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TRIPLE DEFICIT PRESSURE INDEX AND ESTIMATION OF THE FINANCIAL CRISIS: THE CASE OF TURKEY

ÜÇÜZ AÇIK BASKI ENDEKSİ VE FİNANSAL KRİZLERİN TAHMİNİ: TÜRKİYE UYGULAMASI

Murat AKKAYA[1]

1. Doç. Dr., İstanbul Arel Üniversitesi, muratakkaya@arel.edu.tr, https://orcid.org/0000-0002-7071-8662

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Abstract

The main indicators affecting short and longterm macroeconomic stability are budget deficits, current account deficit and savings deficits expressed as savings-investment imbalance. In the literature of Economics and Finance, there are many national and international studies on Twin Deficits Hypothesis. The triple deficit is also the balance of imbalance. The Triple Deficit Hypothesis is based on the relationship between the budget balance expressed as internal balance and the balance of savings and the current account balance representing the external balance. As with twin deficits, triple deficit can cause a financial crisis through many channels. The main purpose of this study is to create a Triple Deficit Pressure Index for Turkey in 1998 - 2019 period. The Speculative Pressure Index developed by Eichengreen et al. (1996) is taken as model to create the Triple Deficit Pressure Index (TPI). Because this model formed the basis for the development of new indices later on. In addition, leading indicators that cause financial crises are investigated using the Triple Deficit Pressure Index. The study proves that Triple Deficit Pressure Index is valid in Turkey. In addition, there is one-way Granger causality for the Trıple Deficıt Pressure Index.

Keywords: Financial Crisis, Tripal Deficit Pressure Index, Modeling, Turkey.

Öz

Kısa ve uzun vadeli makroekonomik istikrarı etkileyen ana göstergelerin bütçe açıkları, cari işlemler açığı ve tasarruf - yatırım dengesizliği şeklinde ifade edilen tasarruf açıkları olduğu İktisat teorilerinde açıkça belirtilmektedir. İktisat ve Finans yazınında ikiz açık üzerine çok sayıda ulusal ve uluslararası çalışma bulunmaktadır. Üçüz açık ise dengesizliğin dengesidir. Üçlü Açık Hipotezi, iç denge olarak ifade edilen bütçe dengesi ile tasarruf dengesi ile dış dengeyi temsil eden cari işlemler dengesi arasındaki ilişkiye dayanmaktadır. İkiz açıklarda olduğu gibi Üçüz açık da bir çok kanal üzerinden finansal krize neden olabilmektedir. Bu çalışmanın ana amacı 1998 - 2019 döneminde Türkiye için Üçüz Açık Baskı Endeksi oluşturulmasıdır. Eichengreen vd. (1996) tarafından geliştirilen Spekülatif Baskı Endeksi Üçüz Açık Basınç İndeksi'ni (ÜBE) oluşturmada model olarak alınmıştır. Çünkü bu model daha sonra yeni baskı endekslerinin geliştirilmesine temel oluşturmuştur. Çalışma sonucunda Üçüz Açık Baskı Endeksi'nin Türkiye'de geçerli olduğu sonucuna varılmıştır. Ayrıca analiz sonuçlarına göre, İmalat Sanayi Kapasite Kullanım Oranı ve Sanayi Üretim Endeksi'nden Üçüz Açık Baskı Endeksi'ne doğru tek yönlü Granger nedenselliği bulunmaktadır.

Anahtar Kelimeler: Finansal Kriz, Üçüz Açık Baskı Endeksi, Modelleme, Türkiye.

GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı

Türkiye'de ve uluslararası alanda yapılan çalışmalar İkiz ve Üçüz Açık hipotezlerinin geçerliliği ve bu açıkları etkileyen faktörler üzerinedir. İktisat ve Finans alanında üçüz açıkların ekonomiler üzerinde geçerliliği belirlenmesine rağmen üçüz açıkların yarattığı finansal ve ekonomik baskıların takibi üzerine herhangi bir endekse rastlanılmamıştır. Bu çalışmanın ana amacı yazında karşılaşılan finansal baskı endeksi, kırılganlık endeksi veya dalgalanma endeksi benzeri bir endeksin oluşturulması ve bu endeksin Türkiye'de geçerliliğinin test edilmesi ve finansal krizlerin tahmininde öncü gösterge olarak kullanılmasıdır. Ayrıca endeks oluşturulduktan sonra seçilmiş makroekonomik ve finansal göstergelerle olan ilişkisinin belirlenmesi de çalışmanın bir diğer amacını oluşturmaktadır.

Araştırma Soruları

Bu çalışmada 1998 - 2019 dönemi Tasarruf Açığı, Cari Açık ve Bütçe Açığı yıllık verileri kullanılarak Üçüz Açık Baskı Endeksi (ÜBE) oluşturulmaya çalışılmış ve endeksin seçilmiş makroekonomik ve finansal göstergelerle ilişkisi araştırılmıştır.

Literatür Araştırması

Literatürde Eichengreen (1996) tarafından geliştirilen Spekülatif Baskı Endeksi, Kaminsky ve Reinhart (1999) tarafından oluşturulan Döviz Piyasası Baskı Endeksi, Kibritçioğlu (2003)'nu geliştirdiği Bankacılık Sektörü Kırılganlık Endeksi ve Ural ve Balaylar (2007) tarafından geliştirilen Aşırı Risk Endeksi bulunmaktadır.

Yöntem

Üçüz Açık Baskı Endeksi (ÜBE) oluşturulurken Eichengreen (1996) tarafından geliştirilen Spekülatif Baskı Endeksi örnek alınmıştır. Bu endekste; Tasarruf açığı (T), Cari açık (C) ve Bütçe açığının (B) ağırlıklı ortalama değişimleri kullanılmaktadır. Ayrıca Endeks ve seçilmiş makroekonomik ve finansal göstergeler arasındaki nedensellik ilişkisine Granger Nedensellik Testi ile bakılmıştır.

Sonuç ve Değerlendirme

1998 – 2019 dönemine ait Tasarruf Açığı, Cari Açık ve Bütçe Açığı verileri kullanılarak formül geliştirilmiş ve oluşturulan Üçüz Açık Baskı Endeksinin Türkiye'de geçerli olduğu sonucuna varılmıştır. Üçüz Açık Baskı Endeksi'nin finansal krizlerde öncü bir gösterge olarak kullanılabilmesi için bir eşik değerin belirlenmesi gerekmektedir. Krizi tanımlamada Üçüz Açık Baskı Endeksinin eşik değeri ÜBE'nin standart sapmasının - 1 katı (eksi bir) olarak belirlenmiştir. Eğer endeks eşik değerin altındaysa kriz var (1); aşmayan dönemler ise kriz yok (0) olarak tanımlanacaktır. 1998 – 2019 dönemi için standart sapma 1,24 olarak hesaplanmıştır. Üçüz Açık Baskı Endeksi ve seçilen değişkenler arasında ABD Doları/TRL Kuru, İmalat Sanayi Kapasite Kullanım Oranı ve ABD Dolar Endeksi haricinde düşük korelasyon bulunmaktadır. Bu değişkenlerle olan yüksek korelasyon beklenen yönde bulunmuştur. İmalat Sanayi Kapasite Kullanım Oranı ile 0,6842, ABD Dolar Endeksi ile – 0,4843 ve ABD Doları/TRL Kuru ile – 0.5851 olmuştur. Granger Nedensellik Test sonuçlara göre, İmalat Sanayi

Kapasite Kullanım Oranı ve Sanayi Üretim Endeksi'nden Üçüz Açık Baskı Endeksi'ne doğru tek yönlü Granger nedenselliği bulunmaktadır. Başka bir ifadeyle, İmalat Sanayi Kapasite Kullanım Oranı ve Sanayi Üretim Endeksi'ndeki değişiklikler Üçüz Açık Baskı Endeksi üzerinde önemlidir. Ayrıca, Üçüz Açık Baskı Endeksi'nden Bankacılık sektörü Kredi Hacmine doğru tek yönlü bir nedensellik görülmektedir. Analiz sonuçlarına göre, İmalat Sanayi Kapasite Kullanım Oranı ve Sanayi Üretim Endeksi'nden Üçüz Açık Baskı Endeksi'ne doğru tek yönlü Granger nedenselliği bulunmaktadır. Başka bir ifade ile, İmalat Sanayi Kapasite Kullanım Oranı ve Sanayi Üretim Endeksi'ndeki değişikliklerin Üçüz Açık Baskı Endeksi üzerinde önemli olmaktadır. Bu sonuç hem teorik olarak hem de istatistiki olarak anlamlıdır. Çünkü İmalat Sanayi Kapasite Kullanım Oranı ve Sanayi Üretim Endeksi'ndeki artışlar hem toplanacak vergiler nedeniyle bütçe açığının hem de üretim nedeniyle arzın artması ve fiyatların düşmesi ile cari açığın düşmesine ve sonuçta tasarruflarda artışa neden olacaktır. Bu endekslerdeki ciddi düşüşler üçüz açıkların büyümesine ve finansal krize girilmesine sebep olabilecektir.

1. INTRODUCTION

The economic theories state that the main factors affecting macroeconomic stability are budget deficit, current account deficit and savings deficit expressed as savings-investment imbalance. The Twin Deficit Hypothesis emphasizes that an economy's budget and current account deficits are intertwined, and that the degradation in the budget balance ultimately leads to a deformation in the current account balance of an economy. The Twin Deficit Hypothesis gains popularity in the early 1980s. Because, big and longterm current account deficits had been accompanied by the expansion of the United States of America budget deficits. The depictions of budget and trade (current) deficits together produce an inseparable "Siamese twins" image (Feldstein, 1992). There are two contradictory views for twin deficits. The traditional Keynesian approach suggests a positive relationship between the budget and the current account deficit, while the Ricardian Equivalence Hypothesis (REH) argues that there is no relationship between the budget and the current account deficit. The Twin Deficit Hypothesis, based on the traditional Keynesian approach, suggests that a positive relationship between the budget deficits and the current account deficit occurs and increases in the budget deficits cause the current account deficit. The increase in budget deficits causes domestic expansion to increase in imports and narrows in exports. The deterioration in the foreign trade balance leads to a decrease in net exports and thus an increase in the current account deficit. The Ricardian Equivalence Hypothesis shows that no relation between the budget deficit and the current account deficit emerges. The Ricardian Equivalence Hypothesis approach put forward by Barro (1974) suggests that financing public spending with tax increase or borrowing has no effect on the current account balance and financing of public expenditures through the increase of taxes or borrowing has no effect on total demand or interest rate. Therefore, according to Ricardian Equivalence Hypothesis, the crowding out effect does not occur in the economy as in the Keynesian approach. Since there is no exclusion effect in the economy, the level of savings-investment remains at the same level and borrowing has no real effect on the economy.

The Triple Deficit Theory is also basically the expansion of the Twin Deficit Theory, which includes the savings-investment balance. The Triple Deficit Hypothesis is based on the connection between the budget balance that is internal counterpoise and the balance of savings and the current account balance representing the external counterpoise. The private sector savings-investment balance and the budget balance, which constitute the internal economic balance, cause the current deficit (Karaçor et al. 2012). The traditional Keynesian model of national income in an open economy is the basis of theory and analysis of twin and triple deficit balance. The relationship between these three balances is presented as follows with the identity of national income (Güder and Kılıç, 2016):

$$GDP = C + I + G + CA \quad (1)$$

GDP: Gross Domestic Product, C: Consumption, I: Investment, G: Government spending,
CA: export-import

In this equation, the current account balance (CA) is taken as the difference between exports and imports. So, CA = (X – M). Therefore, equation (1) is rearranged as follows:

$$GDP = C+I+G+CA \quad (2)$$

In an open economy, total savings (S) consist of parts of national income that are not consumed by the private and public sectors. So S = GDP – C – G + CA. The equation (GDP – C – G) is equal to investments (I) and the equation can be rewritten as follows:

$$S = I + CA \quad (3)$$

Total savings (S) in an economy are the sum of private savings (Sg) and public savings (Sp). So, S = Sg + Sp. If this equation is replaced by the total savings in equation (3);

$$Sg + Sp = I + CA \quad (4)$$

Public savings in an economy are obtained by subtracting the state's public expenditures (G) from taxes (T) collected in that country. So, Sg = T – G. When this equation is replaced by the public savings in equation (4), the equation takes the form:

$$T – G + Sp = I + CA \text{ or } (T – G) + (Sp – I) = CA \quad (5)$$

This equation shows all three balances that make up the triple deficit. The equation (T – G) shows the budget balance, (Sp – I) the private savings-investment balance and the CA current account deficit. Equation (5) shows the equality of internal and external balance. In an economy, the sum of the budget balance and private savings balance, which constitute the internal balance, is equal to the current account balance, which is the external balance. Briefly; the total of private and public savings gives the current deficit.

In economics and finance literature, there are many national and international studies on the validity of Twin Deficit Hypothesis. These studies investigate the determinants of twin deficits, the causes of twin deficits and the relationship between twin deficits and macroeconomic variables. However, the studies on Triple Deficits Hypothesis are rare and similarly, the determinants, causes and the relationship between triple deficits and macroeconomic variables have been examined in these studies. The study on creating the Triple Deficits Pressure Index is not ranked with literature. Thus, the main purpose of this study is to create Triple Deficit Pressure Index for Turkey in 1998 - 2019 period. In addition, it is aimed to determine leading indicators that cause financial crises using the Triple Deficit Pressure Index. The second part of the study includes theoretical motivation. The third section contains data and methods, and the fourth section includes findings. In the last section, the results are discussed.

2. MOTIVATION

Empirical studies examining different countries or country groups support the Twin deficit Hypothesis (Summers (1986), Roubini (1988), Bachman (1992), Vamvoukas (1999), Andersen (1990) and Vyshnyak (2000). They support Keynesian approach. Kim and Roubini (2008) observe an opposite relationship between the budget and the current account deficit in the short term due to the positive

private savings-investment balance which is effective on the budget deficit and call as "Twin Divergence". Gruber and Kamin (2007), on the other hand, state that the increase in global savings negatively affects economies with savings deficit and thus increases the current deficit. The reason why the study results differ is due to the political and social characteristics of the countries or the differences in the implementation of macroeconomic policies. At the same time, the financial fragile structures of the countries and their susceptibility to crisis are the main determinants of the relationship. The results in the studies testing the validity of Twin Deficit Hypothesis in Turkey are intricate. In addition to the studies proving the validity of the Twin Deficit Hypothesis (Bayrak and Esen (2012)), there are also non-supporting studies (Bolat et al. (2011), Kılavuz and Dumrul (2012), İyidoğan and Erkam (2013), Özçalık and Erataş (2014)).

Some international studies prove the validity of Triple Deficit Hypothesis (Gruber and Kamin (2007), Chowdhury and Saleh (2007), Zaidi and Iqbal (1985) and Dooley et al. (1987)). Although some studies refuse Triple Deficit Hypothesis in Turkey (Sürekçi (2011), Karaçor et al. (2012), Tülümce (2013) and Özdemir et al. (2014)), there are numerous studies supporting (Türkay (2013), Bolat et al (2014)). Akıncı and Yılmaz (2013), determine that savings deficits and budget deficits have impact on the current deficit in the short and long term in the 1975-2010 period and Triple Deficit Hypothesis is valid in Turkish economy. Akbaş et al. (2014), also prove the validity for the 1960-2012 period. Moreover, Karanfil ve Kılıç (2015), apply cointegration and granger causality tests to obtain supporting evidence for the validity of the Triple deficit Hypothesis.

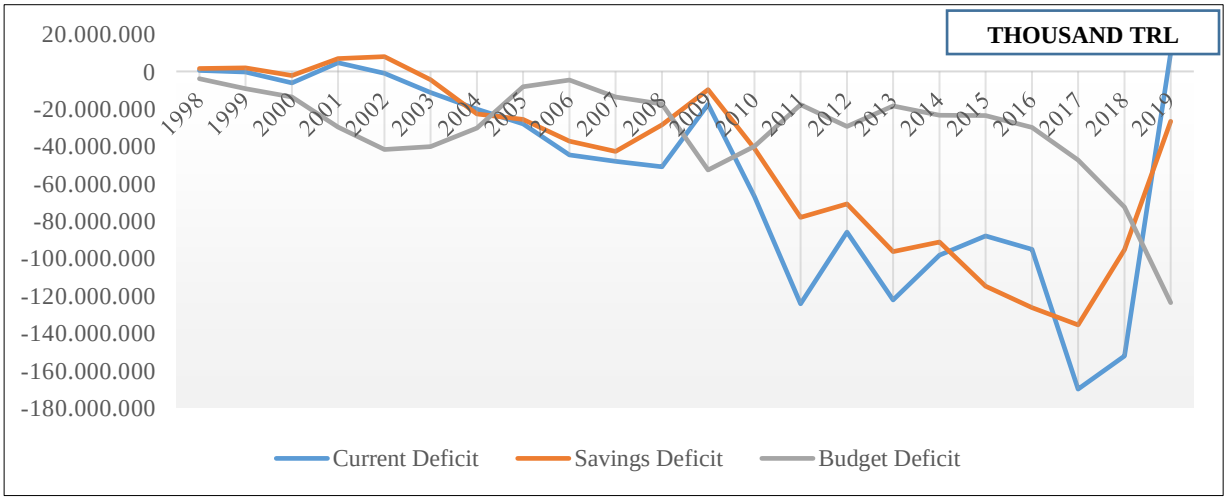
Altınöz (2018) examines the validity of the Triple Deficit Hypothesis in the Turkish economy and determines short-long-term cointegration. Kamacı and Kara (2019) look for the validity of the Triple Deficit Hypothesis in the Turkish economy with ARDL analysis and Toda-Yamamoto causality analysis for the period 1974-2015 and observe is a long-term cointegration relationship. Also, Saraç (2019) focuses on the validity of the Triple Deficit Hypothesis in 23 upper middle-income countries including Turkey with the Panel Granger Causality Test for the period 2005-2017 and determines a bidirectional causality relationship between the variables.

Kızılkaya and Öztutuş (2018) analyzed and apply Johansen Cointegration Test and Granger Causality Test to test the validity of Triple Deficit Hypothesis in the Turkish economy. The study confirm that the budget and savings deficit are effective together on the current account deficit. Therefore, the triple deficit hypothesis is valid for Turkey in the relevant years range. Oral and Fazlılar (2022) investigate the validity of the Triplet Deficit Hypothesis in Turkey and PIIGS countries. They examine the 1986-2018 period with panel data analysis and observe that the Triple Open Hypothesis was not valid. Akkaya (2022) investigates the relationship between the triple deficit pressure index and macroeconomic variables. Borsa İstanbul 100 Index Value, Banking Sector Credit Volume, Current Account Deficit, Domestic Debt Stock, Export Import Coverage Ratio, Manufacturing Capacity Utilization Rate and USD / TRL buying rate have significant effect on the Triple Deficit Pressure Index.

3. DATA AND METHODOLOGY

The Savings, Current account and Budget Deficits changes in the Turkish economy for the period 1998-2019 are shown in Figure 1. 1998 - 2001 period, there are current and savings surplus and small budget deficit. Since 2002, the Turkish economy has started to create triple deficits and the current account deficits and savings deficits have increased rapidly as a result of high liquidity, foreign direct capital and portfolio investments after the 2008 Global Crisis. With 2015, the increase in triple deficit accelerates. After the currency crisis on August 10-12, 2018, current account deficit and savings deficit decrease rapidly, and current surplus is observed in 2019. However, the budget deficit reaches 123.7 billion Turkish Lira at the end of 2019.

Figure 1. Savings Deficits, Current Account Deficit and Budget Deficit Changes



Source: Author
Source of Data: Electronic Data Delivery System of Central Bank of Turkey (2020).

This study is first attempt in the literature to create Triple Deficit Pressure Index (TPI) using the annual data of Savings, Current Account and Budget Deficit for Turkey in the period of 1998-2019. In the literature, there are risk based leading indices such as the Speculative Pressure Index developed by Eichengreen et al. (1996), the Index of Currency Market Turbulence created by Kaminsky and Reinhart (1999), the Banking Sector Fragility Index developed by Kibritçioğlu (2003) and the Extreme Risk Index developed by Ural and Balaylar (2007).

The Speculative Pressure Index (SPI) developed by Eichengreen et al. (1996) is taken as model to create the Triple Deficit Pressure Index (TPI) in this study. SPI is the first and the most often used index to explain financial crises in developing countries. SPI also pioneered the development of a large number of different indices. Because this model formed the basis for the development of new pressure indices later on. Numerous studies have cited this study. This index uses average changes of the savings deficit (S), current deficit (C) and budget deficit (B) and it is calculated by the formula below.

$$TPI = \frac{\frac{\Delta S}{S} - \mu_S}{\sigma_S} + \frac{\frac{\Delta C}{C} - \mu_C}{\sigma_C} + \frac{\frac{\Delta B}{B} - \mu_B}{\sigma_B}$$

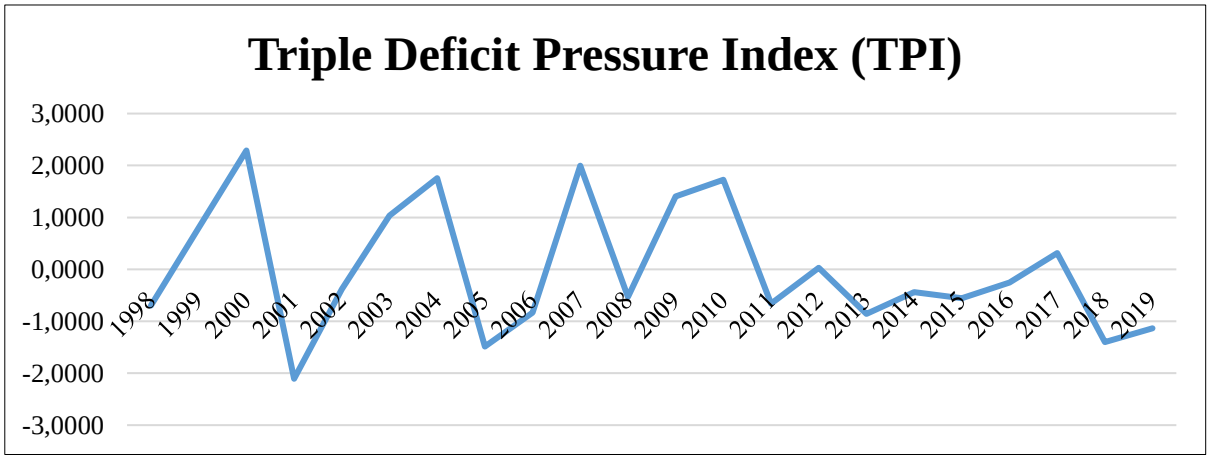
ΔS/S: Annual changes of the savings deficit (S);

ΔC/C: Annual changes of the current deficit (C)

ΔB/B: Annual changes of the budget deficit (B); μ: Average; σ: Standart error

The changes in the Triple Deficit Pressure Index, which is created according to the above formula using the Savings, Current and Budget Deficits data for the period 1998 - 2019 are shown in Figure 2.

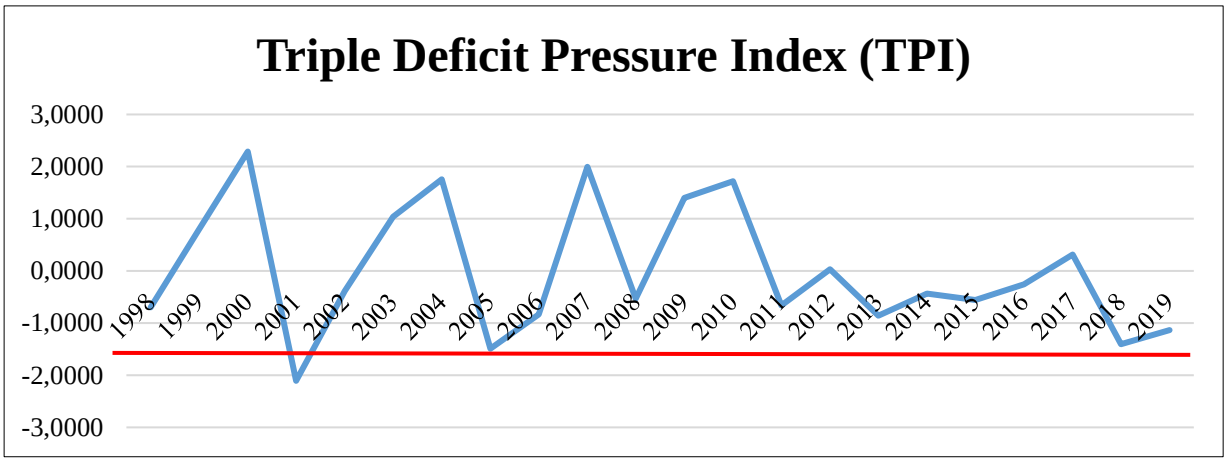
Figure 2. Triple Deficit Pressure Index for the period 1998 – 2019



The Triple Deficit Pressure Index in Figure 2 reflects the 2001 crisis in the Turkish economy. In addition, the global crisis started in the United States of America (USA) in 2008 and affected all economies does not force the Turkish economy as a result of increasing liquidity, foreign direct investment and portfolio investments. However, after Bernanke, the President of the Federal Reserve of America in 2013, announced that the monetary expansion has come to an end and even the monetary contraction should be applied, Turkish economy has started to be affected. The Triple Deficit Pressure Index also explains the currency crisis on August 10-12, 2018 and the subsequent economic contraction. Consequently, figure shows that Triple Deficit Preassure Index is valid in Turkey.

In order to use the Triple Deficit Pressure Index as a leading indicator for a financial crisis, a threshold value should be determined. In defining the crisis, the threshold value of the Triple Deficit Pressure Index in the Figure 3 has been determined as - 1 times (minus one) of the standard deviation of the TPI. It is checked whether the threshold value shows the crisis years that have actually been experienced and if it is consistent, then the threshold value emerges while determining the threshold values in Figure 3 in parallel with the pioneering studies of Eichengreen et al. (1996) and by Kaminsky and Reinhart (1999) and subsequent studies in which the threshold value is 1 standard deviation. If the index is below the threshold value, there is a crisis (1); periods that do not exceed will be defined as no crisis (0). The standard deviation for the 1998 - 2019 period is calculated as 1.24.

Figure 3. Triple Deficit Pressure Index Threshold Value



TPI $\leq$ - 1σ → Yes, Crisis, Dummy = 1

TPI $\geq$ - 1σ → No Crisis, Dummy = 0

Considering the economic and social consequences of financial crises, prediction with leading indicators is very crucial. In this respect, there are many studies for testing the leading indicators on financial crisis in the literature. In addition to the Speculative Pressure Index, Index of Currency Market Turbulence, Banking Sector Fragility Index and Extreme Risk Index, which are widely used in the studies, there are also Financial Conditions Index, Financial Development Index and Financial Strength Index. Another purpose in this study is to determine the leading indicators in order to use the Triple Deficit Pressure Index in the prediction of financial crises. For this purpose, the study covers 22 variables (16 macroeconomic and 6 financial) to predict the financial crisis (Table 1). The variables in Table 1 and used in the analysis are gathered from the Central Bank of Republic of Turkey electronic data system.

Table 1. Variables and Abbreviations of Variables

Abbreviation	Variable	Abbreviation	Variable
TPI	Triple Deficit Pressure Index	**PI**	Portfolio Investment
GOLD	Gold Price	**RER**	Real Exchange Rate
BIST	Borss İstanbul 100 return Index	**IPI**	Industrial Production Index
BSCV	Banking Sector Credit Volume	**CPI**	Consumer Prices Index
FDI	Foreign Direct Investment	**TRLDEPO**	TRL Deposit Interest Rate
INF	Inflation Rate	**CCI**	Consumer Confidence Index
DBS	Domestic Debt Stock	**USD 10Y**	USD 10 Year Bond Rate
MICUR	Manufacturing Industry Capacity Utilization Rate	**USD Index**	USD Dolar Index
UR	Unemployment Rate	**USD/TRL**	USA Dolar/TRLBuying Rate
NEO	Net Error Omission	**VIX**	Volatility Index
GDP	Gross Domestic Product	**NNSP**	Non-Residents Stock Portfolio
NIR	Net International Reserves		

Source of Data: Electronic Data Delivery System of Central Bank of Turkey (2020).

4. RESULTS

There is a low correlation between the Triple Deficit Index and the variables, except for the US Dollar/TRL Buying Rate, the Manufacturing Industry Capacity Utilization Rate and the US Dollar Index. The correlation with these variables is high in the expected direction. The correlation is at 0.6842 with Industry Capacity Utilization Rate, - 0.4843 with the US Dollar Index and - 0.5851 with the US Dollar / TRL Buying Rate.

In finance and economics studies, time series should be stationary, that is, time series should not have the unit root. Because, it causes spur regression and misleading results. In this study, Augumented Dickey-Fuller (ADF) unit root test of Dickey and Fuller (1981) is applied.

Table 2. Augumented Dickey-Fuller Unit Root Test Results

	t-Statistic	Prob.*	1. Diff.	Prob.*		t-Statistic	Prob.*	1. Diff.	Prob.*
TPI	-3,83248	0,01			**PI**	-4,18421	0.00		
GOLD	-3,73944	0.01			**RER**	-0,36937	0.89	-9,10349	0.00
BIST	-6,79573	0.00			**IPI**	-3,75849	0.01		
BSCV	-2,55322	0.12	-3,6727	0.01	**CPI**	-3,86977	0.01		
FDI	-4,29833	0.00			**TRLDEPO**	-3,40262	0.02	-5,36677	0.00
INF	-3,8795	0.01			**CCI**	-5,09813	0.00		
DBS	-4,5505	0.00			**USD 10Y**	-4,33443	0.00		
MICUR	-4,4885	0.00			**USD Index**	-5,01208	0.00		
UR	-4,15118	0.00			**USD/TRL**	-0,90821	0.75	-8,1501	0.00
NEO	-4,2837	0.00			**VIX**	-3,96922	0.00		
GDP	-4,62089	0.00			**NNSP**	-6,64473	0.00		
NIR	-3,06792	0.04	-6,0664	0.00					

Except for Banking Sector Credit Volume, Net International Reserves, Real Exchange Rate, TRL Deposit Interest Rate and US Dollar/TRL Buying Rate, the series are stationary at 1% significance level (Table 2). These 4 variables become stationary at the first difference and transformations are made.

Advanced econometric methods cannot be used since model uses annual data and the number of data is not sufficient, and also Granger causality test is performed to determine the direction of the relationship. Granger causality test is selected for analyzing the short-term relationship among the variables. This test provides information to show the direction of relationships (Granger, 1969). The causality test results between the Triple Deficit Pressure Index and the variables are presented in Table 3.

Table 3. Granger Test Results

Pairwise Granger Causality Test					
Variables	**F-Statistic**	**Prob.**	**Variables**	**F-Statistic**	**Prob.**
GOLD-TPI	1.26731	0,3197	PI - TPI	0.42246	0,6656
TPI - GOLD	1.83909	0,2046	TPI - PI	2.07240	0,1723
BIST - TPI	0.52688	0,6046	RER - TPI	2.26310	0,1502
TPI - BIST	0.76138	0,4901	TPI - RER	0.34475	0,7158
BSCV - TPI	0.01278	0,9873	IPI - TPI	4.00413	0,0494
TPI - BSCV	4.87122	0,0305	TPI - IPI	1.48201	0,2692
FDI-TPI	1.56230	0,2528	CPI - TPI	1.27456	0,3178
TPI - FDI	1.66448	0,2336	TPI - CPI	0.25744	0,7776
INF-TPI	0.58525	0,5734	TRLDEPO - TPI	1.04349	0,3846
TPI - INF	1.34358	0,3006	TPI - TRLDEPO	0.86539	0,4477
DBS-TPI	1.46380	0,2731	CCI - TPI	0.43366	0,6588
TPI - DBS	1.09996	0,3669	TPI - CCI	0.08544	0,9187
ICUR - TPI	3.22366	0,0791	USD 10Y - TPI	0.36049	0,7053
TPI - ICUR	2.22775	0,1541	TPI - USD 10Y	0.76877	0,4870
UR - TPI	0.38536	0,6890	USD INDEX - TPI	0.68516	0,5243
TPI - UR	0.68309	0,5252	TPI - USD INDEX	0.38859	0,6870
NEO - TPI	0.64956	0,5412	USD/TRL- TPI	0.02416	0,9762
TPI - NEO	0.64655	0,5427	TPI - USD/TRL	0.40155	0,6787
GDP - TPI	0.67432	0,5294	VIX - TPI	3.73688	0,0578
TPI - GDP	1.47612	0,2705	TPI - VIX	1.61752	0,2422
NIR - TPI	1.01323	0,3946	NNSP - TPI	0.42528	0,6639
TPI - NIR	1.19339	0,3396	TPI - NNSP	0.55607	0,5888

Table 3 shows a one-way Granger causality from the Manufacturing Industry Capacity Utilization Rate and the Industrial Production Index to the Triple Deficit Pressure Index. In other words, changes in the Manufacturing Industry Capacity Utilization Rate and the Industrial Production Index are significant on the Triple Deficit Pressure Index. In addition, there is a one-way causality from the Triple Deficit Pressure Index to the Banking Sector Credit Volume.

5. CONCLUSION

The Twin Deficit Hypothesis emphasizes that an economy's budget deficit and current account deficits are intertwined, and that the deformation in the budget balance ultimately leads to a deterioration in the current account balance of an economy. The Triplet Deficit Hypothesis is basically the expansion of the Twin Deficit Hypothesis, which includes the savings-investment balance. The Triple Deficit is based on the relationship between the budget equilibration expressed as internal balance and the balance of savings and the current account representing the external equilibration. By adding the budget and the current account deficit together with the savings deficit, the efficiency of the macroeconomic balances and policies of the countries deteriorates.

A country which has a current account deficit most likely chooses foreign borrowings to finance this deficit. Thus, some part of country's future income will be transferred to foreigner lenders. Due to borrowing, budget deficit and fluctuations in exchange rates make the economy fragile. In addition, an economy that uses a fixed exchange rate regime and finances foreign deficits through borrowing may be fragile to the financial crisis as the volatility in exchange rates increases. The ascending government spending in small and extroverted economy that has flexible exchange rates and full capital mobility, also escalates interest rates. As the domestic interest rate is higher than the world rate, the flow of capital accelerates and the value of the national currency strengthens. Thus, the demand for imported goods, which has become cheaper with the exchange rate, is increasing and has a major impact on the current account deficit. Consequently, this condition launches the financial crisis cycle.

In this study, Triple Deficit Pressure Index (TPI) is formed using 1998 - 2019 period Savings, Current Account and Budget Deficit annual data and results prove that TPI has validity in Turkey. In addition, Granger causality test is applied to determine the leading indicators in the prediction of financial crises on the TPI. Test results show one-way Granger causality from MICUR and IPI to the TPI. In other words, changes in these indices are statistically significant on the TPI. This result These results is consistent with the theory and the econometric model. Because, increases in the Manufacturing Industry Capacity Utilization Rate and Industrial Production Index will lead to increase in supply by production, in the taxes that will be collected and decrease in prices. This will also bring decrease in the current account deficit and eventually increase in savings. Serious decreases in these indices may lead increase in triple deficits and launch the financial crisis or turbulence.

Figure 4. Triple Deficit Pressure Index, MICUR and IPI

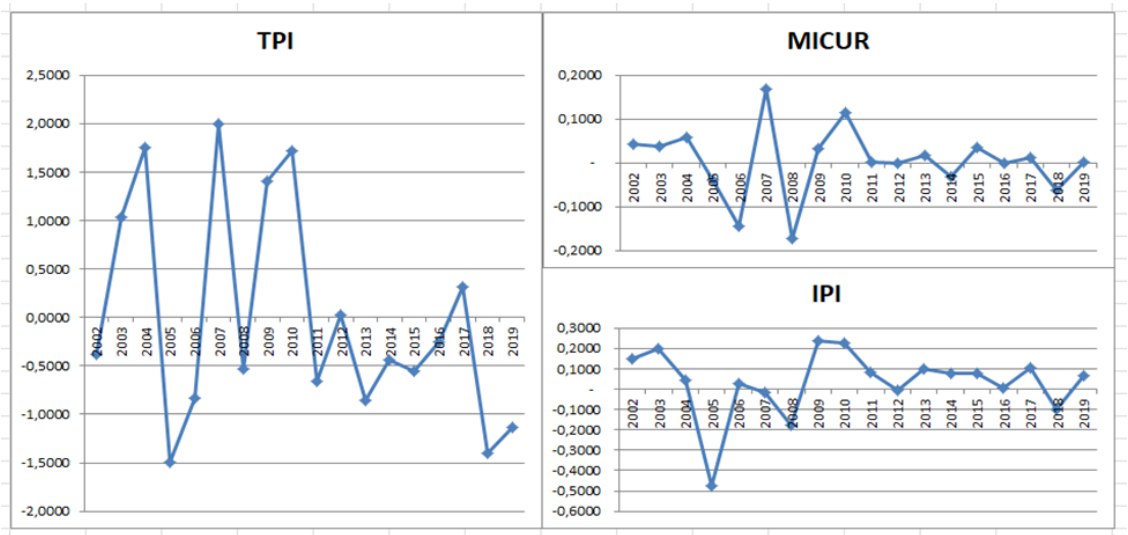


Figure 4 clearly shows the relationship between Triple Deficit Pressure Index, MICUR and IPI. All 3 indices move parallel to each other. In particular, the Manufacturing Industry Capacity Utilization Rate acts very similar to Triple Deficit Pressure Index. As the Manufacturing Industry Capacity Utilization Rate decreases 10% and more, serious parallel decline occurs in TPI. Consequently, 10% or

more decline in these indices causes financial crisis or turbulence. Therefore, MICUR and IPI can be used as a leading indicator in forecasting financial crises or tumoils.

The most important point for the Turkish economy, which has been running a current account deficit for many years, is that the reduction of savings and budget deficit accelerates the current account deficit. If the high interest rate, low exchange rate and hot money cycle applied as a solution to this is over, the budget deficit can be reduced and a sustainable current account deficit may emerge. In addition, since public expenditures increase the budget deficit, budget balance should be ensured with planned and programmed public expenditure policies. As a result, policy makers should consider the budget balance and savings balance in the face of the current account deficit problem, which is one of the most fundamental problems of the emerging countries.

The main aim of this study is to create Triple Deficit Pressure Index using 1998-2019 period annual data for Turkey. Annual data for this period is not enough for many statistical models such as Vector Autoregressive Model, Cointegration Tests and other models to apply. In future studies, the number of data can be increased by using monthly and quarterly data and thus it can be used for many econometric models. The study even contributes to the literature with the creation of the Triple Deficit Pressure Index.

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