Akduğan U. & Yıldız N. (2020). The relationship between external debt and economic growth: the case of fragile five countries. Gümüşhane Üniversitesi Sosyal Bilimler Enstitüsü Elektronik Dergisi, 11(2), 448-460.

The Relationship Between External Debt and Economic Growth: The Case of Fragile Five Countries[1]

Dış Borç ve Ekonomik Büyüme Arasındaki İlişki: Kırılgan Beşli Ülkeleri Örneği

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Abstract

The inadequacy of the internal savings required for investments in developing countries pushes them to seek outsourcing and external borrowing. In this study, the relationship between external borrowing and economic growth has been examined by the VAR model for 1970-2018 period in Brazil, Indonesia, India, South Africa and Turkey, which also called as "Fragile Five". The direction of the relationship between the variables has been examined with the Granger causality test by using the generated VAR models. In order to support the causality test results, the dynamic relationships between variables has been analyzed with impulse-response functions and variance decomposition analysis. The findings obtained from the analysis are as follows: i) In Brazil, a unidirectional causality relationship from the GDP to the external debt stock has been found. Also, economic growth has a significant positive impact on external borrowing. ii) There is no statistically significant relationship between external debt stock and GDP in Indonesia and India. iii) In Turkey and South Africa, a unidirectional relationship from external debt stock to GDP has been found and it has been seen that external borrowing has a positive effect on growth in these countries.

Anahtar Kelimeler: *External Debt, Economic Growth, VAR Analysis, Granger Causality*

Öz

Gelişmekte olan ülkelerde yatırımlar için gerekli tasarrufların yurtiçinde yetersiz kalması, bu ülkeleri dış kaynak arayışına ve dış borçlanmaya itmektedir. Bu çalışmada "Kırılgan Beşli" olarak adlandırılan Brezilya, Endonezya, Hindistan, Güney Afrika ve Türkiye'de dış borçlanma-ekonomik büyüme ilişkisi 1970-2018 dönemi için VAR modelleri ile incelenmiştir. Oluşturulan VAR modelleri kullanılarak, değişkenler arasındaki ilişkinin yönü Granger nedensellik testi ile araştırılmıştır. Nedensellik testi sonuçlarını desteklemek amacıyla, değişkenler arasındaki dinamik ilişkiler etki-tepki fonksiyonları ve varyans ayrıştırma analizi ile incelenmiştir. Analiz sonucunda elde edilen bulgular şu şekildedir: i) Brezilya'da dış borç stoku ile GSYİH arasında çift yönlü nedensellik ilişkisi tespit edilmiş, ancak dış borçlanmanın büyüme üzerindeki etkisinin daha fazla olduğu görülmüştür. ii) Endonezya ve Hindistan'da dış borç stoku ile GSYİH arasında anlamlı ilişki bulunamamıştır. iii) Türkiye ve Güney Afrika'da dış borç stokundan GSYİH'ya doğru tek yönlü bir nedensellik ilişkisi tespit edilmiş ve bu ülkelerde dış borçlanmanın büyüme üzerinde pozitif etkisinin olduğu görülmüştür.

Keywords: *Dış Borç, Ekonomik Büyüme, VAR Analizi, Granger Nedenselliği*

Araştırma Makalesi [Research Paper]

JEL: *C32, C51, F43*

Submitted: 03 / 02 / 2020
Accepted: 01 / 05 / 2020

[1] This study is an updated and expanded version of the paper named as "The External Debt-Economic Growth Nexus: An Empirical Analysis For Fragile Five" which is presented in 3rd International Conference on Social Sciences and Education Research organized in Rome-Italy at April 27-29, 2017.

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Introduction

In today's World, one of the main objectives of all countries is to realize economic growth. Especially for developing countries, economic growth is the main means of development and reducing poverty. If these countries can not achieve economic growth, it is not possible to reach the level of developed countries. There is also a need for investments and capital accumulation for sustainable economic growth. At this point, underdeveloped and developing countries face with capital constraint. As Nurkse (1971) put it in vicious cycle theory, savings of these countries are insufficient for new investments.

Nurkse (1971), who describes the underdevelopment as a vicious circle of poverty, points out that per capita income is low in underdeveloped countries where production is low and population growth rate is high. The low level of income also negatively affects both the supply and demand side of the capital (Nurkse, 1971: 115).

If one country spends more than its income, this leads to savings gap. This gap is financed by taking the advantage of the savings of other countries. Much of this financing is covered by external borrowing. While external borrowing creates additional resources for the country during the borrowing period, it also causes the flow out of funds from the country in the payment period. While in the first case economic growth may be affected positively, in the second case it may adversely be affected. So, the areas where the borrowings are used are important. It is important that the borrowings are used at least in self-financing areas. Otherwise, it can be encountered with economic instabilities such as 1980s international debt crisis. Many developing countries swiftly have get external borrowings from 1970s until 1982. As a result of the rapid rise in real interest rates in 1982, these countries faced with high interest payments and debt burdens. This has led developing countries to enter into a debt crisis in the 1980s (Dornbusch, Fischer and Startz, 1998: 595).

External borrowing should not always be considered to increase investments and to provide economic growth. External borrowing can be an important contribution to economic growth if it can be invested in productive areas.

Developing economies of Brazil, Indonesia, India, Turkey and South Africa was described as fragile five in Morgan Stanley's economic report of August 2013. The same report also mentions that the Federal Reserve (FED) would taper bond purchases. Following this announcement of the FED, the foreign capital flows to fragile five countries have been decreased and even foreign capital has flown out these countries. Thus, the fragile five countries have become the most depreciated countries in the emerging markets. These countries are characterized as fragile five by a common and quite important reason: the increase in external financing needs and current account deficits that make these countries more dependent on foreign capital flows (Morgan Stanley, 2013: 1). In addition to the high current account deficit, high inflation rates and decreases in growth performance are presented as the reasons why these countries are considered within such a group. At that time, it was estimated that fragile five countries' foreign financing needs would increase and if FED abandoned monetary expansion, these economies would have difficulties in finding the necessary foreign financing. Therefore, the countries that would be most affected from FED's decision to reduce bond purchaces, namely the economies that are fragile in terms of external financing problems, were defined as "Fragile Fives".

Developing countries, whose domestic savings and capital stock are limited, generally want to benefit more from foreign capital flows and produce policies to achieve this. Because the current account deficits of these countries are generally high and they have foreign exchange deficits. Therefore, such countries try to create the foreign financing they need by attracting foreign capital to their countries. If they fail to achieve this, they have to resort to external borrowing. In a setting where monetary expansion has come to an end, the decline in foreign capital inflows to developing countries has increased the need for these countries' external borrowing. On the other hand, if the external financing is not managed properly, current debt stock and interest payments can result in more external borrowing. In addition, in the countries where financial markets are not sufficiently developed and domestic borrowing opportunities with national currency are limited in domestic markets, foreign borrowing is generally resorted. In this study; the relationship between foreign borrowing and economic growth in fragile five countries was analyzed with VAR models generated for each country respectively. By estimating the generated VAR models, the direction of the relationship between the variables was analyzed with the Granger causality test. Subsequently, the impulse-response functions and variance decompositions analysis were examined to ensure that the results obtained in the causality test were robust. All the findings were evaluated respectively for each country and the study was completed. The aim of this study is to contribute to the literature in terms of examining the fragile five countries that are likely to have problems in accessing external finance.

1. Theoretical Framework

The concept of borrowing extends to Mercantilism. The issues addressed by Mercantilists included the nature and boundaries of state debts.

On the other hand classical economists did not accept borrowing except in extraordinary circumstances because they refused state intervention in the market. Classical economists also saw borrowing as an intergenerational problem. In classical and neo-classical ecoles, state intervention creates the effect of exclusion. As a result of this, economic growth would be negatively affected. According to the "Ricardian Equivalence Theorem" developed by D. Ricardo from the classical ecole, public borrowing does not cause a real influence on the economy. The reason is that the decline in public savings as a result of budget deficits is balanced by the rise in private sector savings. As a result, the total savings in the economy do not change. Therefore, interest rates and investments are not affected by this situation. The main reason fort he emergence of this result is the rational behaviour of the economic units.

The concept of borrowing has become important along with the Keynesian ecole which supports the state intervention to the economy. Keynes stated that during the stagnation periods, the government's budget deficit and borrowing could positively affect the economic growth by increasing total demand. In this respect, he emphasized that the countries in the development stage would have difficulties in finding resources to provide economic growth and that external borrowing was important for eliminating these problems. Keynes' hypothesis, which asserts that state intervention is essential for economic growth, forms the basis of his theoretical infrastructure. In the Harrod-Domar approach, which is based mainly on the Keynesian approach, it is claimed that foreign borrowings would increase investments by increasing domestic savings in developing countries and this would result in higher output and economic growth. That is, according to the Harrod-Domar model, what drives growth is savings that finance investments and if the savings level is low, the external borrowing would contribute to existing savings (Hjertholm et. al., 1998: 3).

T. Sargent and N. Wallace from the New Classical ecole have indicated that financing the budget deficit with borrowing would create inflationary effects. However, they asserted that if the ratio of the total budget deficit to the GDP is fixed, borrowing-GDP ratio will achieve stability and have a positive impact on economic growth (Dornbusch, Fischer and Startz,1998: 594). On the other hand, in the neoclassical model, changes in economic growth are emphasized in the case of interest payments of foreign borrowings are financed by taxes. In such a situation, there are two different effects that negatively affect economic growth. The first is that, because taxes reduce disposable income, it leads to a reduction in savings and thus investments. The second one is due to the decrease in consumption expenditures, as direct taxes reduce disposable income (Diamond, 1965: 1126). Post Keynesian H. Minsky stated that the borrowing structure may cause financial difficulties. If the ratio of borrowing-income ratio rises to a certain level, enterprises can not pay their debts. This, in turn, will affect the consumption and investment adversely and drive the economy to a stagnation. At the same time, as the borrowing continues, the risk of the borrower will rise.

On the other hand, approaches emphasizing the importance of external borrowing in covering the savings gap have come to the fore recently. In this context, another approach explaining the relationship between external borrowing and growth is the "two-gap" approach, which argues that the savings deficit caused by the insufficient domestic savings and the foreign exchange deficit arising from the lack of foreign currency inflow occur together. Countries that need capital goods importing finance the foreign currency required for imports through foreign capital inflows or exporting revenues. A lack that may arise in this financing will negatively affect investments and production. Therefore, according to the two-gap approach, if importing of investment goods are financed by generating foreign currency inflow through external borrowing, this will also affect economic growth positively (Moreira, 2005: 27).

The intertemporal borrowing model focuses on how the savings gap in developing countries will be covered by borrowing depending on the intertemporal income-consumption level. Accordingly, if the economic growth rate in the current period does not reach to the desired level, external sources can be used. Thus, in the current period, the increase in the income level will increase the total demand and this will accelerate the growth. Another approach based on covering the savings deficit with external borrowing is borrowing-based growth models. Accordingly, countries that achieve their economic growth through external borrowing evaluate their borrowing capacities according to the benefits and costs of borrowing. As long as the difference between the benefit and cost of borrowing is in favor of benefit, external borrowing will contribute to production and growth (Gürdal and Yavuz, 2015: 157-158). The level of benefit of used external resources depends on many factors such as efficient use of resources, the reflection of the structural regulations in the country to the foreign trade regime, the capacity to increase the savings level of the provided additional income, and the degree of additional savings to compensate for the lack of investments.

In the scope of various economic approaches, different hypotheses are put forward in applied studies examining the relationship between external debt and economic performance. According to "debt overhang hypothesis", high external debt acts as a tax on future output and reduces the incentive for saving and investment. In this case, the external debt burden has a negative impact on the rate of investment. Because, the debt stock exceeding the repayment capacity will point to te existence of a borrowing problem in the country, and this will reduce investors' willingness to invest. Thus, excessive indebtedness will negatively affect investments and economic growth (Krugman, 1988: 253-268; Froot, 1988: 1-33). According to "liquidity constraint hypothesis", liquidity constraints arising from debt obligations have a negative

impact on investments (Hoffman and Helmut, 1991: 280-297). However, these approach imply an indirect adverse impact of external debt on economic growth through decrease in investments. As an alternative to this study, the direct effect of external debt on economic growth through its impact on productivity will be examined.

2. Empirical Evidence

In the studies related to the effect of external borrowing on economic growth, it has been found that external borrowing have both negative and positive effects on economic growth. In these studies two different conclusions have emerged. This is due to factors such as differences in economic structures of the countries, debt management, borrowing costs, areas where the borrowings are used, and nature of the investments made with borrowings. In this context, firstly, studies performed for Turkey are summerized in Table 1.

Table 1. Literature Review for Turkey

Study	Period	Method	Results
Gövdeli (2019)	1970-2016	The ARDL bounds testing	The external debt has a positive impact on economic growth.
Çöğürcü ve Tuna (2019)	1980-2017	VAR analysis	There is an unidirectional causality relationship from external debt to economic growth
Mercan ve Ergen (2018)	1990-2017	VAR analysis, Granger causality test	The external debt reacts negatively in response to a shock to growth. According to the Granger Causality test, it is seen that the unidirectional causality relationship from economic growth to external debt.
Öztürk and Çınar (2018)	1975-2016	Engle-Granger cointegration test, Dynamic OLS	There is a cointegration relation between public external debt and economic growth, and external debt has a positive effect of economic growth.
Ağır (2016)	1970-2014	Linear, Non-linear and Asymmetric Causality tests	The external debt has a negative impact on economic growth.
Kutlu ve Yurttagüler (2016)	1998-2014	Granger causality test	There is an unidirectional causality relationship from external debt to economic growth
Korkmaz (2015)	2003-2014	VAR analysis	The unidirectional causality relationship from external debt to economic growth, and external debt has a positive impact on economic growth
Gürdal and Yavuz (2015)	1990-2013	Gregory-Hansen cointegration test, Hacker and Hatemi-J causality tests.	There is a cointegration relation between external borrowing and economic growth and also a one-way causality from economic growth towards external borrowing.
Çelik and Direkçi (2013)	1991-2010	Johansen cointegration test, OLS regression, Granger causality test	The external debt has a negative impact on economic growth.
Çöğürcü and Çoban (2011)	1980-2009	Johansen cointegration test, Regression analysis	The external debt has a negative impact on economic growth.
Umutlu et. al. (2011)	1990-2008	Ordinary Least Squares Method	The external debt has a positive impact on economic growth.
Bilginoğlu and Aysu (2008)	1965-2005	Regression analysis	The external debt has a negative impact on economic growth.
Çiçek et. al. (2010)	1990-2009	Regression analysis	The external debt has a negative impact on economic growth.
İpek and Yaşar (2008)	1989-2007	Cointegration and Causality analysis	There is a cointegration and bidirectional causality relationship between external and economic growth.
Uysal et. al. (2009)	1965-2007	VAR analysis	The external debt has a negative impact on economic growth.

The studies examining the relationship between foreign debt and economic growth for various countries are as follows:

Okon and Monday (2017) analyzed the relationship between external borrowing, poverty and economic growth in Nigeria using the data of annual time series of 1986-2016. This study includes various efforts by the government, NGOs and individuals to reduce poverty in the country. The search for economic growth and development has forced Nigeria to borrowing in this period. It has been found that external borrowing has had a negative effect on economic growth and one unit increase in external borrowing has reduced (decreased) economic growth by 0,31 units.

Chaudhry, Iffat, and Farooq (2017) analyzed the relationship between foreign direct investments, external borrowing and economic growth for 25 developing countries. They used 1990-204 data for analysis. One of the conclusions they have found is that foreign direct investment has a greater impact on economic growth than external borrowing. One unit increase in foreign direct investments increases growth by 4,03 units, while one unit increase in external borrowings increases it by 2,13 units.

Mohd Daud and Podivinsky (2012) have had negative results in their study of the effects of external borrowing on economic growth over a 36-year period in 31 developing countries. Especially, it has been found in this study that accumulation of external borrowings slows down the economic growth.

Fosu (2011) analyzed the effects of external borrowing on economic growth in 35 Sub-Saharan African countries using the data of 1980-1990 period. It has been reached the conclusion that without the external debt burden, these countries' growth could be 50% higher. At the same time, it was found that there was, even slightly, a negative correlation between borrowings and investment levels.

Checherita and Rother (2010) has investigated the effect of public debts on growth of Per Capita GDP in 12 Euro countries. They have come to the conclusion that if the ratio of debt to GDP is between 90% and 100%, then long-term growth is adversely affected. They have also found that even if the ratio of debt to GDP is between 70% and 80%, the negative growth effect has already begun.

Reinhart and Rogoff (2010)'s work on developed and developing 44 countries has found surprisingly similar results for public borrowing and growth relation. While the relationship between growth and borrowing is relatively weak in normal borrowing levels, it has been found that growth rates in the countries where roughly 90% of GDP is public borrowings are lower.

Clements, Bhattacharya, and Nguyen (2003), in their work on low-income countries, have reached the conclusion that high borrowing levels have put pressure on economic growth. In the same study, it is stated that borrowing affects the growth only after reaching a certain threshold. This threshold has been determined to be 50% of the nominal GDP.

Pattillo, Poirson, and Ricci (2002) analyzed the impact of external borrowing on growth for 93 developing countries. Their conclusion is that borrowing in higher levels decreases the effectiveness of the investments rather than their volume and reduces growth.

Iyoha (1999)'s study covering Sub-Saharan African countries found that high external borrowing stock exerted pressure on investments and affected the growth rate adversely. In addition, it has been revealed that a substantial decrease in debt stock increases investments and growth. A 20% decrease in debt stock increases the investment by 18% and growth by 1% averagely.

When the literature on the subject is evaluated in general, as for the studies conducted for Turkey, mostly it has been reached to the conclusion that external borrowing affects economic growth. In the studies of Ağır (2016), Çelik and Direkçi (2013), Çöğürcü and Çoban (2011), Bilginoğlu and Aysu (2008), Çiçek et. al. (2010), Uysal et. al. (2009), it was found that such effect was negative. On the other hand, in the studies such as Gövdeli (2019), Öztürk and Çınar (2018), Korkmaz (2015) ve Umutlu et. al. (2011), it was concluded that external borrowing affected economic growth positively. As for the studies conducted for different countries, although different results were obtained, commonly it was found that external borrowing affects economic growth. In this study, as in the study of Mercan and Ergen (2018), we have focused on the direction of the relationship between external borrowing and economic growth. On the other hand, there are many studies addressing the relationship between external borrowing and economic growth for both Turkey and other countries. However, it seems that the issue has not been investigated for fragile five countries. This study is intended to contribute to the literature for the countries studied.

3. Data and Methodology

In this study, the relationship between external borrowing and economic growth in Brazil, Indonesia, India, Turkey and South Africa, also called as "Fragile Five", is examined with the help of VAR models. In this direction, analyze is performed using data of the variables of "External Debt Stock" and "GDP". For Brazil, Indonesia, India and Turkey, annual data for 1970-2018 period has been used. Due to data constraints for South Africa, analyze is conducted with quarterly data for 2003-2018 period. The data are taken from the data bank of the World Bank's website (data.worldbank.org) and South African data is taken from the data bank of South African Reserve Bank's website. Since the relationship between external borrowing and economic growth is examined seperately with the VAR models established for each country, the fact that the review period for South Africa is different does not pose a problem. In addition, it is aimed to partially eliminate autocorrelation and heteroskedasticity problems that may arise by using the logarithmic transformations of the variables

in the models. Additionally, since quarterly data is used in the analysis for South Africa, seasonal adjustment have been applied to this series.

In this direction, firstly, the stationarities of the time series related to the variables included in the model are tested. In the case of average and variance of a stochastic Y_t process does not change over time, in other words if it is stable, and covariance of this process is independent of the past, it is assumed that the process is stationary (Granger and Newbold, 1977: 257). In this study, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are used to analyse the stationarity of the series. The large model used in the ADF unit root test is as follows:

$$\Delta Y_t = \alpha + \beta T + \delta . Y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-j+1} + \varepsilon_t \quad (1)$$

In this model, p represents the number of lag lengths and is determined by information criteria such as Akaike (AIC) or Schwarz (SIC). The ADF unit root test is based on the determination of estimation value and standard error of δ by estimating the equation (1) by using the least squares method and thereby τ test statistic is calculated. In decision phase, τ test statistic is compared with the critical values in the tables designated by Dickey and Fuller (1979) for various sample sizes.

Equation (1) in the ADF unit root test is also used in the PP unit root test. However, high-grade autocorrelation problem that may be encountered in the ADF unit root test is addressed in PP unit root test process by corrections which adds various variations of the lagged terms to the model. Besides, the main advantage of the PP unit root test is that it changes in the t-statistics (Awan, Anjum and Rahim, 2015: 386). The null hypothesis and decision making process in the PP unit root test is the same as ADF unit root test.

The analysis is then continued with the VAR model generated by the stationary forms of the variables. In analyzing macroeconomic time series, it can be counted among the reasons for the frequent preference of VAR models, such as the model is flexible, the estimation is easy, and the model is suitable for macroeconomic data. In addition to these properties, the cointegration feature is the most important reason for the preference of VAR models. It also allows to combine long and short term information in the data (Juselius, 2006: 14). In the systems of simultaneous equations, sometimes constraints on the structural model need to be made in order to overcome the problem of determining related to internal/external distinction of variables (Darnell, 1990: 114-116). With the Vector Autoregressive (VAR) Models developed by Sims (1980) in order to overcome the complexity of interaction between these variables which are included in the simultaneous equation systems, the problem in question is removed. In his study Sims (1980) suggests that if there is a true simultaneity in a set of variables, all of them should be treated equally and a priori distinction should not be made between endogenous and exogenous variables.

On the other hand, the direct interpretation of the parameters obtained by estimating the generated VAR model is not very meaningful. Therefore, VAR models are often used to perform three basis analysis: (i) Granger Causality Test, (ii) Impulse-response functions, (iii) Variance decomposition (Greene, 1997: 815-816). Since error terms in time series models are often used to represent shocks, the reaction of each variable in the system to its own and other variables' errors is called as impulse-response. The variance decomposition shows how many percent of changes in the variance of each of the variables are explained by their own lag, or by other variables. It also gives information about whether the variables are endogen or exogen. That is, in the impulse-response analysis responses of the exogenous variables to the shocks and in the variance decomposition relative importance of the shocks are tried to be revealed (Warne, 2000: 17).

The Granger causality analysis based on VAR model is used to determine whether there is a relationship between two variables, and if so, to determine the direction of the relationship. Granger (1969) and Sims (1972) have deal with the causality relations, based on internality and externality relations that thought to be mutual between variables. The following regression relations which adapted to this study for Granger causality analysis, will be estimated (Granger, 1969: 431).

$$GDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} GDP_{t-i} + \sum_{i=1}^{p} \alpha_{2i} EXD_{t-i} + \varepsilon_{1t} \quad (2)$$

$$EXD_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} EXD_{t-i} + \sum_{i=1}^{p} \beta_{2i} GDP_{t-i} + \varepsilon_{2t} \quad (3)$$

In equation (2) and (3), p is the lag length and is estimated by using the information criteria contained in the standard VAR model which is estimated between the variables. Accordingly, it is tested whether the coefficients of the lagged values of

the independent variable in the model are equal to zero at a certain level of significance. In this process, it is decided by surveying the F-statistics of the variables in the model by groups (Granger, 1969: 428-429).

In this context, the analyzes are carried out over the VAR models generated with the stationary series in the mentioned period and the relationship between external debt stock and GDP is examined by this way. In these VAR models, the optimum lag length is determined with AIC. On the other side, the appropriate model is determined by the diagnostic tests applied. Then, Granger Causality Test is applied on the suitable model, afterwards the dynamic relations between variables are examined with generalized impulse-response functions and variance decomposition and the findings obtained from here are presented.

On the other hand, taking the differences of the series to ensure stationarity in the non-stationary series causes information loss and causes the possible long-term relationships to disappear. For this reason, a cointegration analysis is needed to reveal the long term relationship between the series. If there is a common stochastic trend between the variables, this indicates that the variables are cointegrated. If there is a cointegration relation between the variables, the VAR models are not the most suitable models. In this case, the vector error correction (VECM) models must be used (Lütkepohl, 2004: 86-87). Therefore, in the case that the series related to the variables to be analyzed in the study are unit rooted at the level and stationary at the first order and they are cointegrated at the same time, analyzes are performed with VECM models. Standard VAR models are used if the series are not stationary at the same order or if the stationary series at the same order are not cointegrated.

Finally, within the scope of the countries examined, "external debt stock (EXD)" and "GDP" variables are shown with BEXD and BGDP for Brazil, IEXD and IGDP for Indonesia, INEXD and INGDP for India, TEXD and TGDP for Turkey and SAEXD and SAGDP for South Africa. "L" at the beginning of the variables refers to the logarithmic transformation.

4. Findings

In this part of the study, the results of the unit root test, Granger Causality Test, impulse-response analysis and variance decomposition analysis for each country will be summarized in tabular form. Firstly, results of the unit root test are shown in Table 2.

Table 2. Results of the Unit Root Test

	ADF	Critical Values		PP	Critical Values	
		5 %	10 %		5 %	10 %
LBEXD	-4,07** (10)	3,54	3,20	-4,16* (3)	-3,51	-3,18
LBGDP	-3,83** (2)	-3,51	-3,18	-4,58* (2)	-3,51	-3,18
LIEXD	-1,73 (4)	-3,52	-3,19	-1,93 (4)	-3,52	-3,19
LIGDP	-2,14 (1)	-3,51	-3,18	-1,74 (2)	-3,51	-3,18
ΔLIEXD	-1,98** (5)	-1,94	-1,61	-2,44* (6)	-1,94	-1,61
ΔLIGDP	-4,19* (0)	-2,92	-2,60	-4,25* (0)	-2,92	-2,60
LINEXD	-3,36*** (5)	-3,52	-3,19	-1,53 (4)	-3,51	-3,18
LINGDP	-1,97 (0)	-3,51	-3,18	-1,96 (4)	-3,51	-3,18
ΔLINEXD	-3,87* (0)	-2,92	-2,60	-3,62* (2)	-2,92	-2,60
ΔLINGDP	-4,64* (0)	-2,92	-2,60	-4,73* (3)	-2,92	-2,60
LTEXD	-2,28 (1)	-3,51	-3,18	-1,76 (3)	-3,51	-3,18
LTGDP	-3,42*** (0)	-3,51	-3,18	-3,52** (1)	-3,51	-3,18
ΔLTEXD	-5,02* (0)	-2,92	-2,60	-5,02* (0)	-2,92	-2,60
LSAEXD	-0,46 (0)	-3,50	-3,17	-0,49 (0)	-3,50	-3,17
LSAGDP	-3,07 (0)	-3,50	-3,17	-2,63 (2)	-3,50	-3,17
ΔLSAEXD	-5,88* (0)	-2,92	-2,59	-5,75*(2)	-2,92	-2,59
ΔLSAGDP	-9,61* (0)	-2,92	-2,59	-10,09* (5)	-2,92	-2,59

Explanation: Values within the parenthesis represents optimal lag lenghts. (*) represents that it is statistically significant at 1% significance level, (**) represents that it is statistically significant at 5% significance level and (***) in turn at 10% significance level.

According to the results of the unit root test;

- The null hypothesis, which states that EXD and GDP variables have a unit root is rejected for Brazil. Therefore, both variables are stationary at the level (I(0)). In this respect, the relations between these two variables will be investigated with the help of the VAR model in which the level values of the variables are included.

- The null hypothesis, which states that EXD and GDP variables have a unit root is not rejected for Indonesia, India and South Africa. Besides, these variables became stationary after the first differences are taken (I(1)). In this respect, the long-term relationship between these two variables was investigated with Johansen's cointegration approach for Indonesia, India and South Africa. The lag length of the model to be used in the Johansen Cointegration Test is determined according to AIC with the help of the VAR model in which the level values of the variables are included.

Results of the Johansen cointegration test are shown in Annex A. According to these results, when critical values are compared with trace statistics and Max-Eigen Statistics, the null hypothesis, which indicates that there is at least one cointegration vector is rejected at 5% significance level. According to this, it is determined that there is no cointegration relation between the variables. In this case, the analysis will continue with the VAR model where the stationary forms of the variables are included.

- The null hypothesis, which states that GDP variable has a unit root is rejected for Turkey. On the other hand, the null hypothesis, which states that EXD variable has a unit root is not rejected. It has been determined that GDP variable is stationary at the level (I(0)) and EXD variable has difference stationary process (I(1)). In this respect, the relations between these two variables will be investigated with the VAR model in which the stationary form of the variables are included.

In this direction, the lag lengths of the VAR models created for each sample were determined by Akaike Information Criteria (AIC). Whether the models provide the stationary and stability conditions were checked by diagnostic tests. Findings of the Granger Causality Test are shown in Table 3.

Table 3. Results of the VAR Granger Causality Test

Null Hypothesis	Chi-Square	df	Probability
$LBGDP \neq> LBEXD$	13,87*	2	0,0005
$LBEXD \neq> LBGDP$	3,54	2	0,2278
$\Delta LIGDP \neq> \Delta LIEXD$	2,69	1	0,1146
$\Delta LIEXD \neq> \Delta LIGDP$	2,52	1	0,1478
$\Delta LINGDP \neq> \Delta LINEXD$	0,04	1	0,7982
$\Delta LINEXD \neq> \Delta LINGDP$	0,12	1	0,7375
$LTGDP \neq> \Delta LTEXD$	2,57	1	0,1487
$\Delta LTEXD \neq> LTGDP$	3,52***	1	0,0846
$\Delta LSAGDP \neq> \Delta LSAEXD$	0,08	2	0,9487
$\Delta LSAEXD \neq> \Delta LSAGDP$	8,12**	2	0,0116

Explanation: (*) represents that it is statistically significant at 1% significance level, (**) represents that it is statistically significant at 5% significance level and (***) in turn at 10% significance level.

Tablo According to the results of the VAR Granger causality test, the statistical significance of the findings is summarized following:

- The null hypothesis of "LBGDP does not Granger Cause LBEXD" is rejected at 1% significance level. Accordingly, in Brazil, a unidirectional causality relation from the GDP variable to the external debt stock variable is determined.

- The null hypothesis of "LTEXD does not Granger Cause LTGDP" is rejected at 10% significance level. Accordingly, in Turkey, a unidirectional causality relation from the external debt stock variable to the GDP variable is determined.

- The null hypothesis of "LSAEXD does not Granger Cause LSAGDP" is rejected at 5% significance level. Accordingly, in South Africa, a unidirectional causality relation from the external debt stock variable to the GDP variable is determined.

Following the study, the results of the generalized impulse-response functions and variance decomposition analyzes will be listed. Impulse responses of the external debt stock and GDP are presented in the appendix (see Annex C). We are analyzed in how economic growth responded to the change in external borrowing with the generalized impulse-response functions in which the dynamic relations between the variables are showed. Annex C show the dynamic impact of one-standart deviation shocks in EXD on the GDP (or dynamic impact of one-standart deviation shocks in GDP on the EXD) in a span of 10 period and confidence interval of 90%. The statistical significance of these findings is summarized as follows:

- The change in GDP appeared to positively affect the external borrowing in Brazil sample. The impact became statistically significant after four period and this increasingly continues in subsequent periods.

- In Turkey, the change in external debt stock appeared to positively affect the GDP in the first period. Thereafter the effect dissipated quickly.

- The change in external debt stock appeared to positively affect the GDP in South Africa sample. The impact became statistically significant in the third period with a lag of two periods, and this effect diminishes in the subsequent periods.

The results of the impulse-response analyse based on VAR models are parallel to Granger causality test. Finally, the results of the variance decomposition are given in Appendix (see Annex B).

According to the results of the variance decomposition of LBEXD, approximately 11% of the changes in the external debt stock are explained by the GDP in the fourth period. This ratio increases to about 65% in the tenth period. The impact of external debt stock on GDP appears to be limited. According to the variance decomposition results, the impact of GDP on external debt stock is greater than the impact of external debt stock on GDP. Besides, this finding overlaps with both obtained from impulse-response functions and the Granger causality test.

The results of the variance decomposition of LSAEXD show that this variable is explained by the changes taking place in itself for each period. When the results of the variance decomposition of LSAGDP are examined, since the third period, averagely 15% of the changes in GDP for each period are explained by external debt stock. Accordingly, the impact of external debt stock on GDP is greater and this finding overlaps with those obtained from both impulse-response functions and with the Granger causality test.

In view of variance decomposition results for Indonesia, India and Turkey, both variables are explained by the changes that happened in each period in their own lags.

Conclusion

The fragile five countries have common characteristics such as the high sensitivity of national currencies against external shocks, high current account deficit and inflation rates, and problems in accessing external financing. However, the political and economic developments in these countries may differ, so the change in macroeconomic indicators may diverge over time. The economies of these countries are characterised by high economic growth rates in some periods and the need for external resources in almost every period. However, some countries have been able to increase the production capacities of their economies by directing external financing to productive areas. On the other hand, countries that did not give importance to the growth-enhancing infrastructure had to settle for non-sustainable economic growth. The results obtained in this study also support this.

In this study, the relationship between external borrowing and economic growth in fragile five countries was investigated with VAR analysis. Granger causality tests were performed using the estimated VAR models, and the direction of the relationship between variables was determined for each country. Afterwards, in order to ensure that results obtained from the causality test are robust, impulse-response functions were examined with the help of same VAR models and variance decompositon analysis was performed. As the results in Table 2, Annex B and Annex C are evaluated, the findings for each country are as follows: i) In Brazil, a unidirectional causality relationship from the GDP to the external debt stock has been found. In addition to this finding, impulse-response functions and the results of variance decomposition demonstrate the huge impact of economic growth on external borrowing. ii) It has been found that there is a unidirectional causality relationship from the external debt stock to the GDP in Turkey and South Africa. Also, external borrowings in these countries have a positive impact on economic growth. iii) There is no statistically significant relationship between external debt stock and GDP in Indonesia and India.

In terms of Turkey, the obtained results coincides with the results of Gövdeli (2019), Çöğürcü and Tuna (2019), Öztürk and Çınar (2018), Kutlu and Yurttagüler (2016), Korkmaz (2015), Umutlu et. al. (2011). When evaluated for overall, the results for Turkey and South Africa are congruent with the majority of the literature. However, unlike other countries, it is interesting that economic growth in Brazil has an increasing external borrowing effect. While many countries meet their foreign financing needs by external borrowing and therefore increase their investments and production, it is observed that as the Brazilian economy grows, the need for foreign borrowing increases.

In this study, which is expected to contribute to the literature in terms of the countries studied, it is seen that different results are obtained for each of the fragile five countries. This is closely related to the economic structure of these countries, the policies they applied and the areas in which they invested the borrowings. It should not be forgotten that these results are valid in accordance with the analysis method used in the study and for the studied period, and the results that obtained with different methods and for different periods may vary.

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Appendix

Annex A. Results of the Johansen Cointegration Test

Annex A.1. Results of the Johansen Cointegration Test (Variables: LIEXD - LIGDP)

H_0 Hypothesis	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
r = 0	13,41	15,49	12,23	14,26
r ≤ 1	0,64	3,84	0,64	3,84
Explanation: Model-4 is selected according to the Akaike Information Criteria.				

Annex A.2. Results of the Johansen Cointegration Test (Variables: LINEXD - LINGDP)

H_0 Hypothesis	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
r = 0	15,08	15,49	12,47	14,26
r ≤ 1	2,63	3,84	2,68	3,84
Explanation: Model-3 is selected according to the Akaike Information Criteria.				

Annex A.3. Results of the Johansen Cointegration Test (Variables: LSAEXD - LSAGDP)

H_0 Hypothesis	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
r = 0	21,64	25,87	17,69	19,38
r ≤ 1	5,37	12,51	5,37	12,51

Explanation: Model-4 is selected according to the Akaike Information Criteria.

Annex B. Results of the Variance Decomposition

Annex B.1. Results of the Variance Decomposition (Variables: LBEXD - LBGDP)

Period	Vaiance Decomposition of LBEXD		Vaiance Decomposition of LBGDP	
	LBEXD	LBGDP	LBEXD	LBGDP
1	100.0000	0.000000	0.420034	99.57997
2	99.63029	0.369712	0.380770	99.61923
3	96.39114	3.608864	1.156364	98.84364
4	88.52319	11.47681	2.224971	97.77503
5	77.06380	22.93620	3.316590	96.68341
6	64.87372	35.12628	4.318009	95.68199
7	54.24056	45.75944	5.193861	94.80614
8	45.94933	54.05067	5.943055	94.05694
9	39.81644	60.18356	6.577722	93.42228
10	35.35465	64.64535	7.113729	92.88627

Annex B.2. Results of the Variance Decomposition (Variables: LIEXD - LIGDP)

Period	Vaiance Decomposition of ΔLIEXD		Vaiance Decomposition of ΔLIGDP	
	ΔLIEXD	ΔLIGDP	ΔLIEXD	ΔLIGDP
1	100.0000	0.000000	0.008179	99.99182
2	95.81557	4.184433	2.570195	97.42980
3	93.73866	6.261340	4.146184	95.85382
4	92.88721	7.112794	4.847951	95.15205
5	92.54313	7.456874	5.141331	94.85867
6	92.40305	7.596950	5.262481	94.73752
7	92.34565	7.654347	5.312421	94.68758
8	92.32205	7.677951	5.333009	94.66699
9	92.31233	7.687674	5.341500	94.65850
10	92.30832	7.691683	5.345002	94.65500

Annex B.3. Results of the Variance Decomposition (Variables: LINEXD - LINGDP)

Period	Vaiance Decomposition of ΔLINEXD		Vaiance Decomposition of ΔLINGDP	
	ΔLINEXD	ΔLINGDP	ΔLINEXD	ΔLINGDP
1	100.0000	0.000000	0.235810	99.76419
2	99.92613	0.073867	0.433851	99.56615
3	99.90843	0.091572	0.481337	99.51866
4	99.90482	0.095177	0.491027	99.50897
5	99.90411	0.095892	0.492950	99.50705
6	99.90397	0.096033	0.493329	99.50667
7	99.90394	0.096061	0.493404	99.50660
8	99.90393	0.096066	0.493419	99.50658
9	99.90393	0.096067	0.493422	99.50658
10	99.90393	0.096067	0.493422	99.50658

Annex B.4. Results of the Variance Decomposition (Variables: LTEXD - LTGDP)

Period	Vaiance Decomposition of ΔLTEXD		Vaiance Decomposition of LTGDP	
	ΔLTEXD	LTGDP	ΔLTEXD	LTGDP
1	100.0000	0.000000	9.700277	90.29972
2	99.97259	0.027405	5.188608	94.81139
3	99.93629	0.063711	3.564015	96.43598
4	99.89886	0.101143	2.736562	97.26344
5	99.86166	0.138338	2.233528	97.76647
6	99.82491	0.175087	1.895020	98.10498
7	99.78864	0.211363	1.651615	98.34839
8	99.75283	0.247166	1.468173	98.53183
9	99.71750	0.282502	1.324974	98.67503
10	99.68262	0.317377	1.210092	98.78991

Annex B.5. Results of the Variance Decomposition (Variables: LSAEXD - LSAGDP)

Period	Vaiance Decomposition of ΔLSAEXD		Vaiance Decomposition of ΔLSAGDP	
	ΔLSAEXD	ΔLSAGDP	ΔLSAEXD	ΔLSAGDP
1	100.0000	0.000000	3.36E-07	100.0000
2	99.99289	0.007108	0.320605	99.67940
3	99.90372	0.096277	12.35478	87.64522
4	99.88428	0.115721	14.62164	85.37836
5	99.88085	0.119146	15.12599	84.87401
6	99.88073	0.119272	15.14121	84.85879
7	99.88071	0.119288	15.14319	84.85681
8	99.88071	0.119292	15.14340	84.85660
9	99.88070	0.119295	15.14373	84.85627
10	99.88070	0.119296	15.14381	84.85619

Annex C. Generalized Impulse-Response Functions