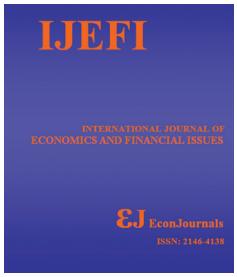

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External Borrowing and Inflation in Turkey Between 2003 and 2015: A Simple Linear Regression Analysis

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ABSTRACT

An economy using external resources can aim at several targets e.g. growth, public financing, covering a deficit in the balance of payments. However, external/foreign debt/borrowing (EXB) may result in some negative impacts such as a vicious cycle of increase in external debt, a decline in economic growth, huge budget deficits and an imbalance of payments in addition to inflation. This study examines the influence of external debts on inflation in Turkey from 2003 to 2015. In this context, the effect of external debt is measured by means of a simple linear regression analysis using both the consumer price index and the producer price ındex. The general opinion with regard to the effect of external debt on inflation is that they are positively related. Here this is confirmed for Turkey for the said period. The results show that both consumers and producers are negatively affected by external debt in terms of inflation.

Keywords: External/Foreign Debt/Borrowing, Growth, Inflation, Consumer Price Index, Producer Price Index, Regression
JEL Classifications: E31, F34, H6

1. INTRODUCTION

External/foreign debt/borrowing (EXB) is one of the financial resources from which any economy lacking the benefits of internal savings can profit. External debt stock is defined by the Central Bank of Turkey (2015b) as "the remainder of current and unconditional liabilities used at any time by the residents of an economy owed to nonresidents, and which requires payment of principal and/or interest on a due date." The foregoing is classified as short or long according to its term. Short term debt includes the credit which is due up to 1 year (365 days), whereas long term debt becomes due in excess of 1 year. As stated by Adıyaman (2006: 22), there are further classifications concerning external debt, one of which is related to the borrower. If the borrower is a government the debt is classified as public, whereas the debt is private if the borrower is other than a government. In this context, where "borrowing" is generally considered as accepting money or similarly valuable objects to be returned after a specific time, government borrowing can also be defined as obtaining credit by a government or a governmental institution from sources other than its own.

The other sort of EXB, private borrowing, is that executed by private institutions such as banks, companies etc. for various purposes; the financing of their projects, budgets, and foreign transactions for example. As the majority of such debts are, in fact, guaranteed by national governments (the Undersecretariat of the Treasury in Turkey's case), they can also be considered, indirectly, as public debts because, should they not be repaid by the private institutions, they are ultimately nationalised and paid by the government. Chile's debt nationalisation in 1982 is an example (Kim and Zhang, 2012: 121). Chilean total foreign debt reached as high as 20 billion dollars in 1982, of which two thirds was private debt incurred by leading domestic private banks. When the Latin American economic crisis led to the cutting of new loans six top private banks failed and the government of chile nationalised the debts as it was assumed to be responsible for private EXB.

According to Evgin (2000: 24), financial resources for a country's capital accumulation can be obtained from three sources: Domestic individual and institutional savings by lowering consumption; net foreign exchange flows through foreign trade and touristic activities; and foreign savings resulting from international

assistance and borrowing. Lessard (1986: 3) states that countries need external financing or EXB for the following reasons: Inadequate internal savings; industrialisation and development efforts that require financing; dependence on external assistance due to low industrial production resulting from the importation of intermediate goods; inadequate foreign trade; the balance of payments and the amount of national foreign exchange; excessively large military expenses; public sector deficit; expensive domestic financing compared to foreign financing; the economy being open to short term capital flows; and the necessity of rendering external debts which become due.

One of the main aims of EXB resulting from any of the above reasons, is to provide growth in an economy. States are, therefore, willing to accept external debts in order to increase economic growth. In Evgin's view (2000: 25), however, a state is also like an individual who, to maximise its productivity, accepts EXB to a point where its marginal social utility is equal to its marginal social cost. Furthermore, for developing countries there is an upper limit to the efficient use of foreign resources. This limit is called "absorption capacity" and according to those who assert this opinion, external debt should be received for only as long as it increases productivity in an economy. An increase in investments made through EXB may be subject to the "Law of Diminishing Returns." That is, any increase in the volume of production following each new investment will decrease gradually with time and may eventually fall below the principal and interest service. Continuation of EXB above this limit results in a net loss for an economy.

Wang (2009: 282-283) refers to the conventional wisdom that low income and low savings rate countries could grow faster with foreign capital inflow on condition that this international borrowing is used for productive purposes. In this context, financial resources should always be allocated to encourage accumulation of physical capital and to stimulate private investment as this will lead to economic growth. In this context, Fuhmei, in his paper on the relationship between public sector foreign borrowing and economic growth, reaches the following conclusion: Only under circumstances of moderate income tax rates to guarantee the solvency of external loans, and households having the patience to substitute consumption between different periods, can government finance fiscal deficits by borrowing from abroad, thereby enhancing investment and economic growth.

Prokop and Baranowska-Prokop (2012: 321) examine the efficiency of foreign investment borrowing and its effect on the economic growth of Poland in the 1970s. Based on their econometric analysis, they conclude that the efficiency of foreign investment borrowing was relatively high, which means proving/confirming that external sources can provide economic growth. To show the positive effect of EXB on economic growth, Burguet and Fernandez-Ruiz (1998: 328) studied countries Malaysia, Indonesia, and especially South Korea. As these countries sustained high growth rates for the years from 1965 to 1989, their respective annual rates of gross domestic product (GDP) per capita growth being, on average, 4, 4.4, and 7%, and they can be given as good examples. Their economic structure changed dramatically in this period: The share of manufacturing doubling in the first two cases and tripling in the case of Korea. And in Indonesia, as in Malaysia, development expenditures such as irrigation projects, village works or school programmes were an important component of the development process.

Conversely, EXB can result in some negative problems for an economy. In this context, Akdiş (2003: 15) states that it is not possible for a government to adequately perform its basic duties such as the provision of education, health, security, and justice services - which absorb approximately 50% of its budget, and when almost all taxation incomes are reserved to service interest debt. An indebted country which has budget deficits enters a vicious cycle of repeated borrowing in order to pay back its accrued debts. EXB may also result in other negative problems such as a disequilibrium in income distribution and taxation, shortcomings in savings and investment mechanisms and so on. EXB can be a root cause of inflation as well.

The effects of EXB on inflation in Turkey have been studied before. This paper, however, will focus specifically on the period 2003-2015. There are two main reasons for selecting the said years, the first of which is to see if the positive relationship between EXB and inflation continues to exist during this period as Turkey gradually improves its economic structure immediately following the most dramatic effects of the South Asian Economic Crisis that began in 1997 and which was deeply felt in Turkey from 1999 to 2001. The second reason is that inflation indices began to be calculated more systematically from 2003 onwards.

In this paper, a literature review is given first and then a simple linear regression analysis is made using both consumer price index (CPI) and producer price index (PPI). However, before the regression analysis the autocorrelation, causality, and heteroscedasticity of the variables were examined to remove the spurious regression problems by checking the levels of integration of data set. The aim in using both indices is to see the nature of the effects of external debt on consumers and producers in Turkey from 2003 to 2015. At the end, some proposals are made towards lowering the negative effects of EXB on inflation and other economic aggregates. While sources for litearature review include articles, reports etc., those for regression analyses involve data provided by the Statistical Institute of Turkey and the Treasury of Turkey.

2. LITERATURE REVIEW: INTERACTION BETWEEN EXTERNAL DEBT AND INFLATION

There are two opposing views with regard to the effects of EXB on prices. While one view asserts that borrowing causes an inflationary effect, the other asserts that it results in a deflationary effect by playing a restrictive role in an economy (Adıyaman, 2006: 37). The common characteristic of theoretical approaches is in their agreement that there is an interaction between borrowing and inflation. The majority of such approaches propose that both internal and EXBs have inflationary effects (Sugözü and Yiyit, 2010: 371). This is confirmed by several studies one of which is

by Ulusoy and Küçükkale (1996: 23) who made an econometric analysis based on data of Turkey from 1965 to 1994. Using the Granger Causality Test they found that foreign borrowing increases inflation in Turkey.

In a paper by Karakaplan (2009: 215), the following two hypotheses are tested: The first states that the external debt is less inflationary if financial markets are well developed; the second is that the effects of the determinants of inflation are heterogeneous across countries in their extent and signs. For this purpose, using an unbalanced panel data set that includes 121 countries in different groups (Latin American, European Union, high inflation, and transition countries) for the period 1960-2004, his analysis offers robust empirical support for these hypotheses.

Cardoso and Fishlow (1990: 324) state that inflationary deficit finance leads inevitably to two types of vicious circle. First, if government prices are adjusted with delays and income taxes are collected on the basis of incomes earned 1 year before (Olivera-Tanzi effect), higher inflation itself increases the budget deficit, inducing even larger increases in money. Second, the share of the inflation tax in output is inversely related to velocity. Since velocity increases with inflation, increasing budget deficits will require further increases in money creation as velocity responds to increasing inflation rates. This is a vicious circle, and when EXB is made it causes an increase in the money supply followed by inflation, which in turn further increases the need for foreign debt.

Ulusoy and Küçükkale (1996: 23) mention that external debt, however acquired, increases the cash capital accumulation of a debtor country in terms of foreign exchange. If this excess cash is shifted to unproductive areas due to an insufficiency of investment incentives and/or a high propensity to consumption, it results in increases in domestic prices - a phenomenon of inflation. The same effect will be seen if the debts are used in infrastructural investments because the expenditure for such an investment will immediately stimulate consumption (accelerator), while the contribution of the investment to production (multiplier) will be revealed later. They state that using external resources for public financing and import financing can also be seen as applications which accelerate inflation.

Demir and Sever (2009: 14) say that when it comes to borrowing in terms of public financing, EXB by the state and the use of foreign exchange are generally considered. The relationship between budget deficit and borrowing becomes more evident in those economies that have weak capital markets and lack borrowing possibilites. Since internal borrowing possibilities are limited, public financing need is covered by EXB. Duran (1996: 450), finds that external debts result in an inflationary effect when public financial deficit is met by exchanging foreign exchange reserves with national currency used for public expenditures. As this causes emission, the result is an increase in aggregate demand. In addition, the use of foreign exchange generated through the EXB mechanism for the purpose of public financing narrows import capability and thus has a negative effect on the aggregate supply. As aggregate supply decreases to below aggregate demand this leads to inflationary pressure.

As stated by Akdiş (2003: 7), the Public Sector borrowing requirement (PSBR) demolishes the public financing balance and increases inflationary pressure. The Public Sector then endeavours to cover its deficit either by raising its net pecuniary liabilities or by borrowing from the private sector through bond sales. In that case, there will be a direct relationship between public sector net pecuniary liabilites and money stock. Thus, when the public deficit increases, money stock has to be increased as well unless the deficit is covered through bond sales. This direct relationship between public deficit and money stock becomes the most important factor indicating the character of the inflation phenomenon. Akdiş says, therefore, that PSBR and its continuity supports inflationary increases. As an extension of this relationship, Demir et al. (2005: 264), in an empirical analysis about Turkey, find that PSBR is in positive relation with interest rates and inflation.

Duran (1996: 436) asserts that although PSBR is one of the important reasons for inflation it is not the sole reason. As PSBR affects inflation through emission, it plays an increasing role while budget deficits are covered by credit mechanisms and when there is a disequilibrium between equity and foreign sources. Demir and Sever (2009: 24), in their paper concerning the relationship between budget deficits and borrowing by Turkey, Azerbaijan, Kazakhstan, and Kirgyzstan, find the following: In Azerbaijan, increasing budget deficits raise external debt depending upon insufficiencies in national savings. In Turkey, Kazakhstan, and Kirgyzstan, however, PSBR is, in some periods, met by other resources (internal borrowing, tax or emission) rather than by EXB.

In their study whose findings regarding sustainability of fiscal deficit have an important bearing on macro-economic policies, Chaudhary and Anjum (1996: 784) focus on analysing the sustainability of fiscal deficit in Pakistan. In this context they indicate that inflation, unemployment, increasing debt burden, and debt-servicing are linked to fiscal deficit. Thus, there is a need to keep the fiscal deficit within a limit consistent with other macro-economic variables like inflation, debt etc. They say that doing so may help to stabilise the economy and resolve the related economic problems.

Evgin (2000: 11) states that one of the influences of foreign debt increases is rising interest rates. A state may have to increase the interest rates of its bonds to cover a budget deficit. An upward tendency in interest rates increases the share of interest service in budgetary expenses and this raises budget deficits. The rise in interest rates leads to negative effects on consumption and investment expenses. In their study on Australia, Makin and Narayan (2013) examine the impact of capital inflow on interest rates. They show that rising net capital inflow has had a statistically significant negative impact on domestic real interest rates in Australia, an Asia-Pacific economy that has borrowed heavily from abroad since the mid 1980s.

Ulusoy and Küçükkale (1996: 23) state that it is also possible to meet inflation phenomena during repayment of external debts. A country liable to repay its due debts has to increase its export revenues. This requires one of the simplest solutions; devaluation. While devaluation increases exports it makes imports expensive,

resulting in cost increases in foreign input-using sectors. These costs are reflected in prices, leading to an inflationary process. On the other hand, as a result of an increase in exports, a shrinkage in supply will occur in some sectors and this too will cause increased pressure on prices. They indicate that the economic crisis in 1994 (5th April) in Turkey happened in just this way. In the said period, the inflation rate was very high (150%) while growth rate was negative (−6%).

As can be seen from Table 1, external debt results in inflationary effects in many aspects. However, it should be noted that the main economic fact underlying this relationship is the insufficiency of supply to demand.

3. EXB AND INFLATION IN TURKEY FROM 2003 TO 2015

Quarterly total external debt stock of Turkey from 2003 to 2015 is available in Table 2.

As can be seen in Table 2, the external debt stock of Turkey increased gradually between 2003 and 2015. The amount of debt eventuated as 130,931 million US Dollars in early 2003 reaching 405,223 million US Dollars in the midst of 2015. Many ratios are used to calculate the external indebtedness rate of a country. The commonly accepted external indebtedness ratios can be classified into four groups as shown in Table 3.

In accordance with the data for 2014, the following interpretations could be made by considering the commonly accepted external debt ratios of Turkey in Table 3:

- External debt/GDP in Turkey is 50.4% which remains within normal limits. Turkey, therefore, takes its place in the table of medium level indebted countries in terms of this ratio
- External debt/exports in Turkey is 255.5% which is also between the accepted limits. It shows that the export volume of Turkey allows it to cover a certain amount of its external debt stock
- External debt service/exports in Turkey is 31.2%. This ratio is above the upper limit. Although it is not in a very risky position, Turkey has a fragile capacity to render its principal and interest rate by its export revenues
- Interest service/export in Turkey is 6.3%. This is below even the lowest level of the commonly accepted ratio. This proves that the external debt interest can be paid easily through export gains.

As Karagöz (2007: 100) mentions, the World Bank takes two main measures into account with regard to borrowing. The first is "external debt/GDP" and the second "external debt service/exports." These two measures show the repayment capacity of a country. From a different point of view, since the first measure indicates revenue generating capacity and the second shows the foreign exchange-gaining possibility of an economy, they are significant for both internal and EXBs. While for Turkey the "external debt/GDP" lies between the commonly accepted rates, the rate of "external debt service/exports" was above the said limit as of end of 2014. The external debt service should, therefore, be tackled with care.

As shown in Table 4, starting from 2003 to 2015, there has, with minor exceptions, always been an upward tendency in inflation, in terms of CPI. This holds good for PPI too, as can be seen in Table 5.

Considering the inflationary process of Turkey from 2003 to 2015 in terms of both CPI and PPI, it may be asserted that there is a positive relationship between external debt and inflation. However, this requires to be tested. For this purpose a simple linear regression analysis has been made under the following title.

4. METHODOLOGY AND FINDINGS; REGRESSION ANALYSIS FOR THE EFFECTS OF EXTERNAL DEBTS ON INFLATION IN TURKEY FROM 2003 TO 2015

Here, the effect of EXB on inflation rates in Turkey is measured through a simple linear regression analysis. In this context, both CPI and PPI are used. The aim is to confirm that EXB by Turkey had a positive effect on the inflation rate between 2003 and 2015. 50 observations of EXB, CPI, and PPI were used in the analysis. EXB data were collected from the Public Finance statistics of the Treasury of Turkey, while CPI and PPI data were taken from the

Table 1: Interaction mechanism between external debt and inflation

Subject	Usage area/mechanism	Impact	Economic fact	Result
External debt	Unproductive investments	Production insufficiency	Demand>supply	Inflation
External debt	Infrastructural investments	Production insufficiency (accelerator effect)	Demand>supply	Inflation
External debt	Public financing	Increase in emissions (multiplier effect)	Demand>supply	Inflation
External debt	Public financing	Decrease in imports; (decreases in machinery and equipment imports lower production capacity)	Demand>supply	Inflation
External debt	Public financing	Increases in interest rates cause a decrease in investments (crowding out effect)	Demand>supply	Inflation
External debt requirement	Public financing	Increases in budget deficits cause increase in emissions	Demand>supply	Inflation
External debt repayment	Devaluation	Increase in export volume (concentrating on foreign markets and neglecting the domestic markets)	Demand>supply	Inflation
External debt repayment	Devaluation	Decrease in imports (decreases in machinery and equipment imports lower production capacity)	Demand>supply	Inflation
External debt repayment	Devaluation	Increase in import cost (increases in the costs of production factors)	Demand>supply	Inflation

Table 2: Quarterly external debt stock of Turkey from 2003 to 2015 (million USD)

Quarter	Amount	Quarter	Amount	Quarter	Amount	Quarter	Amount
2003 Q1	130,931	2007 Q1	214,220	2011 Q1	301,994	2015 Q1	393,135
2003 Q2	135,040	2007 Q2	224,492	2011 Q2	313,683	2015 Q2	405,223
2003 Q3	138,722	2007 Q3	236,444	2011 Q3	312,123		
2003 Q4	144,161	2007 Q4	250,012	2011 Q4	303,931		
2004 Q1	144,800	2008 Q1	265,048	2012 Q1	316,747		
2004 Q2	147,353	2008 Q2	287,156	2012 Q2	322,691		
2004 Q3	153,105	2008 Q3	291,984	2012 Q3	327,496		
2004 Q4	161,139	2008 Q4	280,957	2012 Q4	339,042		
2005 Q1	160,322	2009 Q1	265,563	2013 Q1	352,109		
2005 Q2	162,686	2009 Q2	268,180	2013 Q2	367,803		
2005 Q3	166,472	2009 Q3	271,275	2013 Q3	373,499		
2005 Q4	170,750	2009 Q4	268,963	2013 Q4	389,146		
2006 Q1	185,545	2010 Q1	267,487	2014 Q1	388,244		
2006 Q2	191,622	2010 Q2	265,741	2014 Q2	402,368		
2006 Q3	197,246	2010 Q3	284,062	2014 Q3	397,781		
2006 Q4	208,108	2010 Q4	292,057	2014 Q4	402,720		

Source: Treasury of Turkey (2015), Public Finance Statistics. Retrieved on 15 October 2015 from the Treasury of Turkey Web site: http://www.treasury.gov.tr/en-US/Stat-List?mid=738&cid=12&nm=684

Table 3: Commonly accepted external debt ratios and Turkey (%)

Ratios	Commonly accepted ratios	Debt ratios in TR (2014)
External debt/GDP	30-60	50.4
External debt/exports	165-275	255.5
External debt service/exports	18-30	31.2
Interest service/exports	12-20	6.3

Source: Treasury of Turkey (2015), Public Finance Statistics. Retrieved on 15 October 2015 from the Treasury of Turkey Web site: http://www.treasury.gov.tr/en-US/Stat-List?mid=738&cid=12&nm=684, Central Bank of Turkey (2015-a), balance of payment statistics. Retrieved on 16 October 2015 from the Central Bank of Turkey Web site: http://www.tcmb.gov.tr/wps/wcm/connect/TCMB+EN/TCMB+EN/Main+Menu/STATISTICS/Balance+of+Payments+and+Related+Statistics/Balance+of+Payments+Statisticss/, Statistical Institute of Turkey (2015-b), National Accounts. Retrieved on 15 October 2015 from the Statistical Institute of Turkey Web site: http://www.turkstat.gov.tr/UstMenu.do?metod=temelist, Akdiş, M. (2003:3), Calculations were made with data obtained from the Treasury, Central Bank, and Statistical Institute of Turkey, GDP: Gross domestic product

inflation and price statistics of the Statistical Institute of Turkey. It should be noted that as there were only monthly data for CPI and PPI, the quarterly rates were calculated and used by the Author in the analysis. Monthly values are available in Appendix 1.

However, as Granger and Newbold (1974: 111-112) pointed out, since regression analysis with time series data may lead to spurious regression problems if the data are non-stationary, the levels of integration of the data set should be checked before starting the analysis. In this context, the autocorrelation, causality, and heteroscadasticity of the variables were examined. For these, linear unit root tests by Dickey-Fuller (Augmented Dickey-Fuller: ADF) and Phillips-Perron (PP) plus Granger Causality Tests were applied. Also heteroscadasticity of the variables was tested. The aim of such tests was to figure out whether regression results were unbiased and efficient. The tests were performed through the EViews 8 while the regression analyses were performed through the MS Excel.

4.1. Tests for the Variables of the Analysis

According to the Dickey-Fuller (ADF) Unit Root Test (1981) the presence/absence of unit root is very significant in figuring out whether a time series is stationary. The series is appropriate for the analysis if it has a unit root and can be removed by the differencing method. Here the "τ (tau)" statistic of the Monte Carlo Study by Dickey and Fuller (1979) is used. If the absolute value of "τ (tau)" exceeds the absolute critical values by Dickey-Fuller or MacKinnon Dickey-Fuller, the assumption of stationarity of time series cannot be rejected. If "Ho: p=1" is rejected then the time series is stationary.

The Dickey-Fuller test assumes that error terms are statistically independent and have constant variance. Therefore, one should be sure that there is no correlation between error terms and they have constant variance (Altunöz, 2013: 187). Phillips and Perron (1988), broadened this assumption of Dickey-Fuller. They ignored the independence and homogenity assumptions of Dickey-Fuller and supposed weakly dependent and possibly heterogenously distributed data. Thus, it is clear that PP did not take into consideration the restrictions on the assumptions of error terms when developing Dickey-Fuller t-statistics.

According to the results in the Table 6, ADF-t statistical values for EXB, CPI, and PPI exceed Mackinnon's (1991) critical value of 5% significance level. Therefore; EXB, CPI, and PPI variables are stationary according to first differences. All variables are stationary although they are at different significance levels. In other words, the variables used in this analysis do not contain unit roots and there is no contrariness for the predictions.

However, for the autocorrelation problem lag numbers are used.

As available in the Table 7, autocorrelation problem is solved when a lag length of 2 is used.

The polynomial can be assessed as an indicator of the stationarity of the model as well.

As can be seen in Figure 1, the position of inverse roots of the AR characteristic polynomial of the model also shows that there is no problem in terms of the stationarity of the Model. As none of the inverse roots are outside the unit encirclement, the established

Table 4: Quarterly CPI in Turkey from 2003 to 2015 (%)

Quarter	Rate	Quarter	Rate	Quarter	Rate	Quarter	Rate
2003 Q1	96.37	2007 Q1	136.64	2011 Q1	183.74	2015 Q1	252.64
2003 Q2	99.75	2007 Q2	139.68	2011 Q2	188.40	2015 Q2	259.92
2003 Q3	100.49	2007 Q3	139.17	2011 Q3	188.69		
2003 Q4	103.39	2007 Q4	144.63	2011 Q4	198.95		
2004 Q1	105.51	2008 Q1	148.68	2012 Q1	203.02		
2004 Q2	107.15	2008 Q2	154.12	2012 Q2	206.14		
2004 Q3	108.61	2008 Q3	155.38	2012 Q3	205.76		
2004 Q4	113.13	2008 Q4	160.44	2012 Q4	212.42		
2005 Q1	114.60	2009 Q1	161.12	2013 Q1	217.65		
2005 Q2	116.38	2009 Q2	162.90	2013 Q2	220.52		
2005 Q3	117.20	2009 Q3	163.67	2013 Q3	222.85		
2005 Q4	121.75	2009 Q4	169.60	2013 Q4	228.30		
2006 Q1	123.86	2010 Q1	176.09	2014 Q1	235.09		
2006 Q2	127.56	2010 Q2	177.92	2014 Q2	241.25		
2006 Q3	129.89	2010 Q3	177.39	2014 Q3	243.44		
2006 Q4	133.71	2010 Q4	182.20	2014 Q4	248.30		

Source: Statistical Institute of Turkey (2015-a), inflation and price. Retrieved on 15 October 2015 from the Statistical Institute of Turkey Web site: http://www.turkstat.gov.tr/UstMenu.do?metod=temelist. The quarterly rates were calculated by the monthly values of the Statistical Institute of Turkey. Monthly values are available in the Appendix 1, CPI: Consumer price index

Table 5: Quarterly PPI in Turkey from 2003 to 2015 (%)

Quarter	Rate	Quarter	Rate	Quarter	Rate	Quarter	Rate
2003 Q1	97.33	2007 Q1	136.39	2011 Q1	185.61	2015 Q1	239.35
2003 Q2	101.09	2007 Q2	139.11	2011 Q2	189.52	2015 Q2	247.45
2003 Q3	98.93	2007 Q3	140.55	2011 Q3	192.79		
2003 Q4	100.80	2007 Q4	142.63	2011 Q4	200.56		
2004 Q1	106.34	2008 Q1	147.81	2012 Q1	203.22		
2004 Q2	110.86	2008 Q2	161.42	2012 Q2	203.51		
2004 Q3	109.63	2008 Q3	161.88	2012 Q3	202.23		
2004 Q4	115.48	2008 Q4	158.61	2012 Q4	206.32		
2005 Q1	115.63	2009 Q1	156.52	2013 Q1	207.30		
2005 Q2	119.50	2009 Q2	158.89	2013 Q2	209.67		
2005 Q3	121.38	2009 Q3	159.50	2013 Q3	215.19		
2005 Q4	122.25	2009 Q4	162.58	2013 Q4	219.67		
2006 Q1	123.83	2010 Q1	167.85	2014 Q1	231.78		
2006 Q2	130.63	2010 Q2	173.33	2014 Q2	233.41		
2006 Q3	135.66	2010 Q3	173.42	2014 Q3	236.12		
2006 Q4	135.41	2010 Q4	177.18	2014 Q4	237.82		

Source: Statistical Institute of Turkey (2015-a), inflation and price. Retrieved on 15 October 2015 from the Statistical Institute of Turkey Web site: http://www.turkstat.gov.tr/UstMenu.do?metod=temelist., The quarterly rates were calculated by monthly values of the Statistical Institute of Turkey. Monthly values are available in Appendix II, PPI: Producer price index

Table 6: Linear unit root test results

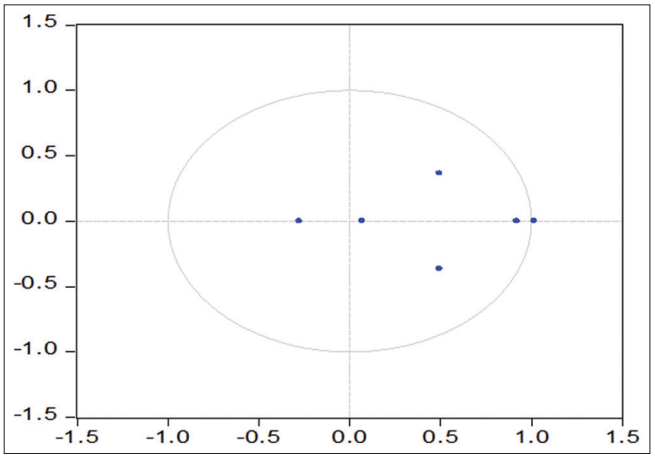
Variable	ADF statistics (level)	PP statistics (level)
EXB	–2.922	–2.922
CPI	–2.926	–2.922
PPI	–2.928	–2.928
Variables on first differences (constant and inconstant)		
EXB	–3.506	–3.506
CPI	–3.518	–3.506
PPI	–3.510	–3.506

MacKinnon 5% critical value: Level (constant): –2.9; First difference (constant and inconstant): –3.5, Lags were determined in accordance with the Schwarz Information Criterion, Tests were performed through EViews 8, EXB: External borrowing, PPI: Producer price index, CPI: Consumer price index, PP: Phillips-Perron, ADF: Augmented Dickey-Fuller

Table 7: Lags for autocorrelation problem

Lags	LM-statistics	Probability
1	5.960573	0.7439
2	3.529407	0.9396
3	6.454472	0.6937
4	5.482571	0.7904
5	8.745679	0.4611
6	3.569288	0.9374

Figure 1: Inverse roots of AR characteristic polynomial



VAR system is stable and there are no different variances. Thus, the Model is stable in this context.

At this stage, the variables should be settled from outer to inner in the VAR analysis prediction. For this, the granger causality test that can

be done through VAR analysis with positive significance test results following the determination of appropriate lag numbers is applied.

As can be seen in the Table 8, there is a causality between CPI→PPI at 5% significance level. However, there is no relation between other variables (PPI→CPI, CPI→EXB, PPI→EXB, EXB→CPI, EXB→PPI).

The results of the white heteroscedasticity test applied to determine whether the variance of error terms is constant for whole sample, are shown Table 9.

It is seen in the Table 9 that the variance of time error term is constant for all observations. That is, there is no variance problem (p=0.8458>5%). In this case, "Ho" is accepted and an inconstant variance problem is not available (null hypothesis: No heteroscedasticity).

4.2. Model 1: Simple Linear Regression Analysis for EXB and CPI

This model includes 50 observations for the period 2003-2015. The regression analysis summary outputs are available in the Appendix 3. Variables of the model are as follows:

Dependent variable (Y) : CPI
Independent variable (X) : EXB

As the relationship between the variables of the model is positive, a linear regression analysis is applied.

Y	$= \beta_0$	$\beta_1 X$	+	Ɛ
Inflation (CPI)	$= \beta_0$ +	β_1 (EXB)	+	Ɛ
Y	= 21.75424209 +	0.000546646 X	+	Ɛ
Standard Error	: (4.083334534)	(1.46847E-05)		
$t_{statistics}$	: (5.327567924)	(37.22559373)		
R^2	= 0.966521239			
Adjusted R^2	= 0.965823765			

Assessments of the results are as follows:

- β_0: 21.75; even if there is no EXB, there will be a CPI of 21.75.
- β_1: 0.00055; 1 unit EXB causes a 0.00055 unit increase in CPI.

Now, we try to figure out if the model is significant. For this purpose F-test shall be applied. Here are the hypotheses:

Table 8: Granger causality test results

Model	Statistic (χ^2)	Lag	Probability	Causality
PPI→CPI	0.608191	2	0.7378	Unavailable
CPI→PPI	8.678073	2	0.0130*	Available
CPI→EXB	1.638277	2	0.4408	Unavailable
PPI→EXB	2.368730	2	0.3059	Unavailable
EXB→CPI	0.031739	2	0.9843	Unavailable
EXB→PPI	2.989692	2	0.2243	Unavailable

Lags were determined in accordance with the Akaike Criterion, *shows 5% significance level

Table 9: White heteroscedasticity test results

Chi-squares	df	Probability
59.85760	72	0.8458

- H_0: β=0 (It is not significant that the model best fits the population from which the data were sampled; that is Model is not significant).
- H_1: β≠0 (It is significant that the model best fits the population from which the data were sampled; that is Model is significant).

If F value > critical value of F distribution, then the null hypothesis is rejected. As F value=1385.745 > critical value of F distribution=1.61, we reject the null hypothesis. That is the Model is significant which means that EXB increases CPI.

It is time to check whether the coefficients are statistically significant. For this purpose, T-test shall be applied and, in this context, the values of $t_{statistics}$ and t_{table} shall be compared. Here are the hypotheses:

- H_0: β=0 (a unit change in X does not make any change in Y; that is, there is no correlation between these two variables).
- H_1: β≠0 (a unit change in X makes a significant change in Y; that is, there is a correlation between these two variables).

If the value of α is 0.05, then t_{table} is 1.68. In this case if $t_{statistics} > t_{table}$, it means that the coefficients are statistically significant. As $t_{statistics}$ for β_1 =37.23 > t_{table} for β_1=1.68, coefficient β_1 is statistically significant which means that there is a positive correlation between EXB and CPI.

Another measure to interpret the model is the coefficients of determination:

R^2 = 0.966
Adjusted R^2 = 0.966

Values of coefficients of determination show the strength of the relationship between the dependent and independent variables. Both R^2 and Adjusted R^2 are high (97%) which means that the model is reliable. In a word, these coefficients show that the 97% increase in the CPI is explained by EXB in Turkey for the period 2003-2015.

4.3. Model 2: Simple Linear Regression Analysis for EXB and PPI

This model also includes 50 observations for the period 2003-2015. The regression analysis summary outputs are available in Appendix IV. Variables of the model are as follows:

Dependent variable (Y) : PPI
Independent variable (X) : EXB

As the relationship between the variables of the model is positive, a linear regression analysis is applied here too.

Y	$= \beta_0$	+ $\beta_1 X$	+	Ɛ
Inflation (PPI)	$= \beta_0$	+ β_1 (EXB)	+	Ɛ
Y	= 30.01116	+ 0.000508 X	+	Ɛ
Standard Error	: (3.559362)	+ (1.28E-05)		
$t_{statistics}$	: (8.431611)	(39.66731)		
R^2	= 0.970398			
Adjusted R^2	= 0.969781			

Assessments of the results are as follows:

- $\beta_{0:}$ 30.01; even if there is no EXB there will be a PPI of 30.01.
- $\beta_{1:}$ 0.00051; 1 unit EXB causes a 0.00051 unit increase in PPI.

For showing the significance of the Model we apply F-test. As F value=1,573.496 > critical value of F distribution=1.61, the null hypothesis is rejected. That is the Model is significant which means that EXB increases PPI.

As another component of model assessment for checking whether the coefficients are statistically significant, T-test shall be applied.

As $t_{statistics}$ for β_1 =39.67 > t_{table} for β_1=1.68, coefficient β_1 is statistically significant. That is, EXB increases PPI.

The interpretation of determination coefficients is given below:

R^2 = 0.970
Adjusted R^2 = 0.970

In this model, both R^2 and Adjusted R^2 are high (97%) which means that the model is reliable. That is, the 97% increase in PPI is explained by EXB in Turkey in the said period.

5. CONCLUSION

Different views on borrowing can be found. As quoted by Tuna (2014), while David Ricardo defined public borrowing as "an awful scourge invented at any time to torment the people," nearly 100 years later, Lorenz von Stein, a Finance Officer in Germany, opposing this idea said that "a debtless country either does fewer things for its future or demands many things from the moment." Considering these approaches it is clear that on the one hand, while inflation as a result of EXB becomes a means to torment the people, on the other hand it is also the result of investment, public financing, growth etc.

In this paper, both effects have been examined for Turkey. Firstly, the simple linear regression analyses confirm that the use of EXB has resulted in increased inflation rates. These analyses show that both the CPI and the PPI have been affected by the EXB in Turkey from 2003 to 2015. That is, EXB has increased both CPI and PPI through various mechanisms. Secondly, it is obvious that EXB has had some positive results on some economic aggregates such as investments, the public budget and growth. However, these have also had indirect effects on inflation due to some negative aspects of Turkey's economy. One of which may, be the lack of well organised financial markets in addition to other shortfalls. The main factors for foreign debt being a cause of inflation in the economy of Turkey may be a misuse of these sources for unproductive investments, huge infrastructural investments, public deficits, and an imbalance of payments.

Ulusoy and Küçükkale (1996: 24), while considering that external debts used for infrastructural investments cause inflation, say that if external debts were used to finance income-generating investments (especially for gaining foreign exchange), the debts could be repaid and factor endowments increased in favour of capital. Thus, it would be possible to provide growth without accelerating the inflationary process.

Duran (1996: 442) says that direct income-generating public investment expenditures could be financed by EXB as they provide direct revenue for the servicing of principal and interest. However, maturity of the debt should be equal to the terms of return on investment. The most significant component of such financing is the difference between the real interest rate and the return on investment ratio. He adds that it is advantageous to finance investment by EXB provided the real interest rate is either negative or less than the return on investment ratio. In any case, taxation would be preferable to long term, unmeasurable and indirect income-generating public investments.

Evgin (2000: 13) emphasises that while there have been brilliant successes in decreasing inflation in several countries, increases in external debt may frustrate these results and that strong budget discipline together with monetary stability measures are the sole solution for success in this respect. An expansionary monetary and budgeting policy may result in economic crises as happened in Germany in the 1920s and in the USA in the 1930s. She asserts that continuous economic growth is possible only through implementation of a stable monetary policy and strong budget discipline. Only these policies can decrease interest rates by dashing inflationary expectations and lowering public debt burden to a bearable level.

Karagöz (2007: 109) asserts that covering a deficit in the balance of payments rather than dealing with the shortfall in internal savings has been the main reason for the need for EXB in Turkey. In his study he states that by providing balance of payments, new financial resources should be generated and current debts be repaid before further debts are incurred. For this purpose, while export revenues are increased, import expenditures should be decreased. Moreover, tourism revenues need to be increased and direct foreign investments fostered. Furthermore, internal borrowing with its positive effect on internal savings and with less foreign exchange risk, may be preferable to EXB. Sugözü and Yiyit (2010: 371), on the other hand, in agreement with Classical Economists say that borrowing should be the last financial choice made and only then under obligatory circumstances such as the need for financing huge amounts of investment due, for example, to natural disasters and war.

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APPENDIX

Appendix 1: Monthly CPI in Turkey from 2003 to 2015 (%)

Months	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January	94.77	104.81	114.49	123.57	135.84	146.94	160.90	174.07	182.60	201.98	216.74	233.54	250.45
February	96.23	105.35	114.51	123.84	136.42	148.84	160.35	176.59	183.93	203.12	217.39	234.54	252.24
March	98.12	106.36	114.81	124.18	137.67	150.27	162.12	177.62	184.70	203.96	218.83	237.18	255.23
April	99.09	106.89	115.63	125.84	139.33	152.79	162.15	178.68	186.30	207.05	219.75	240.37	259.39
May	100.04	107.35	116.69	128.20	140.03	155.07	163.19	178.04	190.81	206.61	220.07	241.32	260.85
June	100.12	107.21	116.81	128.63	139.69	154.51	163.37	177.04	188.08	204.76	221.75	242.07	259.51
July	99.93	107.72	116.14	129.72	138.67	155.40	163.78	176.19	187.31	204.29	222.44	243.17	
August	100.09	108.54	117.13	129.15	138.70	155.02	163.29	176.90	188.67	205.43	222.21	243.40	
September	101.44	109.57	118.33	130.81	140.13	155.72	163.93	179.07	190.09	207.55	223.91	243.74	
October	102.38	112.03	120.45	132.47	142.67	159.77	167.88	182.35	196.31	211.62	227.94	248.37	
November	103.68	113.50	122.14	134.18	145.45	161.10	170.01	182.40	199.70	212.42	227.96	248.82	
December	104.12	113.86	122.65	134.49	145.77	160.44	170.91	181.85	200.85	213.23	229.01	247.72	

Source: Statistical Institute of Turkey (2015-a). Inflation and Price, Retrieved on 15 October 2015 from the Statistical Institute of Turkey Web site: http://www.turkstat.gov.tr/UstMenu.do?metod=temelist

Appendix 2: Monthly PPI in Turkey from 2003 to 2015 (%)

Months	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January	94.32	104.46	114.83	123.51	135.09	143.80	155.16	164.94	182.75	203.10	206.91	229.10	236.61
February	97.28	106.17	114.81	123.83	136.37	147.48	156.97	167.68	185.90	202.91	206.65	232.27	239.46
March	100.40	108.40	117.25	124.14	137.70	152.16	157.43	170.94	188.17	203.64	208.33	233.98	241.97
April	102.17	111.27	119.62	126.54	138.80	159.00	158.45	174.96	189.32	203.81	207.27	234.18	245.42
May	101.53	111.24	119.23	130.05	139.34	162.37	158.37	172.95	189.61	204.89	209.34	232.96	248.15
June	99.58	110.06	119.64	135.28	139.19	162.90	159.86	172.08	189.62	201.83	212.39	233.09	248.78
July	99.04	108.39	119.33	136.45	139.28	164.93	158.74	171.81	189.57	201.20	214.50	234.79	
August	98.85	109.25	121.40	135.43	140.47	161.07	159.40	173.79	192.91	201.71	214.59	235.78	
September	98.90	111.26	123.40	135.11	141.90	159.63	160.38	174.67	195.89	203.79	216.48	237.79	
October	99.46	114.85	124.22	135.73	141.71	160.54	160.84	176.78	199.03	204.15	217.97	239.97	
November	101.15	115.72	121.40	135.33	142.98	160.49	162.92	176.23	200.32	207.54	219.31	237.65	
December	101.78	115.87	121.14	135.16	143.19	154.80	163.98	178.54	202.33	207.29	221.74	235.84	

Source: Statistical Institute of Turkey (2015-a). Inflation and Price, Retrieved on 15 October 2015 from the Statistical Institute of Turkey Web site: http://www.turkstat.gov.tr/UstMenu.do?metod=temelist

Appendix 3: Regression analysis summary outputs for external borrowing and CPI in Turkey from 2003 to 2015

Summary output	
Regression statistics	
Multiple R	0.983118121
R square	0.966521239
Adjusted R square	0.965823765
Standard error	8.803423529
Observations	50
ANOVA	

	df	SS	MS	F	Significance F	
Regression	1	107395.5926	107395.5926	1385.744828	4.57738E-37	
Residual	48	3720.01276	77.50026583			
Total	49	111115.6053				
	Coefficients	**Standard error**	**t stat**	**P value**	**Lower 95%**	**Upper 95%**
Intercept	21.75424209	4.083334534	5.327567924	2.61965E-06	13.54414775	29.96433643
X variable (Ext. Debt)	0.000546646	1.46847E-05	37.22559373	4.57738E-37	0.000517121	0.000576172

Appendix 4: regression analysis summary outputs for external borrowing and PPI in Turkey from 2003 to 2015

Summary output	
Regression statistics	
Multiple R	0.985088
R Square	0.970398
Adjusted R square	0.969781
Standard error	7.67377
Observations	50
ANOVA	

	df	SS	MS	F	Significance F	
Regression	1	92658.05	92658.05	1573.496	2.38E-38	
Residual	48	2826.564	58.88675			
Total	49	95484.61				
	Coefficients	**Standard error**	**t stat**	**P value**	**Lower 95%**	**Upper 95%**
Intercept	30.01116	3.559362	8.431611	4.94E-11	22.85458	37.16773
X variable (Ext. Debt)	0.000508	1.28E-05	39.66731	2.38E-38	0.000482	0.000533