree [I(1)]. Moreover, this test is a second-generation test, and it considers the cross-sectional dependence. Two test statistics are obtained from the Durbin-Hausman cointegration test. The Durbin-H Group Statistics show that the autoregressive variables are different (heterogeneous) between the groups, and the Durbin-H Panel Statistics show that the autoregressive variables are not different (homogeneous) (Topal, 2017: 195-196).

While the main hypothesis indicates that there is no cointegration relation between the variables, the alternative hypothesis accepts the presence of the cointegration relation between the variables. The main hypothesis is rejected if t statistics computed are smaller than 0.1 at 10% significance level; 0.05 at 5% significance level; 0.01 at 1% significance level. So, the alternative hypothesis is accepted, which means that there is a cointegration relation between the variables.

5.2.5. The Dumitrescu-Hurlin Causality Test

The Dumitrescu-Hurlin causality test is one of the causality tests that gives effective results if there is a cross-sectional dependence or cross-sectional independence. Moreover, it can also be used in circumstances in which there is a cointegration relation or in which there is not such a relation. The main hypothesis shows that there is not a causality relationship from the first variable to the second variable in this causality test in which the Z-bar and Z-bar tilde statistics are calculated (Dumitrescu and Hurlin, 2012). The Z-bar tilde statistics are more powerful when the Z-bar and Z-bar tilde statistics give different results. Therefore, it is important to interpret the results by considering the Z-bar tilde statistics. In this

method, the stationarity of variables is essential. If they are not stationary, they must be turned into stationary variables. The stationary variables should be used when researching the causality relationship.

While the main hypothesis shows that there is no causality relation between the variables, the alternative hypothesis accepts the causality relationship between them. The main hypothesis is rejected if t statistics computed are smaller than 0.1 at 10% significance level; 0.05 at 5% significance level; 0.01 at 1% significance level. So, the alternative hypothesis is accepted, which means that there is a causality relationship between the variables.

5.3. Findings

This research study decided which unit root tests would be used in stationarity tests based on whether there were dependencies between the sections. The table below shows the cross-sectional dependence test results.

Table 3. The Cross-Sectional Dependence Test Results

Variables <i>CD Tests</i>	lnGDP		INT		EXT	
	<i>T Statistics</i>	<i>Prob. Value</i>	<i>T Statistics</i>	<i>Prob. Value</i>	<i>T Statistics</i>	<i>Prob. Value</i>
CD _{lm1} (BP, 1980)	290.0162	0.0000	106.7627	0.0000	76.17094	0.0000
CD _{lm2} (Pesaran, 2004)	41.51009	0.0000	13.23347	0.0000	8.513060	0.0000
CD (Pesaran, 2004)	16.93386	0.0000	2.216475	0.0267	6.235343	0.0000
LM _{adj} (Pesaran et al., 2008)	41.29134	0.0000	13.01472	0.0000	8.294310	0.0000

As given in Table 3, the probability values of CD tests are smaller than 0.01. Since T is bigger than N in the research, the CD_{lm1} and LM_{adj} results can be read. Since the CD_{lm1} test gives biased results, the LM_{adj} test results are considered. Accordingly, the hypothesis of “there is no dependency between the sections” is denied. There is a cross-sectional dependence between the countries in the panel data, and a one-unit shock affects other countries as well. The interaction between the countries is quite high by the effect of the globalization. Accordingly, the policymakers have to consider the economy policies of other countries at the same time.

Table 4. The MADF Unit Root Test Results

Variables	Level		
	lnGDP	INT	EXT
MADF Statistics	43.434(1)	153.878(1)*	63.916(4)
Critical Value (%5)	55.310	55.310	86.328
First Difference			
MADF Statistics	144.793(1)*	-	119.248(2)*
Critical Value (%5)	62.766	-	72.726

Note: The numbers are in brackets in the test statistical values show the lag length based on the smallest AIC information criteria. Since the data of the research were the annual data, the maximum lag length was accepted as 4.

Table 4 shows the MADF unit root test results that reveals whether the overall panel has a unit root or not. It is seen based on the test results that the MADF test statistics are smaller than the critical value at 5% significance level, and the lnGDP and EXT variables have unit roots at the level values. They become stationary when the first difference is computed. Since the test statistics value is bigger than the critical value, the INT series are stationary at the level value.

Table 5. Homogeneity Test Results

Test Statistics	T Statistics	Probability Value
Delta_tilde	-1.176	0.880
Delta_tilde_adj	-1.334	0.909

The Delta homogeneity test is applied to determine whether the slope coefficients change between the units (Table 5). With reference to these test results, since the probability values of both test statistics are bigger than 0.1, the slope coefficients do not change between the units in the long term; in other words, they are homogeneous. Therefore, the panel statistics should be used instead of the group statistics to examine the relations between the variables.

Table 6. The Durbin-Hausman Cointegration Test Results

Test Statistics	T Statistics	Probability Value
Durbin-H Statistics Group	2.597	0.005
Durbin-H Statistics Panel	-0.313	0.623

Table 6 shows the test results that reveal whether there is a cointegration relation under the assumption of both homogeneity and heterogeneity. When the results of the homogeneity test are analyzed, it is determined that using panel statistics is more suitable. To this end, the Durbin-H Panel statistics are considered. Therefore, since the probability value of the Durbin-H Panel statistics is bigger than 0.1, there is not a long-term relationship between the variables.

Table 7. The Dumitrescu-Hurlin Causality Test Results

<i>The Direction of Causality</i>	<i>Test Statistics</i>	<i>T Statistics</i>	<i>Probability Value (%5)</i>
lnGDP \nrightarrow INT	Z-bar	4.3294	0.1229
	Z-bar tilde	0.9654	0.1965
INT \nrightarrow lnGDP	Z-bar	7.9390	0.0697
	Z-bar tilde	2.2517	0.0697
lnGDP \nrightarrow EXT	Z-bar	-0.5044	0.6857
	Z-bar tilde	-0.6243	0.5234
EXT \nrightarrow lnGDP	Z-bar	3.9460	0.1318
	Z-bar tilde	0.8288	0.2649
Note: The \nrightarrow icon indicates the direction of causality. The test statistics were obtained with 789 iterations.			

Table 7 investigates the causality relations between internal debt, external debt, and economic growth. Since the probability values of test statistics are bigger than 0.05, there is not a causality relation between the variables. This result shows that the BRICS-TM countries discussed in the study do not have an economic growth based on their debts.

6. CONCLUSION

The welfare levels of societies can be increased by borrowing when there are no sufficient opportunities for realizing economic growth and developmental goals. This borrowing can be actualized in two ways which are internal and external borrowings. One of the most important reasons for appealing to external borrowing is the lack of resources. Another important reason is the lack of foreign currency as an instrument of payment to buy the goods and services that public needs. Countries can also appeal to internal borrowing if the public revenues cannot meet the expenses and if the domestic sources are sufficient. Internal and external borrowings positively affect the economic activities of countries. That's why some countries may prefer borrowing from time to time. The money borrowed will create an increasing effect for the national income when it is used in productive areas by increasing the capital accumulation. Interest payments except for the capital need to be made in repayment process. The size of the interest payments may create a reducing effect on the gross domestic product in the long-term.

The relationship between internal debt and external debt in BRICS-TM countries was analyzed by the panel data analysis in this study. The data belong to 2000-2016 period based on the availability of the data. First, the cross-sectional dependence test was applied for more consistent estimations. According to the cross-sectional dependence test results, there is a cross-sectional dependence between the countries. A one-unit shock that comes to one of the countries affects the other countries as well. The MADF test was utilized because the cross-sectional dependence was determined. The INT variable is steady at the level value, and the lnGDP and EXT values are stationary when their first differences are computed. The Heterogeneity test was applied to determine whether the slope coefficients change

between the units. It was found at the end of the test that the slope coefficients did not change between the units in the long-term. The Durbin-Hausman cointegration test results show that there is no long-term relationship between the variables. According to the Dumitrescu-Hurlin causality test results, there is no causality relation between the variables. While these results share similarities with the results of studies such as Ademola et al. (2018) and Daud (2016), the same results conflict with a number of studies including Onakoya and Ogunade (2017), Burhanudin et al. (2017), Nantwi and Erickson (2016), Lau and Kon (2014), Brini et al. (2016), Favour et al. (2017) and Stauskas (2017). The structures of the variables, which include being a different country, country groups and having a different data set, are effective on the conflicts.

To sum up, the results of the current study put forth that the size of internal and external debts does not have a dimension that can negatively or positively affect the economic growth in BRICS-TM countries. In other words, the BRICS-TM countries are not growing through debts. That's why, the cointegration and causality relationships between the variables could not be found.

While there are positive developments in the economic performances of the BRICS-TM countries, the share of the internal and external debts in the gross domestic product increases in China, Mexico and South Africa. These countries need to avoid from the negative effects of internal and external debts to ensure a sustainable economic growth. They should extend their debts to long-term loans and utilise the debts in areas with high added value that positively contribute to the national economy.

It is thought that our study can be a model for future studies in which different variables in actualizing the economic performances achieved by the BRICS-TM countries may be considered and different methods may be applied.

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