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**FACTORS AFFECTING EXTERNAL DEBT IN TRANSITION ECONOMIES:
THE CASE OF CENTRAL ASIA AND THE CAUCASUS***

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ABSTRACT

This study is to examine the key factors affecting external debts for the Central Asia and the Caucasus economies between the years 1995-2017 by using panel data analysis. Panel regression results show that public expenditures and the debt service have positive effect on external debt, while current account of the balance, inflation rate and domestic savings have a negative, and also significant effect on external debt. The results of this study show that foreign debt is being used as a significant source of financing for public expenditures, foreign debt repayments, and the current account deficit in the countries of Central Asia and the Caucasus.

Keywords: External Debt, Panel Data Analysis, Transition Economies, Central Asia and the Caucasus Economies.

**GEÇİŞ EKONOMİLERİNDE DIŞ BORÇLANMAYI ETKİLEYEN
FAKTÖRLER: ORTA ASYA VE KAFKAS ÜLKELERİ ÖRNEĞİ**

ÖZET

Bu çalışmada, Orta Asya ve Kafkas ekonomileri için 1995-2017 yılları arasında panel veri analizi kullanılarak dış borçları etkileyen temel faktörler incelenmektedir. Panel regresyon bulguları; kamu harcamaları ve borç servisinin dış borçlanmayı pozitif yönde etkilediği ve istatistiksel olarak anlamlı etkiye sahip olduğunu göstermektedir. Tam tersine cari işlemler dengesi, enflasyon oranı ve iç tasarruf oranlarının dış borçlar üzerinde negatif ve anlamlı bir etkiye sahip olduğu görülmektedir. Bu çalışmanın sonuçları, Orta Asya ve Kafkas ülkelerindeki dış borçlanmanın kamu harcamaları, cari işlemler açıkları ve borç servisi ödemelerinde önemli bir finansman kaynağı olarak kullanıldığını göstermektedir.

Anahtar Kelimeler: Dış Borçlanma, Panel Veri Analizi, Geçiş Ekonomileri, Orta Asya ve Kafkas Ekonomileri.

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1. Introduction

Factors such as the insufficiency of domestic savings, the necessity of financial resources for economic development and growth, international trade and deficits in the balance of payments, and the financing of budget deficits arising from high public expenditures have made external debts an important matter. Therefore, the interest of economists and policy makers on external debts has been increased day by day. In general, the main factors affecting external debts in the literature can be listed as public revenues, public expenditures, budget deficits, loan demand, domestic debt stock, debt ceiling, debt service ratio, national income level and variability, population, social infrastructure, educational level, domestic savings, the degree of trade openness, export of goods and services, deficits in the balance of payments, imports of goods and service, current account balance, foreign exchange gap, global interest rates, capital inflow and outflow, political instability, and poverty.

The developments of the economic and political fields in the 1990s introduced states called “transition economies” transforming command economies into market economies i.e. transforming from authoritarian regimes into democratic regimes. While adopting new reforms in economic, political and socio-cultural fields, these countries have had to finance these reforms with debts. As a matter of fact, the ratio of debts to GDP exceeded a hundred percent in some of these countries and so they entered the category of countries with high debts. The financing provided by foreign debt was used in the financing of the imports of consumer goods, rather than activating economic dynamics (Uzun et al., 2012: 151). With this respect, it has been aimed at investigating the relationship between external debt levels and its affecting factors for the economies of Central Asia and the Caucasian countries of Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan between the years 1995-2017.

In the section following introduction, the causes and progress of external debt in developing countries will be briefly reviewed. Then, empirical literature on the determinants of the external debts and theoretical framework will be discussed. The next section provides econometric methodology and evaluation of the empirical findings. Finally, the last section concludes the study.

2. The Causes and Development of External Debt in Central Asia and The Caucasus Economies

External debt is a form of financing provided by a country, generally in foreign currency from international markets, international organizations and foreign states on the condition that they are paid back the principal amount with the interest at a set maturity date. In other words, external debt is the flow of capital from developed countries to developing countries in order to meet their needs.

One of the main problems of undeveloped and developing countries is the weakness of capital accumulation and insufficiency of domestic savings. It is an obligation for these countries to resort to external debt in order to continue economic development processes. In addition, these countries use the debt as a tool in the financing of the import of investment goods in order to carry out necessary investments (Bilginoğlu & Aysu, 2008: 2).

Table 1: External Debt Stocks for Developing Countries (% of GNI)

Years	East Asia and Pacific (developing)	Europe and Central Asia (developing)	Latin America and Caribbean (developing)	Low and middle income	Low income	Lower middle income	Middle East and North Africa (developing)
1995	35.00	32.72	34.21	38.22	124.42	53.92	56.13
1996	32.81	34.60	31.80	35.89	108.71	49.21	47.24
1997	33.22	35.24	30.06	34.67	102.32	47.66	42.53
1998	36.60	47.08	33.90	39.07	107.95	56.26	43.55
1999	33.49	58.66	39.34	40.57	100.63	52.91	40.95
2000	28.03	51.16	33.53	35.51	83.29	48.32	38.18
2001	27.04	51.87	34.33	35.03	84.91	46.56	35.90
2002	24.14	48.51	35.07	34.15	82.31	44.86	38.27
2003	22.59	47.10	36.20	33.17	80.45	42.26	36.65
2004	21.15	41.12	31.62	29.89	71.65	38.49	33.71
2005	19.72	37.16	25.01	25.66	52.55	32.26	25.63
2006	17.31	39.49	21.73	23.70	35.62	28.22	21.19
2007	15.15	40.79	21.29	22.95	32.90	26.64	18.62
2008	12.31	36.32	19.52	20.53	28.28	26.12	16.78
2009	13.09	47.07	22.02	22.54	29.22	28.21	18.11
2010	15.60	41.84	21.38	21.94	25.71	24.98	16.59
2011	16.66	38.30	21.83	21.83	24.17	24.53	14.39
2012	16.50	38.79	24.63	22.63	23.77	26.12	14.22
2013	18.17	40.70	26.62	24.31	25.04	27.26	17.17
2014	19.55	40.17	28.69	24.84	24.98	27.32	17.40
2015	15.48	48.22	34.70	24.21	27.24	28.71	19.61
2016	16.00	53.16	35.90	25.01	28.85	28.47	21.44
2017	17.15	48.72	33.26	25.02	29.51	29.29	25.24

Source: World Bank, 2018.

Data related to the change in the external debt burdens are presented in the table above by considering the categorizations carried out by the World Bank. It appears that Europe and the Central Asia, which also contain the Middle-Eastern and Caucasian countries have the highest level of external debts among these developing economies. External debt levels of these countries showed a tendency to continuously increase in the period between 1995 and 2017. In the post-2000 period, external debt burdens were valued at over 50%. The third block with the highest debt level is composed of countries in the developing Latin American and Caribbean regions. In contradistinction to the developing European and Middle Eastern countries, the

external debt level of these countries shows a tendency to decrease. While the average external debt burden was 36% in the 1990s, it was at the rate of 33% in 2017. The external debt burden also showed a tendency to decrease in these countries. In general, when the low-income, lower-middle income and total low and middle income country categorizations are examined, external debt burdens which were over 50% in the 1990s decreased to a level between 20-30%.

Table 2: External Debt Stocks for Central Asia and the Caucasus Economies (% of GNI)

Years	Azerbaijan	Georgia	Kazakhstan	Kyrgyzstan	Uzbekistan	Tajikistan	Turkmenistan
1995	10.56	48.18	18.54	37.49	13.53	53.24	16.09
1996	14.07	45.02	14.04	63.58	17.22	71.76	31.56
1997	12.85	40.29	18.66	78.73	20.11	116.93	73.63
1998	15.94	43.31	27.83	96.06	22.65	95.48	90.87
1999	28.42	62.85	40.49	157.62	31.40	129.94	111.75
2000	31.78	57.50	75.66	150.49	36.54	138.36	96.32
2001	28.21	58.72	73.34	124.41	46.55	112.81	65.35
2002	28.91	59.71	78.43	126.47	53.87	107.73	49.10
2003	28.40	53.65	79.85	115.69	53.15	86.92	32.49
2004	27.18	44.51	82.49	121.37	43.44	58.35	26.98
2005	19.37	33.23	84.74	95.13	32.43	50.34	15.29
2006	15.29	32.54	104.02	93.19	26.18	39.29	9.93
2007	13.96	29.26	104.72	76.75	20.03	37.11	6.92
2008	10.26	61.17	93.53	73.54	16.21	48.88	4.05
2009	11.11	81.44	106.86	91.35	20.32	54.32	3.54
2010	14.63	77.94	92.59	91.74	19.25	51.09	2.56
2011	12.63	77.20	75.39	99.18	17.39	47.16	1.72
2012	16.61	77.23	75.34	93.79	16.85	47.37	1.58
2013	15.18	82.75	70.79	98.60	17.54	43.27	1.42
2014	16.90	83.49	79.33	101.77	20.14	45.39	1.04
2015	26.95	105.62	88.49	117.58	21.65	55.53	1.20
2016	42.45	115.77	131.66	122.80	23.83	64.93	1.44
2017	39.12	109.83	118.38	111.17	34.99	71.34	1.92

Source: World Bank, 2018

According to the Table 2, Kyrgyzstan and Kazakhstan have the highest levels of external debt burden. The general development progress of external debt burdens in Middle-Eastern and Caucasian economies shows that the external debt burden increased in periods when the structural transformation was dense and that, the external debt burden decreased in the post-2000 period. The time-related transformation effect of the external debt burden also indicates the development in the form of an “Inverse -U- Curve”. According to 2017 data, economies with the highest level of debts are Kazakhstan (118.38%), Kyrgyzstan (111.17%), Georgia (109.83%) and, Tajikistan (71.34%). Economies with the lowest level of debts, on the other hand, are Turkmenistan (1.92%), Azerbaijan (39.12%) and Uzbekistan (34.99%). The positive transformation of the debt structure in Central Asian and Caucasian economies is an indicator that the countries moved away from economic problems arising from debts and that there were improvements in eliminating financial fragilities.

The public external debt of the Republic of Azerbaijan was 4.8126 billion dollars on January 1st, 2012. When the providers of signed loan contracts are analyzed, the shares are as follows: World Bank 29%, Japan International Cooperation Agency 14%, European Bank of Reconstruction and Development 12%, Asian Development Bank 10% and Islamic Development Bank 7%. The share of the International Monetary Fund which is one of the two main organizations from which Azerbaijan took on debts until 2004 is 5%. When the fact that the Azerbaijan government stopped receiving loans from this organization is taken into account, it is expected for this share to get even lower in the years to come (Bulut and Süleymanov, 2013: 280). 11.2% was used for economic reforms of the Republic of Azerbaijan and 88.8% was used for financing investment projects (electrical energy, infrastructure, chemistry, petroleum, natural gas and the restoration of regions freed from invasion etc.) (Bulut and Süleymanov, 2013: 281).

3. Theoretical Framework and Literature Review

The rationale for the accumulation of external debt firstly developed by Harrod (1939) & Domar (1946) as “Two Gap” model. This model advanced by Chenery & Strout (1996) and explains that external debt is a path that bridges the gap between domestic savings and investments (Sa’ad et al., 2017). “Two Gap” model explains the interaction between domestic savings level and foreign exchange amount. The lack of domestic savings and foreign exchange resources pressures the countries to acquire foreign capital. In general, the reasons why countries resort to external debt can be named as follows (Açba, 1991: 6-7; Adıyaman, 2006: 22-23; İnce, 2001: 148-149; Meriç, 2013: 80; Yaşa, 1978: 30-32):

- Continuous budget deficits,
- Insufficiency of domestic savings and capital accumulation,
- High defense expenditures,
- Deficits in balance of payments,
- To provide financing for matured liabilities,
- Insufficiency of financing in industrialization and development efforts,
- Financing of expenditures in extraordinary periods (war, natural disasters, economic depressions etc.),

- Increasing demand for imported inputs by external dependence, as a result of industrialization policies,
- Financing large infrastructure investments and reforms,
- Undeveloped financial markets and institutions.

Depending on the factors affecting external debt for developing countries, there are different perspectives in the literature. The main factor for developing countries is the insufficiency of domestic savings and capital accumulation. Especially the insufficiency of domestic savings leads countries to find external sources. In the long run, this situation causes countries to pay their debts again with new borrowings. Paying the debts with new borrowings (refinancing debts) will also cause the debt rollover ratios in the external debt policies to increase and negative developments in the debt management. Economic growth, institutions, financial markets, infrastructure investments, financing of industrialization related to economic growth are also the main determinants of external debt. Basically, many theories have emerged, especially on the basis of economic thoughts. External debt has become even more important with The Keynesian view. These theories generally focus on economic growth and efficiency through borrowing. With this respect, the empirical studies analyzing the relationship among external debt and other economic variables will be discussed in this section of the study. The study conducted by Eaton & Gersovitz (1981) is one of the first studies in the literature, analyzing the factors which determine the external debts with data of 81 developing countries for the 1970-1974 period. They created a theoretical model in their study and according to the empirical results of this model, the main factors determining the debt of a country are loan demand and debt ceiling of these countries. They found a positive relationship between loan demand and income variability, the variability of exports, and income level. Eichengreen & Portes (1986) analyzed the relationship among central government external debt level and gross domestic product per capita, population, the degree of openness, and export instability for 23 countries over the period 1930-1938. Their empirical findings showed that economic growth has positive effect on external debts, while export instability and external openness have a statistically insignificant negative effect on the external debts.

Hajivassiliou (1987) examined the variables of debt service to export ratio, the reserves to imports ratio, real GDP per capita, and the rate of export to GDP as the dynamics determining the external debt demand, using data for 79 developing countries over the period 1970-1982. The results show that factors other than economic growth increase the external debt demand. Ozler & Tabellini (1991) found positive relationship between political instability and external debts for 55 countries in the period of 1970-1999. As a result of the study, they stated that the external debt would be higher in countries with higher political instability.

Karagöl (2002) examined the relationship between external debt and economic growth for Turkey using annual data for the period 1956 and 1996. The results show unidirectional negative causal relationship between debt service and GNP level. Edo (2002) examined the effects of public expenditures, the balance of payments and global interest rates on the external debts for Morocco and Nigeria covering periods between 1980 and 1999. The findings show that the balance of payments and domestic saving rates negatively affect the external debts, on the contrary, global interest rates and public expenditures positively affect the external debts. It was determined in the study conducted by Tiruneh (2004) with the panel data analysis method

for the period of 1982-1998 that poverty, income variability, debt service, capital flight, and foreign exchange gap were the main determinants of the external debts. Lane (2004), with the panel data analysis method, studied the external debt and its determinants for 55 developing countries in the period of 1970-1998. The research findings show that GDP per capita, the rate of export to GDP, social infrastructure, and education have a positive effect on external debts.

Karagöl (2005) investigated the causal relationship between defence expenditures and external debt in Turkey over the period 1955-2000. The findings show that there is a causality from defence expenditures to external debt. Karagöz (2007) studied the causes of external debt in Turkey with data covering the period between 1980 and 2004. The research findings show that domestic savings and internal debts negatively affect the external debts but that deficits in the balance of payments positively affect the external debts. Colombo & Longoni (2009) investigated the determinants of external debts for developing countries. In addition to the economic variables, they found positive relationship between institutional quality, competitive electoral system and external debts.

Oatley (2010), by using the error correction model, determined in his study of 78 developing countries covering the period between 1976 and 1998 that autocratic governments were more inclined to go into debt than democratic governments. Loganathan et al. (2010) analyzed the relationship between external debts and macro-economic performance in Malaysia for the period of 1988-2008 using the time series analysis method. They showed that there was a relationship among external debts and budget incomes, the balance of payments and reserves in the long and short term but that there was no relationship of causality among them. Koyuncu & Tekeli (2010) investigated the effect of current account deficits, domestic savings, internal debt ratio and public expenditures on external debts in Turkey during the period 1990-2009. The research findings show that the level of domestic savings and current account deficit have a significant effect on external debts.

Awan et al. (2011) tested the relationship between the external debts, foreign exchange rate, foreign trade and budget deficit in Pakistan considering the 1974-2008 period. The decrease in the foreign exchange rate and deterioration of foreign trade in Pakistan were determined as the main reasons for the external debts. Together with this, they showed that budget deficits and external debts were related to each other in the long term. Uzun et al. (2012) analyzed the causality relationship between external debts and economic growth for seven Central Asian and Caucasian economies over the period 1993-2009. According to the empirical results, it was determined that economic growth has a significant effect on long-term external debts as well as affecting the total external debt stock, and that the current account deficit was one of the main causes of external debts in the countries included in the analysis.

Peker & Bölükbaş (2013) analyzed the determinants of the external debts in Turkey using quarterly data from 1994 through 2010 and 2001 through 2010. When the 1994-2010 period is considered, it was determined that public expenditures, domestic debt have a positive effect on external debts. On the other hand, when the 2001-2010 period is considered, it is seen that public expenditures have a positive effect on external debts while the balance of payments has negative effect on external debts.

Imimole et al. (2014) found that the main determinants of Nigeria's external debt are debt service, gross domestic product, and exchange rate. Lau et al. (2015) found short run

causality relationship between the macroeconomic indicators and the external debt and in Malaysia covering the period between 1970 and 2013. Abdullahi et al. (2015) examined the macroeconomic factors of external debt accumulation in Nigeria for the 1980 to 2013 period. The empirical results show that interest rate, exchange rate, and budget deficits have negative effect on external debt in the long and short term. Yamaçlı (2015) investigated the determinants of foreign debt in Turkey. It has been concluded that real exchange rate, noninterest public debt requirement, domestic interest rate and the economic growth rate are the main factors affecting the external debt. Awan et al. (2015) examined macroeconomic determinants of external debt in Pakistan for the period of 1976-2010. Their findings indicate that trade openness and nominal exchange rate are statistically significant determinants of external debt.

Lau & Lee (2016) used time series for Thailand and the Philippines for 1976- 2013. Their results imply that the existence of short-run linkages originated from inflation rate, real interest rate to external debt. Al-Fawwaz (2016)' study for Jordan during the period 1990-2014 reveals that there is a positive effect of trade on the external debt, and a negative effect of economic growth on the external debt in the long run.

Waheed (2017) examined the macroeconomic determinants of external debt for 12 oil and gas exporting countries and 12 oil and importing countries for the period 2004- 2013. The results show that increased economic growth, general government revenue, foreign exchange reserves, price of oil, and domestic investment are the important factors in reducing external debt. Akduğan (2017) analyzed the determinants of external debt in Turkey for the period of 1970-2015 by using ARDL bound test approach. It is concluded that there is a significant negative relationship between inflation rate, exchange rate regime, money supply, and external debt. On the contrary, it is determined that the effect of GDP per capita, debt service, budget balance, domestic credits and trade openness on external debt stock are statistically significant and positive. Saad et al. (2017) also investigated the determinants of external debt using ARDL Cointegration Technique in Nigeria from 1973 – 2013. Findings from the study show that inflation rate, interest rate, economic growth, and money supply are cointegrated with external debt in both the short-run and long-run. Özata (2017) investigated the impact of interest rates, savings, exchange rates and budget deficits on external debt in Turkey and concluded that those variables have significant effect on the accumulation of external debt both in the short and the long run.

Nguyen (2018) examined the relationship between external debt, economic growth, unemployment and national expenditure for Vietnam over the period of 1987-2016. The results of this study show that there are directional relationships between unemployment and external debt, GDP, and national expenditure. Bittencourt (2018) investigated the main determinants of government and external debt in the young democracies of South America between 1970 and 2007. The results based on dynamic panel time-series analysis show that economic growth has a significantly negative effect on external debt. Kamacı (2018) investigated the determinants of foreign debts using annual data between the periods of 1975-2017 for Turkey. The results show that economic growth, inflation and budget deficits have statistically positive effect on external debt. Chiminya et al. (2018) investigated the factors affecting external debt for 36 Sub Saharan Africa Countries over the period 1975 to 2012. They considered the effect of sociopolitical factors as well as the usual macroeconomic ones and they found that parliamentary systems

seemed to accumulate more debt than presidential democracies. Moreover, they determined that countries with more open and competitive electoral systems tend to lead to the accumulation of less debt.

Toktaş et al. (2019) examined the relationship between Turkey's foreign debt and economic growth using annual data for the period of 2003Q and 2017Q. The empirical results of this study show that there is a causality relationship between net foreign debt stock and economic growth. Arslan & Athwari (2019), examined the factors affecting the external debt for Turkey for the period of 1980-2017. The empirical results show that showed that economic growth, foreign direct investment, foreign reserves and debt service to exports are the most important factors affecting the external debt.

In empirical studies conducted in the literature, the factors determining the external debt for developing countries were taken as economic growth, domestic savings, the variability of exports and imports, the degree of openness, debt service, public expenditures, public revenues, the balance of payments, foreign exchange rate, population, social infrastructure, educational level, current account balance, etc. This study investigates the factors affecting external debt for Central Asian and Caucasian countries. In this respect, this study differs from other studies in the literature. In the empirical part of the study, factors determining external debt were estimated in accordance with previous studies in the literature. With this aim, explanatory variables are taken economic growth, public expenditures, the average rate of inflation, deficits in the balance of payments, domestic saving rate, and debt service.

4. Data and Model Specifications

In this section, the factors affecting external debt in Central Asian and Caucasian countries will be analyzed. The analysis covers the years between 1995 and 2017 for the countries of Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Although it is seen that many variables have effects on the external debts in the literature, the current model in this study is estimated by taking the data limitation, significance and theoretical framework into account. The datasets are obtained from World Development Indicators (WDI) and the International Monetary Fund (IMF). In the study, while the dependent variable is taken as external debt stock (EXDEBT), explanatory variables are economic growth (GDPGR), public expenditures (PEXP), the average rate of inflation (INF), deficits in the balance of payments (BOP), domestic saving rate (DSAV) and debt service (DSERV). All variables are taken as a share of GDP (constant 2010, USD). Stata 12 and Gauss 10 statistical packages are used in the econometric analysis. Table 3 provides descriptive statistics for the variables in the study.

Table 3: Descriptive Statistics

	EXDEBT	GDPGR	PEXP	BOP	DSAV	DSERV	INF
Mean	0.392729	4.871827	0.264811	-0.017151	0.159612	0.047678	433.0675
Median	0.262543	4.762642	0.252990	-0.016502	0.098084	0.030477	153.8205
Maximum	1.249420	33.03049	0.440360	0.356812	0.937807	0.266628	4297.232
Minumum	0.010814	-17.90799	0.108660	-0.247428	-0.207005	0.000000	4.461000
Std. Dev.	0.322976	5.946947	0.079144	0.095451	0.213474	0.051484	740.2199
Skewness	0.928594	0.166385	0.296568	1.175912	1.283857	1.909832	3.136295
Kurtosis	2.890680	8.384185	2.040408	5.965525	4.87808	6.555517	13.29725
Jarque-Bera	23.21821	195.2138	8.537208	96.09964	65.78222	182.6782	444.9623
Obs.	161	161	161	161	156	161	161

Table 4 shows the variance inflation factor (VIF), tolerance coefficients and correlation values among the variables. Table 4 indicates that there is no multicollinearity between all independent variables.

Table 4: Correlation Matrix of the Variables

	EXDEBT	GDPGR	PEXP	BOP	DSAV	DSERV	INF	VIF	Tolerance
EXDEBT	1								
GDPGR	-0.1548	1					1.07	0.93	
PEXP	0.3140	-0.2003	1				1.08	0.92	
BOP	-0.3804	0.0899	0.0364	1			1.53	0.65	
DSAV	-0.3268	0.1481	0.1119	0.5431	1		1.53	0.65	
DSERV	0.7203	-0.0803	0.0925	-0.1606	0.0633	1	1.09	0.92	
INF	-0.1070	0.0478	0.2718	0.1289	0.1607	-0.0944	1	1.10	0.90

The panel data method is used to analyze external debts and causal factors (GDPGR, PEXP, INF, BOP, DSAV, and DSERV) for Central Asian and Caucasian countries. The direction and size of the relationship among the external debts between 1995 and 2017 and the factors affecting the external debts are determined in the study within the context of said methods and data. The definitions of the data used in the study are summarized in Table 5.

Table 5: Variables, Descriptions and Measures

	Variable	Source	Expected Impact
EXDEBT	External Debt (%GDP)	WDI, IMF	
GDPGR	Growth Rate of Gross Domestic Product (%)	WDI, IMF	- / +
PEXP	Public Expenditures (% GDP)	WDI, IMF	+
INF	The average of Inflation rate (%)	WDI, IMF	- / +
BOP	Balance of Payments (% GDP)	WDI, IMF	-
DSAV	Domestic Savings (% GDP)	WDI, IMF	- / +
DSERV	Debt Service Ratio (% GDP)	WDI, IMF	+

Four separate model were generated to overcome the endogeneity problem for all models. External debt to GDP (EXDEBT) is used as the dependent variable in all of these models, and growth rate of gross domestic product (GDPGR), the average of inflation rate (INF) and public expenditures (PEXP) are added to main models as macroeconomic control variables. Model 1 was created to analyze the levels of significance of the macro variables used. Model 2, 3 and 4 were set up to examine the direction of the relationship between external debt and balance of payments (BOP), domestic saving rate (DSAV) and debt service ratio (DSERV).

$$\text{Model 1: } EXDEBT_{it} = \beta_0 + \beta_1 GDPGR_{it} + \beta_2 PEXP_{it} + \beta_3 INF_{it} + e_{it} \quad (1)$$

$$\text{Model 2: } EXDEBT_{it} = \beta_0 + \beta_1 GDPGR_{it} + \beta_2 PEXP_{it} + \beta_3 INF_{it} + \beta_4 BOP_{it} + e_{it} \quad (2)$$

$$\text{Model 3: } EXDEBT_{it} = \beta_0 + \beta_1 GDPGR_{it} + \beta_2 PEXP_{it} + \beta_3 INF_{it} + \beta_4 DSAV_{it} + e_{it} \quad (3)$$

$$\text{Model 4: } EXDEBT_{it} = \beta_0 + \beta_1 GDPGR_{it} + \beta_2 PEXP_{it} + \beta_3 INF_{it} + \beta_4 DSERV_{it} + e_{it} \quad (4)$$

5. Empirical Analysis and Findings

Similar to the time series analysis, the variables in the panel data analysis also need to be stationary. The fact that panel data has the time aspect along with the unit aspect puts forward the necessity of researching the stationarity of the series with the aim of determining the process which creates the data (Şak, 2015: 203). Conducting the analysis with non-stationary process may lead to problems associated with risk of spurious regression (Tatoğlu, 2013: 199). Unit root tests are mainly categorized into two groups according to whether there is correlation among units (cross-section dependence) (Şak, 2015: 204; Tatoğlu, 2013: 199). The tests developed for situations where there is no cross-sectional dependency are named as first generation panel unit root tests, while the tests used where cross-sectional dependency exists, are named as second generation panel unit root tests (Şak, 2015: 204; Tatoğlu, 2013: 199). The Levin, Lin & Chu (2002) test, Harris & Tzavalis (1999) test, Breitung (2000) test, Fisher ADF test (Maddala & Wu, 1999), Fisher Philips & Peron test (Choi, 2001), Hadri (2000) test and Im, Pesaran & Shin (2003) test can be counted among the frequently used first generation panel unit root tests in the literature (Şak, 2015: 204; Tatoğlu, 2013: 199).

The Pesaran (2004) test, Bai & NG (2004) test, Phillips & Sul (2003) test, Moon & Perron (2004) test, Choi (2002) test and Chang (2002) test can be counted as second generation panel unit root tests developed by assuming that there is a cross-sectional dependency among the series belonging to the units (Şak, 2015: 222; Tatoğlu, 2013: 220). Before determining the stationarity of the series (variables) in panel data analyses, their cross-section dependence needs to be tested. If there is no cross-section dependence in the used variables, first generation panel unit root tests can be used. Second generation panel unit root tests are used with cross-section dependence. Although it is assumed that all cross-section units are affected at the same level by the shocks reaching the units in the panel data analyses and that macro-economic shocks do not affect each other, the possibility that a unit would be affected at a different level by a shock reaching one of the cross-section units which form the panel can be said to be more realistic, when the economies of our day are taken into consideration (Mercan, 2014: 235). The selected method considering this fact will yield more consistent and efficient results in the tests used in the estimations and analysis. Therefore, before determining the stationarity level of the variables, their cross-section dependence will be tested.

Cross-section dependency is tested with Breusch & Pagan (1980) CDLM1 test, Pesaran (2004) CDLM2 test, Pesaran (2004) CDLM test and Pesaran, Ullah & Yamagata (2008) CDLMadj test. Breusch & Pagan (1980) CDLM1 test is used when N is constant and $T \rightarrow \infty$. It can be said that this test will not be suitable for large cross-section observations and is used when N is large relative to T ($T > N$). Pesaran (2004) CDLM tests the cross section dependence when $N > T$. Pesaran (2004) CDLM2 is used when N and T are great ($T \rightarrow \infty$ and $N \rightarrow \infty$). However, Pesaran (2004) pointed out that this test may not be suitable when $N > T$ (Guloglu & Ivrendi, 2010:384). Therefore, Pesaran (2004) CDLM2 test is more consistent and efficient when $T > N$. The Pesaran, Ullah & Yamagata (2008) CDLMadj (Bias-Adjusted Cross-sectional Dependence Lagrange Multiplier) test is more consistent and efficient in both cases ($T > N$, $N > T$).

Table 6: Cross Section Dependence Test Results of the Variables

	CDLM Pesaran (2004) t-stat p-value	CDLM₁ Breusch-Pagan (1980) t-stat p-value	CDLM₂ Pesaran (2004) t-stat p-value	CDLM_{adj} Pesaran et al. (2008) t-stat p-value
EXDEBT	-8.895 (0.185)	35.943 (0.022)	2.306 (0.011)	5.849 (0.000)
GDPGR	-2.162 (0.015)	34.336 (0.033)	2.058 (0.020)	-0.697 (0.757)
PEXP	-2.812 (0.002)	36.472 (0.019)	2.387 (0.008)	-0.605 (0.727)
INF	21.47 (0.000)	461.231(0.000)	66.689 (0.000)	66.849 (0.000)
BOP	-1.611 (0.054)	51.565 (0.000)	4.716 (0.000)	-0.469 (0.680)
DSAV	-2.316 (0.478)	38.950 (0.010)	2.770 (0.003)	-0.075 (0.530)
DSERV	-0.054 (0.002)	34.787 (0.030)	2.127 (0.017)	-0.139 (0.555)

The results of the cross-section dependence tests are summarized in Table 6. According to the results, it is determined that there is cross-section dependency in all series of this

analysis, rejecting the null hypothesis. Therefore, it is concluded that the shocks reaching the countries also affect other countries for all variables. These results indicate strong evidence of cross-section dependence for all variables. Since it is determined that there is cross-section dependence, first generation panel unit root tests are not sufficient and thus the results of the second generation panel unit root tests need to be analyzed.

Pesaran (2007) developed the Cross-Sectional Augmented Dickey Fuller (CADF) test eliminating the first difference correlation among the units by using the augmented version cross-section averages of the ADF regression (Tatoğlu, 2013: 223). The Pesaran CADF panel unit root test is a second generation panel unit root test which also takes the cross-section dependence into account. Table 7 shows the results of the second generation panel unit root test of all the variables in the model. The results show that all variables are stationary in first difference.

Table 7: Results of Second Generation Pesaran CADF Unit Root Test*

	t-bar	Z[t-bar]	p
EXDEBT	-3.215	-3.967	0.000
GDPGR	-4.647	-7.875	0.000
PEXP	-3.025	-3.450	0.000
INF	-2.880	-3.056	0.000
BOP	-3.995	-6.097	0.000
DSAV	-	-2.860	0.002
DSERV	-2.637	-2.392	0.000

*Values show Cross-Sectionally Augmented IPS (CIPS) statistics, which are average of CADF.

The regression models estimating the external debts and their causal factors (GDPGR, PEXP, BOP, DSAV, and DSERV) for the Central Asian and Caucasian countries studied were reported according to the ordinary least squares method (OLS) using fixed effect model, random effect model and pooled model, depending on the existence of regional effects. Whether the random effect model or pooled model is suitable can be tested with the Breusch and Pagan Lagrange Multiplier (LM) test. According to the results of all models, the rejection of the null hypothesis points out that the pooled OLS would not be suitable in all models and shows that there is existence of individual effects (panel effect) against the random effects. After determining the all models used in our study has individual effects, it should be decided whether these effects are fixed or random. For this reason, the Hausman (1978) Specification test was developed in order to determine the fixed or random effects among the estimators. Hausman tests the null hypothesis that “the difference in coefficients is not systematic (random effect is suitable)” (Tatoğlu, 2012: 183). The rejection of the null hypothesis means that random effects are not suitable, and the estimator of fixed effects is appropriate. Hausman test results of all models show that fixed effects specification is appropriate in our models. In order to estimate the models created in the study, the fixed effects will be taken into account. Pooled, random and fixed effect models in the panel data analysis are based on the assumptions that there is no

presence of cross-section dependence, autocorrelation and heteroskedasticity. If one or several assumptions are not provided, this causes loss of efficiency in the estimated parameters and the misestimating of standard errors (Ün, 2015: 71). The problems of autocorrelation, cross-section dependence and heteroskedasticity in the random effect model selected for this study will be tested and the most suitable estimation method will be selected according to the results.

The existence of cross-section dependence in the created models besides the cross-section dependence of the series in the panel data analysis affects the parameters in the same way as it affects the effectiveness of the estimated model and the consistency. The cross-section dependence in the fixed effect model to be used in the study is tested with Pesaran CDLM test (2004), Friedman R test (1937) and Fries Q test. According to the results of related tests, there exist cross-section dependence for all models. Heteroskedasticity in the fixed effect model is one of the basic assumptions which arises from changing the variance of one or both of the error components for the panel units (Ün, 2015: 72). The heteroskedasticity in all models was tested with Lagrange Multiplier Test (LM) and Modified Wald test. These tests reveal that heteroskedasticity appears in all models. One of the most fundamental assumptions in the models evaluated in the panel data analysis is the fact that there is an autocorrelation between error terms. Making estimations by ignoring the autocorrelation causes the parameters to be consistent but not efficient which causes standard errors bias (Tatoğlu, 2012: 225). To examine the autocorrelation, the Wooldridge test was used in all models. The results of Wooldridge test for all estimations indicate the presence of serial correlation. The assumption tests conducted in the analysis for all models have heteroscedasticity, cross-section dependence and serial correlation problems. With this respect, the ‘panel-corrected standard errors’ (PCSE) estimator was used to estimate the models which robust to heteroscedasticity and cross-sectional dependence and serial correlation.

Table 8: Prais-Winsten (PCSE) Panel Regression Models

Dependent Variable: EXDEBT				
Variables	Prais-Winsten (PCSE) (Model 1)	Prais-Winsten (PCSE) (Model 2)	Prais-Winsten (PCSE) (Model 3)	Prais-Winsten (PCSE) (Model 4)
GDPGR	-0.0038 (-1.06)	-0.0021 (-0.62)	-0.0024 (-0.64)	-0.0020 (-0.91)
PEXP	1.5753 (8.12) ^{***}	1.6697 (7.69) ^{***}	1.2949 (7.69) ^{***}	1.1593 (5.81) ^{***}
INF	-0.000 (-3.02) ^{**}	-0.000 (-2.76) ^{**}	-0.000 (-2.62) ^{**}	-0.000 (-2.39) [*]
BOP		-1.1180 (-4.40) ^{***}		
DSAV			-0.3917 (-3.37) ^{***}	

Table 8 continued

DSERV				4.2639 (16.18)***
R ²	0.1654	0.2717	0.2075	0.6114
Wald Chi2 (Prob.)	72.32 (0.000)	62.82 (0.000)	153.19 (0.000)	346.39 (0.000)
Obs.	161	161	156	161

Notes: The t-statistics are in parentheses. ***, **, * represent %1, %5 and %10 significant level respectively. The data sample includes yearly observation for the Central Asia and the Caucasus Economies over the period 1995-2017.

The results of Prais-Winsten Regression Estimation (PCSE) are reported in Table 8. The results show that there is a negative relationship between economic growth and external debt, but this result is not statistically significant. It is determined that the estimated coefficient of the public expenditures (PEXP) has a statistically and significantly positive impact on external debt while inflation rate has a negative impact on external debt in all the estimated models. Negative and statistically significant effect of balance of payment (BOP) found in Model 2, which is one of the important financing sources of the external debt. It can be stated that current account balance is among the basic dynamics for the external debt in the sustainability process of current deficit for these countries. The impact of the debt service (DSERV) on the external debt is statistically significant and positive at the 1% significance level in Model 4. External debt level has a positive effect in meeting the debt service (total of principal amount and interest payments) in the borrowing policies for Central Asian and Caucasian countries. Paying the debts with new borrowings (refinancing debts) will cause the debt rollover ratios in the external debt policies to increase and will cause negative developments in the debt management. Moreover, it is determined that there is a negative and significant relationship between domestic saving rate (DSAV) and external debt in Model 3. Therefore, when the relevant period and data set are considered, the domestic saving rate negatively affects the external debt for Central Asian and Caucasian countries. For the period under analysis, it can be stated that the change in the public expenditures and debt service ratio caused a positive and statistically significant effect on external debt, on the contrary, current account balance and domestic saving rates affect external debt in the negative direction. In addition to this, it is concluded that economic growth negatively affected the external debt but is statistically insignificant.

6. Conclusion

The factors affecting the external debt for developing countries in the literature include deficits in balance of external payments, problems arising from the insufficiency of domestic savings, high public expenditures and budget deficits, economic growth, financing development, debt stocks and increases in the debt burden. In this study, the factors affecting the external debt are analyzed for Central Asian and Caucasian countries over the period 1995-2017. First, the existence of cross-sectional dependence among the variables is investigated and the Cross-Sectional Augmented Dickey-Fuller Test (CADF) developed by Pesaran (2006), which considers the cross-sectional dependency, is used to investigate the stationarity of

variables. In addition to this, the relationship among external debt and the factors affecting external debt are estimated by using the panel regression method. It is determined, as a result of the panel unit root test, that variables are stationary in first difference. Panel regression results show that public expenditures and debt service positively affect external debt. On the contrary, current account balance and domestic saving rates negatively affect external debt. It is concluded that economic growth affected the external debt but is statistically insignificant. These results consistent with the empirical findings of Edo (2002), Karagöz (2007), Koyuncu & Tekeli (2010), Uzun et. al. (2012) and Peker & Bölükbaş (2013). The results of this study show that external debt is used as an important source in financing public expenditures, current account deficits and external debt repayments in Central Asian and Caucasian countries. With this perspective, the main results of this study supports the empirical results of Uzun et. al. (2012). With these findings, this study contributes to the literature by providing an empirical analysis of the determinants of external debt in Central Asian and Caucasian countries.

In this study, the main factors empirically affecting external debt in Central Asian and Caucasian countries are determined to be public expenditures, domestic saving rate, foreign trade deficit and debt service. It can be said that public expenditures, foreign trade deficit and domestic saving level are variables that are interrelated in terms of external debt for these countries. The fact that debt service is positively related to the external debts is seen as a sign of financing the external debt payments with new debts and this caused the debt rollover ratios to increase and led to negative developments in debt management. When these results are taken into consideration, the following suggestions can be made for these countries. It is needed to prioritize policies focusing on export and foreign exchange revenues and to keep external debt credibility high in order to decrease the foreign trade deficits of the countries. Policy makers need to take measures to strengthen the balance of payments and foreign exchange reserves to prevent future problems in debt service.

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