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Relationship with External Debt Burdens and Economic Growth in Turkey: Causality Analysis Between 1970-2017*

Türkiye'de Dış Borç Yükümlükleri ile Ekonomik Büyüme İlişkisi: 1970-2017 Dönemi Nedensellik Analizi

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Abstract: In this study, we examined the relationship between Turkey's external debt burdens and economic growth in three parts. Firstly, the changes in Turkey's foreign debt burden were looked over periodically. Later, some studies which are focus on the effects of external debt on economic growth were examined in the literature. In the last part of the study, causality analyses were conducted to define relationship between economic growth and external debt burdens by using annual data between 1970-2017. In the analysis, the variables of Real GDP ($, Base year 2010), private sector long term foreign debt stock, public sector long term foreign debt stock, short term foreign debt stock and total foreign debt stock were used. After the variables used in the study were made stationary, causality analyses were made among the variables. As a result of the causality analysis, a bidirectional causality was determined between the Real GDP and the long-term external debt stock of the private sector. In other words, the Real GDP and private sector long-term external debt stock mutually affect each other, it means when one increases or decreases, the other increases and decreases. Turkey a dynamic country which have young population and high consumption demand is in need of external debt to finance private sector investment. In addition, a unidirectional causality was determined from Real GDP to all other variables. In other words, the increase in real GDP is the reason for the increase of other foreign debt burdens. It means that when Turkey's economy grow, Turkey's long-term external public debt burden, total short-term external debt burden and total external debt burden are increase.

Structured Abstract: Purpose: Generally, as consumption expenditures are predominant in developing countries, savings are inadequate. Developing countries borrow foreign debt to finance their fixed capital investments and achieve economic growth. Also these countries need external debt to restore macro-economic imbalances after internal or external economic crisis. However, the external debt burden may cause countries to be more affected by global economic crisis or internal economic shocks in the coming periods and countries may pay more costs economically, politically and socially in the future time.

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The relatively low saving rate in Turkey causes the private and public sectors which are striving for investment and growth, to resort to external financing sources. As with many developing countries, the economic difficulties caused by the high foreign debt stock have been the case for Turkey time to time. The main purpose of the study is to investigate the impact of different foreign debt burdens on economic growth. Because of that Granger causality tests were conducted between different external debt burdens and economic growth.

Methodology

In the study, Granger causality analysis was carried out using annual data between 1970-2017 using real GDP, which represents economic growth with different external debt burdens. Granger causality test is often used when questions the existence and direction of the relationship between economic variables in the literature. In the study, granger causality tests were conducted to determine whether is there any causality relationship between Real GDP which represents economic growth and other variables represents different external debt burdens and also determine the direction of causality. In the analysis, the variables of Real GDP ($, Base year 2010), private sector long term foreign debt stock, public sector long term foreign debt stock, short term foreign debt stock and total foreign debt stock were used. After the variables used in the study were made stationary, causality analyzes were made among the variables.

Conclusion

In this study firstly, the changes in Turkey's foreign debt burden were looked over periodically. Later, studies which are focus on the effects of external debt on economic growth were examined in the literature. In the last part of the study, causality analyses were conducted to question the relationship between economic growth and external debt using Real GDP (base year 2010), private sector long-term foreign debt stock, public sector long-term foreign debt stock, short-term foreign debt stock and total foreign debt stock variables. In this respect, the study differs from the studies that address the economic growth and external debt relationship in the literature. The data set of the study covers the period 1970-2017.

As a result of the first causality analysis which conducted in study, a bidirectional causality was determined between the real GDP and the long-term external debt stock of the private sector. In other words, the real GDP and private sector long-term external debt stock mutually affect each other, it means when one increases or decreases, the other increases and decreases. Turkey a dynamic county which have young population and high consumption demand is in need of external debt to finance private sector investment. According to another finding from the study, a unidirectional causality was determined from real GDP to all other variables. In other words, the increase in real GDP is the reason for the increase of other foreign debt burdens. So in the period of Turkey’s economy grew, Turkey's long-term external public debt burden, total short-term external debt burden and total external debt burden are increase.

All analysis of the study was evaluated together and reached following conclusions. Turkey which is striving for economic growth, the private sector tries to invest in production and fixed capital in order to achieve economic growth. In this process, the private sector is unable to find domestic financing due to lack of savings, so it goes to foreign borrowing. Therefore, we can say in Turkey when economy grow, long-term private sector debt stock increases. Or we can say when the long-term private sector foreign debt stock increases, economic growth occurs in Turkey. As a chain process during periods of economic growth in Turkey, long-term public debt burden, short-term total debt burden and total external debt burden increase due to economic growth. This situation does not create a significant difficulty for Turkey during periods where it is possible to access external debt or when the cost of borrowing is appropriate (cheap money period). However, it can lead to troubled processes for Turkey during times when it is difficult to find external debt.

In this sense for Turkey, both economic and political stability is important in terms of borrowing costs. Furthermore, it is obvious that the healthiest source of foreign financing which supporting economic growth is foreign direct investment. Political and financial stability is also important in terms of attracting foreign direct investment. As is known, high inflation leads to higher interest rates and reduced investments to increase the cost of financing. In this context, the Central Bank of the Republic of Turkey should continue its inflation targeting policy decisively.

Keywords: Economy, Real GDP, External Debt Stock, Private Sector External Debt Stock, Public External Debt Stock, Unit Root Test, Causality Analysis

Öz: Türkiye'de dış borç yükümlükleri ile ekonomik büyüme arasındaki ilişkiyi incelediği bu çalışma üç bölümden oluşmaktadır**.** Çalışmada ilk olarak Türkiye'nin dış borç yükündeki değişimler dönemsel olarak incelenmiştir. Daha sonra literatürde yer alan dış borcun ekonomik büyüme üzerindeki etkilerine sorgulayan bazı çalışmalar incelenmiştir. Çalışmanın son bölümünde 1970-2017 yılları arasındaki yıllık veriler kullanılarak ekonomik büyüme ile dış borç yükleri arasındaki ilişkiyi belirlemek için nedensellik analizleri yapılmıştır. Analizde Reel GSYH ($, Baz yıl 2010), özel sektör uzun vadeli dış borç stoku, kamu kesimi uzun vadeli dış borç stoku, kısa vadeli dış borç stoku ve toplam dış borç stoku değişkenleri kullanılmıştır. Araştırmada kullanılan değişkenler durağan hale getirildikten sonra değişkenler arasında nedensellik analizleri yapılmıştır. Nedensellik analizi sonucunda Reel GSYH ile özel sektörün uzun vadeli dış borç stoku arasında çift yönlü bir nedensellik belirlenmiştir. Diğer bir deyişle Reel GSYH ve özel sektör uzun vadeli dış borç stoku karşılıklı olarak birbirini etkilemektedir yani biri arttığında veya azaldığında diğeri artıp azalmaktadır. Türkiye genç nüfusa ve yüksek tüketim talebine sahip dinamik bir ülke özel sektör yatırımlarını finanse etmek için dış borca ihtiyaç duymaktadır. Yapılan diğer nedensellik analizlerinde Reel GSYH'den diğer tüm değişkenlere doğru tek yönlü bir nedensellik belirlenmiştir. Bir başka deyişle Reel GSYH'deki artışın, diğer dış borç yüklerinin artmasının sebebi olduğu tespit edilmiştir. Bunun anlamı Türkiye ekonomisi büyüdüğünde Türkiye'nin uzun vadeli dış kamu borç yükü, toplam kısa vadeli dış borç yükü ve toplam dış borç yükü artmaktadır.

Anahtar Kelimeler: Ekonomi, Reel GSYİH, Dış Borç Stoku, Özel Sektör Dış Borç Stoku, Kamu Dış Borç Stoku, Birim Kök Test, Nedensellik Analizi

Introduction

Countries have recourse to external debts to achieve economic growth and/or restate macroeconomic imbalances which is caused from internal or external originated economic crisis. The main reason to call for external debts in such circumstances is the lack of domestic savings. Generally, because of consumption expenditures are predominant in developing countries savings remain insufficient. The countries striving to economic growth become obliged to external sources to finance their fixed capital investments. Hence external debt burden makes these countries more vulnurable towards global economic crises or internal economic problems which causes deepining of economical, political and social outcomes of these.

Turkey’s relatively low ratio of savings, leads its public and private sectors which targets new investments and growth to resort external financial resources. As in many other developing countries, high external debt burden leads several economical problems also for Turkey. The main objective of this study is to examine the effect of different external debt burden on economic growth. For this purpose, causality tests between different external debt burdens and economic growth were conducted.

In this study, periodical alterations in Turkey’s external debt burden were mentioned firstly. Then, some studies regarding the effects of external debts on economic growth in literature were mentioned. In the last part, a causality test between economic growth and external debt were conducted using the variables of 2010 based real GDP, the long term private sector external debt burden, the long term public sector external debt burden, short term external debt burden and total external burden to investigate the ralationship between economic growth and external debt. In this respect, this study presents originality from those studies which exemine relationship between economic growth and external debt. Because in the literature, the relationship between foreign debt growth is generally questioned by using macroeconomic variables such as totoal dept/export ratio, inflatin, interest rate and exchange rate. The study covers 1970-2017 period because of we able to reached whole variable in this period.

1. The Historical Change in Turkey's Foreign Debt Burden

The first external debt burden of Turkey inherited from the Ottoman Empire. The Empire resorted to external debt after the Crimean War. The first foreign debt was borrowed from England and France in 1854 (Şahin, 2002: 25). Because of payment difficulties of debt borrowed added to challenge which experienced by the Ottoman Empire over long periods and the lack of capital the Duyun-u Umumiye-i Osmani (General Directorate of Debts) was established (Karluk, 2002: 152). The Düyun-u Umumiye-i Osmani was the regulator for the payment of the debts of the Ottoman Empire. After the founding of the Republic of Turkey, an agreement regarding the rebimbursments of debts inherited from the Empire has been signed between the lenders and Turkey on June 13th 1928. The agreement dictated reimburstment 62% of the debts which procured before 1912 and 76% for the debts procured after that year. Republic of Turkey fully paid the inherited depts in 1954. Hence, external debt burden which started in 1854 was concluded after a century (Küçük & Ertüzün, TDV İslâm Ansiklopedisi).

The Great Depression occurred between the years 1929-1936, has led to major economic problems in the all over world as well as Turkey. Two major indications to this are the depreciation of the Turkish Lira and foreign deficit because of collapsed prices of leading export goods such as wheat and grains (Duman, 2013: 215). One of the economic measures taken by the government during this period is the establishment of the Central Bank of the Republic of Turkey. On 30 June 1930, the Central Bank of the Republic of Turkey was established by law No. 1715.

Between 1923 and 1938, the Republic of Turkey took on foreign debt to finance its investments. With this purpose, he went to borrow $ 10 million from the United States for the purpose of “economic apparatus” and $ 8 million from the Soviet Union for investments in the “first 5-year development plan”. During this period, Turkey finally borrowed £ 16 million from the UK in 1938 (Korkmaz, Yeniçağ Gazetesi).

In the early 1930s, the Soviet Union began to draw the Turkish republic to its side, which began to converge with Western Countries. In this context, pri-minister İsmet İnönü was invited to Moscow and visited a number of factories that produces fabrics, automotive, weaponary and aviation at Moscow and Leningrad under a study trip. During the Moscow talks, an 8-million-dollar, interest-free repayment loan was opened to Turkey by the Soviet Union. The loan protocol was signed in Ankara on 21 January 1934 (Ertem, 2013:160).

One of the critical developments occured in this period was the first five-year industrial plan which was implemented in 1934-1939 period. In fact, these studies began in 1929 when the government gave the Ali İktisat Meclisi (Ali Economy Assembly) the task of preparing an economic report. Rapprochement with Moscow in this period paved the way of planned economy. The documents “Sınai Tesisat ve İşletme ve Vekâlet Teşkilatına İlaveler Hakkında Raporlar-(Reports on industrial installations and operations and additions to the power of attorney)” submitted by the Ministry of Economy to the Government in 1933 were later referred to as “The First Five-Year Industrial Plan” (Yücel, 2014:26).

External debt burden of Turkey increased dramatically after 1950. In 1950s, deficit on balance of payment were financed mainly by the external debts. External debt burden of Turkey increased dramatically as much as 410% between 1930 and 1960. During the periods of the 5-year development plans which defined as the “The period of planned economy” the use of external borrowing continued due to lack of internal savings and ongoing capital investments. These outsourcing uses have often been in the form of consortium loans. The “Consortium for assistance to Turkey” was established on 12 July 1962 by the Organization for Economic Cooperation and Development (OECD) to determine the amount of investments to be made during this period when the State Planning Organization was established and 5-year development plans were made. Between 1962-69, 85% of outsourced loans were consortium sourced. An important disadvantage

in terms of financing investments in the planned period is the world oil crises, which began in the early 1970s and were felt until the early 1980s. As a result of these disadvantages, Turkey's external debt for 1974 alone was 359 million dollars. Three seperate external debt renegotiations had been signed by the end of 1970's which comprised $5,5 billion in total (Adıyaman, 2006:26-27).

Turkey take first credit from IMF in 1961 due to due to payment difficulties it faced in the late 1950s. 19 separate standby agreements were signed between Turkey and IMF between 1961-2005. Total credit amount reached to 32.817. million SDR, 30.314 million SDR of credit which is equal to 92.37% of the total was procured by 3 seperate standby agreement signed after 1999 (Özçelik, Konya Ticaret Odası). Turkey cleared her debt to IMF in 2013.

The stagflation period that followed the "oil crisis" in the 1970s and the "Cyprus Peace Operation" in 1974 led to an increase in Turkey's foreign debt requirements (Akdiş, 2003: 69). As a result of all these developments, Turkey found itself in a very large debt crisis in mid-1977. During this period, consolidation of debts with lenders took a long time (Celasun & Rodrik, 1989: 195-196). Turkey has implemented some economic stabilization programs in order to exit the current crisis, but could not obtain the expected success. When the economic programs which had been declared in 1978 and 1979 could not solve the reimbursement problem, a novel economic program, which included radical changes, was initiated on January 24th 1980. New model which introduced at January 24th 1980 declaration had enabled Turkey to reach external sources easier (Kepenek & Yentürk, 2005: 206).

After 1980, the adoption of an export oriented industrialization policy instead of import substitution policies, liberalisation of foreign trade, promotion of exports and radical change in the exchange rate system let Turkey adopt international financial system and facilitated external sourcing.

Restructing of debts following 1978 debt crisis, Turkey's external debt ratio inreased 56% from 28% in total outcome by the end of 1986. Hence, Turkey's total external debt burden ratio reached up to the level of Latin American countries. In 1986, Turkey's external debt reached an even higher level than the average of the group of countries with high external debt listed in the IMF (Wijnbergen, Anand, Chhibber & Rocha, 1992: 4).

Turkey's integration into the global goods market commenced after 1980. This process was followed by liberalisation of national financial markets and integration into global financial markets in 1989-1990. These developments led an outward-oriented cohesion process. Adopted economy policies and growth process that emmerged after 1989, created a loop between foreign capital inflow – economic growth - current account deficit (Yeldan, 2001:30-37). In this period, private commercial resources (bond issues, syndicated loans, etc.) started to come to the fore in order to finance consolidated budget deficits which arising from the public deficits. In addition to the bond issue, which was used extensively in foreign borrowing, syndicated loans were used with bilateral and multilateral sources. In the 1990s, outsourcing started to be undertaken by the private sector as well. Private sector tried to find external debt by using short, medium and long term funds (Bal, 2001: 219).

As a result of the financial liberalization implemented, there have been increases in public sector spending with the development of external borrowing opportunities. In addition, in parallel with expansionist monetary and fiscal policies, public sector deficits have increased (Sakal, 2003: 186). Implemented capital inflow policy (Hot ooney inflow) by the Central bank of Turkey in 1990 has led to a deficit in current account. In 1994, public sector's high requirement of external funding and a simultaneus decrease in the interest rates provoked high dolarization and a huge devaluation of Turkish Lira. International trader firms bankrupted due to 170% increase of exchange rates. Sunk credits also expanded dramatically in this period (Kazgan, 2002: 5). In order to overcome this

situation, a package of measures called "5 April stability decisions" was put into effect in 1994. 5 April stability measures have been successful for a shart time period. A decrease in external debt stock occurred for a short time and a decrease in the ratio of short-term debt/total debt was observed. However, in 1995 another increase in demand for short term external debts from commercial banks led an increase external debts (Ünsal, 2004: 99).

In 1996-1997, public expenditures were reduced in order to balance the budget and decrease budget deficit. But during the same years the Asian financial crisis ignited in 1998-2000 which spread to Russia subsequently. The Asian financial crisis began to affect Turkey in 1998 and caused a significant decrease in capital movements by June 1999. A decrease in capital movements and a decrease in exports forced Turkey into a stand-by agreement with the IMF in 1999 (Koyuncu & Tekeli, 2010: 125).

Macroeconomic instability, caused by public sector imbalances, high debt burdens and high inflation after mid-2000, has been exacerbated by concerns about financing the current account deficit. During November 2000 and February 2001, structural problems in the banking sector led to deepening crises and eventually turning into a systemic banking crisis (BDDK, 2010:1-5). New regulations brought difficulties to the external financing for the banks in November 2000. Although the economic difficulties were considered to have partially improved, the debate between the" prime minister "and the" president " in February 2001 led to speculative movements, and then currency problems began. In order to reassure markets, ensure economic stability and restructure the economy, the so-called " Güçlü Ekonomiye Geçiş Programı- Transition to a Strong Economy Program" was implemented with an agreement with the IMF (Ay & Karaçor, 2006: 71-72). An additional $8 billion credit was released by the IMF in order to support Turkey's "Transition Program to a Strong Economy" (BDDK, 2001: 6). Throughout the crisis, the Turkish financial system had to reimburst her short-term external debt while increasing her total external debt obligations and IMF debt burden (Yeldan, 2002: 9). Table 1 shows Turkey's net External debt and her net external debt ratio to her GDP since 2001.

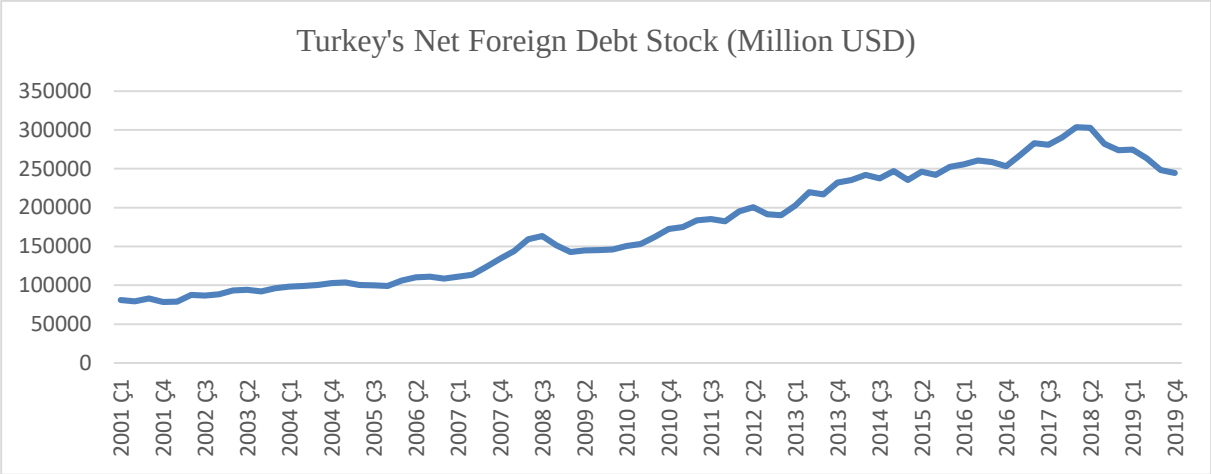
Table 1: Turkey Net Foreign Debt Stock (2001-2019 Period)

Period	Net external debt stock of Turkey (US $ Million)	Turkey's net external debt stock / GDP (%)	Period	Net external debt stock of Turkey (US $ Million)	Turkey's net external debt stock / GDP (%)
2001 Ç1	80,868	29.9	2010 Ç3	162,149	22.0
2001 Ç2	79,305	31.5	2010 Ç4	172,422	22.3
2001 Ç3	83,211	36.8	2011 Ç1	175,014	21.9
2001 Ç4	78,509	39.1	2011 Ç2	183,449	22.1
2002 Ç1	78,835	40.6	2011 Ç3	185,168	22.0
2002 Ç2	87,619	42.4	2011 Ç4	182,359	21.9
2002 Ç3	86,583	39.6	2012 Ç1	194,965	23.4
2002 Ç4	88,451	37.4	2012 Ç2	200,517	24.2
2003 Ç1	93,405	38.3	2012 Ç3	191,399	22.7
2003 Ç2	94,283	36.6	2012 Ç4	189,981	21.8
2003 Ç3	92,254	32.0	2013 Ç1	202,398	22.4
2003 Ç4	96,189	30.7	2013 Ç2	219,818	23.6
2004 Ç1	98,139	28.5	2013 Ç3	217,088	22.9
2004 Ç2	98,981	27.1	2013 Ç4	232,150	24.4
2004 Ç3	100,249	26.2	2014 Ç1	235,356	25.1
2004 Ç4	102,974	25.6	2014 Ç2	241,993	26.1
2005 Ç1	103,710	24.6	2014 Ç3	237,560	25.5
2005 Ç2	100,466	22.6	2014 Ç4	246,855	26.4
2005 Ç3	99,903	21.1	2015 Ç1	235,289	25.2
2005 Ç4	98,995	19.8	2015 Ç2	246,151	26.9
2006 Ç1	106,105	20.6	2015 Ç3	241,996	27.3
2006 Ç2	110,394	20.9	2015 Ç4	252,412	29.3
2006 Ç3	111,244	20.8	2016 Ç1	255,680	30.1
2006 Ç4	108,405	19.8	2016 Ç2	260,624	30.4
2007 Ç1	111,022	19.8	2016 Ç3	258,668	30.2
2007 Ç2	113,503	19.3	2016 Ç4	253,317	29.4
2007 Ç3	123,532	19.7	2017 Ç1	267,651	31.6
2007 Ç4	133,990	19.8	2017 Ç2	282,887	33.9
2008 Ç1	144,166	19.9	2017 Ç3	280,740	33.2
2008 Ç2	159,204	20.8	2017 Ç4	290,244	34.0
2008 Ç3	163,525	20.4	2018 Ç1	303,287	34.3
2008 Ç4	151,392	19.5	2018 Ç2	302,501	34.2
2009 Ç1	142,875	19.8	2018 Ç3	282,180	33.7
2009 Ç2	144,665	21.3	2018 Ç4	273,649	34.7
2009 Ç3	145,076	22.7	2019 Ç1	274,637	36.4
2009 Ç4	146,049	22.6	2019 Ç2	263,685	36.5
2010 Ç1	150,795	22.2	2019 Ç3	248,331	33.8
2010 Ç2	153,288	21.7	2019 Ç4	244,643	32.5

Source: T.C. Ministry of Treasury and Finance, Foreign Debt Statistics Of Turkey

After the devaluation of the 2001 crisis and the IMF resources used with The Transition to a Strong Economy Program, the increase in exports in 2002 put the economy in the recovery process. As a result of this developments the annual growth rate in economy was 7,9 % in 2002. Although there was an increase in exports and economic growth in general until the Mortgage crisis, an increase in the foreign debt stock was observed, as foreign borrowing was maintained due to balance of payments deficits. As shown in Table 1, in the third quarter of 2008, the net external debt stock exceeded $163 billion.

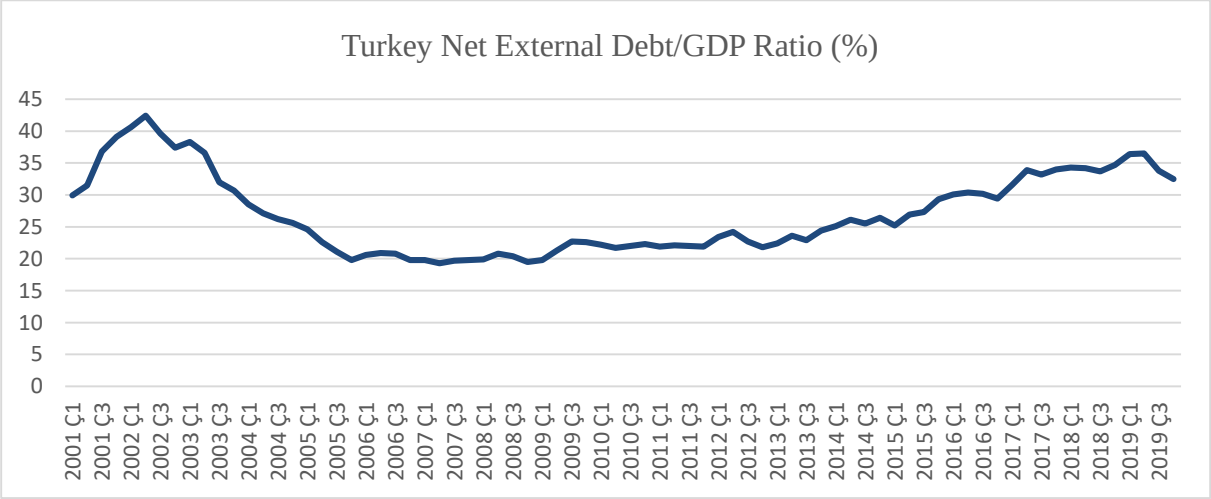
Chart 1: Change In Turkey's Net Foreign Debt Stock (Period 2001-2019)



Source: Chart 1 was produced using data from Table 1

However, Turkey's net foreign debt stock/GDP (%) ratio was 20% in the 2008 crisis. However, Turkey's net foreign debt stock/GDP (%) ratio was 20% in the 2008 crisis. In the following years, this ratio gradually increased and reached 36.5% in the second quarter of 2019, the highest ratio after the 42.4% experienced in the 2002 crisis. After the second quarter of 2019, this rate decreased slightly to 32.5% as of the end of 2019. As of the end of 2019, Turkey's net foreign debt stock reached approximately $ 245 billion. In the 2010s, the share of the public sector in the external debt stock decreased, however, the share of the private sector increased.

Chart 2: Turkey Net External Debt/GDP Ratio (%) (Period 2001-2019)



Source: Chart 2 was produced using data from Table 2

3.Literature

No consensus has been detected in the examined literature regarding the relationship between Turkey's external debt and growth. It is believed that the different results in the studies are caused by differences in the periods studied, differences in the variables used, and differences in the methods of analysis used. Some of the recent studies in the literature are included in this section.

Karagöl examined effects of debt service and long term capital inflow on the growth, between 1960-1996 period. In the study, The Simultaneous Equation Model was used and it was found that the direct impact of the external debt service on economic growth was negative. In addition, study shows external debts has greater indirect positive effects on the growth then its direct effects (Karagöl, 2002: 63-64).

Javed and Şahinöz investigated the impact of foreign debt stock on investments, exports and growth using data from the 1983-2002 period of the Turkish economy. Regression analysis indicates that an increase in the external debt stock has a negative effect on investments while having a positive effect on the exports. In the study, the effect of external debt on economic growth was positive and insignificant. Therefore, In the study it is stated that external debts have no effect on the economic growth (Javed & Şahinöz, 2005: 366).

Ipek and Yaşar investigated the relationship between external debts and economic growth using cointegration and causality tests. The first result from the study is that there is a bi-directional causality between external debt and economic growth in Turkey in the short and long term. Another finding from the study is that the direction of the relationship between external debt and economic growth over the long term is negative. In other words, external debst have a negative effect on the economic growth in the long term (İpek & Yaşar, 2008: 22).

In a study conducted by Çapık and Kösekahyaoğlu in 2019, the relationship between growth and external debt in Turkey was analyzed using 1985-2018 period data. The Toda-Yamamoto causality test was used in study. The outcomes of the causality test are as follows: no causality were detected between external debt and economic growth; a unidirectional causality exists from growth and external debt stock towards labor force, finally exsistence of a unidirectional causality from external debt stock toward exports has been detected.

Güdal and Yavuz (2013) investigated the realtionship between external debt and economic growth for 1990-2103 period. In this study Gregory-Hansen Cointegration Test and Hatemi-J Casualty test were conducted for the purpose. Analysis shows an existence of cointegration between the variables. Also a unidirectional causality from economic growth toward external debt has been identified. According to the long-term coefficient estimation result based on causality analysis, it has been determined that a 1% increase in economic growth has a positive 0.0013%. effect on the foreign debt.

In a 2011 study which conducted by Çöğürcü and Çoban (2011); the realationship between external debt and economic growth was investigated using the variables of GDP, external trade ratio to GDP, fixed capital invetment ratio to GNP, population growth rate external debt stock ratio to GNP, budget sum of Ministry of Education and High Education Board ratio to total consolidated budget. In the study, the Johansen cointegration test and by using least squares method a regression analysis was performed. According to the analysis, it was concluded that external debts and the rate of population growth in Turkey have a negative impact on economic growth. Authors report that, investments should be funded with internal sources through increasing domestic savings and decreasing the requirement for external sources in order to ensure economic growth.

Öztürk and Çınar (2018) examined the relationship between Turkey's external debt and economic growth for 1975-2016 term in a 2018 study using unit root test, Granger cointegration test along with DOLS to forecast long term coefficients in particular. GDP per capita is used as dependent variable while independent variables are floating rate external debts stock rate to GDP, gross national savings rate to GDP and consumer price index. Cointegration test conducted in the study shows existance of a long term relationship among economic growth, external debt, savings and inflation. DOLS test indicated a significant positive relationship between external debt and economic growth along with a significant negative relationship among savings, inflation and growth. Study reports external debt contributes growth; and determined that a 1unit increase in external debt contibutes GDP as 0.632677 unit.

In another study, Özdemir, Gündüz and Çelikay (2020) investigated the effect of public debt burden on economic growth both in short and long terms. Study dataset includes 2000-2017 period from 52 countries classified by World Bank in terms of development level. Study reports that short term shifts in external debt burden have no effect on the economic growth for low income countries; though 1 unit of change in external debt burden causes 0,6% decrase on growth in long term. On the other hand, for the countries that classified under other level of income groups, a shift in external debt burden has a negative effect on growth just for the short term.

Turhan (2020) studied the effect of Turkey's public debt on economic growth. ARDL analysis shows that public total debt does not have a significant effect on economic growth in the long run while it has a negative impact in the short run. Also it is informing that public external debt has a significant and positive (negative) effect on economic growth rate in the long (short) run.

4. Data Set and Analysis

In this study, the relationships between real GDP (base year 2010) which represent economic growth and private sector long-term external debt stock, public sector long-term external debt stock, short-term external debt stock and total external debt stock was analyzed by the Granger causality test using annual data for the 1970-2017 period.

4.1. Method

A stationary time series is one whose statistical properties such as mean, variance, autocorrelation, etc. are all constant over time. It means if the expected value, variance, and covariance of a series are independent of time, that is, if the series fluctuates around its expected value, this series is a stationary series. Most econometric methods assume that the time series able to make approximately stationary through the use of mathematical transformations. Non-stationary series can cause a spurious regression problem.

A test of stationarity (or nonstationarity) that has become popular over the past several years is the unit root test. Let's explain it. The starting point is the unit root (stochastic) process.

$$\mathbf{Y_t = \rho Y_{t-1} + ut} \qquad -1 \leq \rho \leq 1 \qquad \text{(Eq. 1)}$$

where (ut) is a white noise error term.

We know that if $\rho = 1$, that is, in the case of the unit root, (Eq. 1) becomes a random walk model without drift, which we know is a nonstationary stochastic process. Therefore, why not simply regress Yt on its (oneperiod) lagged value Y_{t-1} and find out if the estimated ρ is statistically equal to 1?

If it is, then Yt is nonstationary. This is the general idea behind the unit root test of stationarity. For theoretical reasons, we manipulate (Eq. 1) as follows: Subtract Y_{t-1} from both sides of (Eq. 1) to obtain:

$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + ut$
$= (\rho - 1) Y_{t-1} + ut$

which can be alternatively written as:
$\Delta Y_t = \delta Y_{t-1} + ut$

In this model, the stability of the Y_t series has now become dependent on the state of (δ). Dickey and Fuller (1979) test the following hypotheses.

When H_0: $\delta = 0$ $\rho = 1$, the series is not stationary.

When H_1: $\delta < 0$ $\rho < 1$, the series is stationary.

The Dickey and Fuller (DF) test is estimated in three different forms, that is, under three different null hypotheses.

$$\mathbf{\Delta Y_t = \delta Y_{t-1} + ut} \quad \text{(Eq. 2)}$$
$$\mathbf{\Delta Y_t = \beta_0 + \delta Y_{t-1} + ut} \quad \text{(Eq. 3)}$$
$$\mathbf{\Delta Y_t = \beta_0 + \beta_{1t} + \delta Y_{t-1} + ut} \quad \text{(Eq. 4)}$$

The Augmented Dickey–Fuller (ADF) Test

In conducting the DF test as in (Eq.2), (Eq.3), or (Eq.4), it was assumed that the error term u_t was uncorrelated. But in case the u_t are correlated, Dickey and Fuller have developed a test, known as the Augmented Dickey–Fuller (ADF) test. This test is conducted by "augmenting" the preceding three equations by adding the lagged values of the dependent variable ΔYt . To be specific, suppose we use (Eq. 4). The ADF test here consists of estimating the following regression (Gujarati, 2004: 817).

$$\mathbf{\Delta Y_t = \beta_0 + \beta_{1t} + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + u_t} \quad \text{(Eq. 5)}$$

In the ADF test method, the lag length of the dependent variable was added to the model as independent variables. The lag length is provided by the Akaike and Schwarz criteria. In the Model, (m) is the optimum delay length. It is known as the value for which the AIC or SIC criteria are the smallest. The equation of the model is given below (Gujarati, 2005: 720).

The hypotheses of ADF test are as follows.

When H_0: $\delta = 0$ $\rho = 1$, the series is not stationary.

When H_1: $\delta < 0$ $\rho < 1$, the series is stationary.

Granger Causality Test

The Granger causality test is a statistical hypothesis test for determining whether one-time series is useful in forecasting another, first proposed in 1969 (Granger, 1969: 424-438). In the literature, the Granger causality test is often used when the existence and direction of the relationship between economic variables are questioned. In the study, Granger causality test was conducted first to determine whether there is a causality relationship between real GDP which

represents economic development and different external debt burdens and second the direction of causality. In the Ewies programme real GDP and other variables were analyzed in pairs. There is no dependent - undependent variable distinction. The causal effect of all variables with each other is analyzed simultaneously.

The Granger causality test is performed using the following models.

$$X_t = \sum_{i=1}^{m} \alpha_i X_{t-i} + \sum_{j=1}^{m} \beta_i Y_{t-i} + u_t \quad \text{(Eq. 6)}$$

$$Y_t = \sum_{i=1}^{m} \theta_i X_{t-i} + \sum_{i=1}^{m} \gamma_i X_{t-i} + v_t \quad \text{(Eq. 7)}$$

In equation 6, if adding delayed values of Y to the equation of X increases the predictive performance of X, Y is called the cause of X.

Ho: $\beta i = 0$ for all (i). So there is no causal relationship from Y to X.

Ho: $\beta i \neq 0$ for all (i). So there is a causal relationship from Y to X.

In equation 7, if adding delayed values of X to the equation of y increases the predictive performance of Y, X is called the cause of Y.

Ho: $\gamma_i = 0$ for all (i). So there is no causal relationship from X to Y.

Ho: $\gamma_i \neq 0$ for all (i). So there is a causal relationship from X to Y.

If $\beta i \neq 0$ and $yi \neq 0$, they both affect each other. There is a two-way causal relationship between variables. It means there is bidirectional causality between variables (Göçer,2015:271-272).

4.2. Findings and Comments

In time series models, it is necessary to know whether the stochastic process changes depending on time. If the nature of the stochastic process changes over time, that is, if the series is not stationary, the autocorelations deviate significantly from zero, or move away from zero as delays increase, or spurious regression problem occurs (Kutlar, 2009: 262). A unit root test was applied to the variables used in the study in order to prevent the spurious regression problem which encountered in non-stationary time series and to determine the stationarity of the series. Test results are shown in Table 2. In the table, Real GDP is symbolized as (Y1), Long-Term Private Sector External Debt Stock is symbolized as (X1), Long-Term Public External Debt Stock is symbolized as (X2), Short-Term Total Debt Stock is symbolized as (X3), Total External Debt Stock is symbolized as (X4).

Table 2: ADF Unit Root Test Results

Level		X_1	X_2	X_3	X_4	Y_1
Intercept	t Statistics	1.7469	-0.3677	0.2213	2.6675	4.8158
	Probability Value (Prob)	0.9996	0.9062	0.9712	1.0000	1.0000
Intercept and Trend	t Statistics	-0.5003	-2.6505	-1.5499	-0.6015	1.5372
	Probability Value (Prob)	0.9800	0.2611	0.7975	0.9743	1.0000
First Differences		d (X_1)	d (X_2)	d (X_3)	d (X_4)	d (Y_1)
Intercept	t Statistics	-4.1994	-5.9098	-5.9819	-4.9586	-4.2252
	Probability Value (Prob)	0.0018	0.0000	0.0000	0.0002	0.0016
Intercept and Trend	t Statistics	-5.2572	-5.8344	-6.1179	-5.8113	-5.8119
	Probability Value (Prob)	0.0005	0.0001	0.0000	0.0001	0.0001

Notes:

1. An implies significance at the 1% level.
2. The lags of the dependent variable used to obtain white-noise residuals are determined using Akaike Information Criterion (AIC).

The ADF test delay length is determined according to the Akaike information criterion. Series (variables) used in study are non-stationary according to ADF test results. Because the calculated test statistic is less than the absolute value of the critical value (Ho hypothesis is accepted) and the probability value (prob) is greater than 0.05 then it is decided that the series is not stationary. Therefore, the first differences of the series were taken. After the first differences were taken, it was decided that the series was stationary at the first difference according to the ADF test, since the absolute statistic is greater than the critical value by absolute value and the probability value is less than 0.05.

4.3. Granger Causality Test Results

In this part of our study, the relationships between Real GDP ($, Base year 2010) which represent economic growth and private sector long-term external debt stock, public sector long-term external debt stock, short-term external debt stock and total external debt stock was analyzed by the Granger Causality Test using annual data for the 1970-2017 period. A Granger Causality Test was conducted separately to determine whether there is a causality relationship between the variables given above and the direction of causality, if any. The results from causality tests and evaluations for these results are given below.

Table 3: Real GDP - Long-Term Private Sector External Debt Stock Granger Causality Test Results

	(f) Statistical Value	Probability Value (Prob)
d (X_1) ⟹ d (Y_1)	5.16436	0.0044
d (Y_1) ⟹ d (X_1)	3.13288	0.0370

As a result of the first Granger causation analysis, a bidirectional causality was determined between Real GDP d(Y1) and Long-Term Private Sector External Debt Stock d(X1). Therefore, the increase in long-term private sector external debt stock increases Real GDP, that is, provides economic growth, on the other hand, the increase in real GDP, that is, economic growth, also increases the long-term private sector external debt stock.

As a result of this analysis, it can be said that the private sector was mainly effective in increasing the foreign debt stock in the period 1970-2017, and the type of borrowing that could a potential problem for the Turkish economy was caused by the long-term foreign debt burden of the private sector.

Table 4: Real GDP - Long-Term Public External Debt Stock Granger Causality Test Results

	(f) Statistical Value	Probability Value (Prob)
d (X_2) ⟹ d (Y_1)	0.19426	0.8242
d (Y_1) ⟹ d (X_2)	3.38118	0.0440

There is a unidirectional causality between Real GDP d(Y1) And Long-Term Public External Debt Stock d(X2) from Real GDP to long-term public debt stock (f statistic greater than 3.5 and probability value less than 0.05). Real GDP is the cause of the long-term public external debt stock. According to this result obtained from the Granger causality test, it can be said that when Real GDP increases, that is, when the economy grows, long-term public external debt stock increases.

Table 5: Real GDP – Short-Term Total Debt Stock Granger Causality Test Results

	(f) Statistical Value	Probability Value (Prob)
d (X_3) ⟹ d (Y_1)	0.46082	0.7639
d (Y_1) ⟹ d (X_3)	3.73842	0.0126

There is a unidirectional causality between Real GDP and Short-Term Total External Debt Stock d(X3) from Real GDP d(Y1) to short-term external debt stock (f statistic greater than 3.5 and probability value less than 0.05). Real GDP is the cause of short-term total external debt stock. According to this result obtained from the Granger causality test, it can be said that when Real GDP increases, that is, when the economy grows, the short-term total external debt stock increases.

Table 6: Real GDP – Total External Debt Stock Granger Causality Test Results

	(f) Statistical Value	Probability Value (Prob)
d (X_4) ⟹ d (Y_1)	1.6873	0.1979
d (Y_1) ⟹ d (X4)	11.9017	0.0000

There is a unidirectional causality between real GDP and Total External Debt Stock d(X4) from real GDP d(Y1) to total external debt stock (f statistic greater than 3.5 and probability value less than 0.05). Real GDP is the cause of total external debt stock. According to this result

obtained from the Granger causality test, it can be said that when Real GDP increases, that is, when the economy grows, the total external debt stock increases.

Results and Recommendations

Granger causality test is often used when questions the existence and direction of the relationship between economic variables in the literature. In the study, granger causality tests were conducted to determine whether is there any causality relationship between Real GDP which represents economic growth and other variables represents different external debt burdens and also determine the direction of causality.

According to the results of the first Granger Causality Analysis conducted in our study, a bidirectional causality relationship was determined between long-term private sector external debt stock and real GDP. In other words, an increase in long-term private sector external debt stock increases real GDP, that is, provides economic growth; an increase in real GDP, which represent economic growth, also leads to an increase in long-term private sector external debt stock. The Turkish economy, which is very dynamic in terms of economic growth with its young population and high consumption demand, is resorting to external borrowing to finance private sector investments.

According to another finding from the study, unidirectional causality was determined from real GDP to all other variables. It means real GDP is the cause of long term public external debt stock, short term gross exterrnal debt stock and total external debt. In other words, the increase in real GDP is the reason for the increase of other foreign debt burdens. So in the period of Turkey's economy grew, Turkey's long-term external public debt burden, total short-term external debt burden and total external debt burden are increase.

When all the analyses performed in the study were evaluated together, the following results were reached. In Turkey as a developing country which is striving for economic growth, the private sector tries to make investment and enlarged capital stock in order to achieve economic growth. In this process, the private sector unable to find domestic financing due to lack of savings, so it goes to foreign borrowing. Therefore, in times of economic growth, private sector's long-term debt stock is growing, or when the long-term private sector foreign debt stock increases, economy is growing. As a chain process during periods of economic growth in Turkey, long-term public debt burden, short-term total debt burden and total external debt burden increase due to economic growth. This situation does not create a significant difficulty for Turkey during periods where it is possible to access external debt or when the cost of borrowing is appropriate (cheap money period). However, it is lead to troubled processes for Turkey during times when it is difficult to find external debt. In this sense for Turkey, both economic and political stability is important in terms of borrowing costs. Furthermore, it is obvious that the healthiest source of foreign financing which supporting economic growth is foreign direct investment. Political and financial stability is also important in terms of low-cost borrowing and foreign direct investment. As it is known, high inflation causes increase in interest rates, increase in financing costs and decrease in investments. In this context, the Central Bank of the Republic of Turkey should continue its inflation targeting policy decisively.

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