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THE EFFECT OF CONSTRUCTION SECTOR ON THE ECONOMIC GROWTH OF JORDAN

Dr. Raed Alqirem*
Dr. Hamad Kasasbeh
Dr. Nawaf Alghusin

Al-Zaytoonah University of Jordan
* drraed@zuj.edu.jo

Abstract

The purpose of this study is to investigate the relationship between construction activity and economic growth in Jordan. The study performs an ordinary least square (OLS) regression analysis by using annual data during the period 2002-2015. The analysis indicates a significant relationship between the construction sector and economic growth in Jordan. The study result that the GDP in Jordan is dependent on construction. This required that the government should give the construction sector in Jordan more attention because of the importance of this sector in the economic growth.

1. Introduction

Construction is an important part of the development and modernization process. While it is closely correlated with economic growth, however it is not necessary that construction activity will induce economic growth and employment opportunities given tax exemption and incentives.

The role of construction in economic development has been addressed by various writers and international bodies, many of whom have focused in developing countries [Turin (1973), World Bank (1984). Turin, using cross-country comparisons, both found an association between construction investment and economic growth. That finding was consistent with the classical approach in growth theory in which capital formation is the main engine of economic growth and development.

The World Bank and its affiliates in the Structural Adjustment Program seem to follow the view that investment should accompany economic growth. This study argues that the relationship between the share of construction in GDP and GDP per capita seems to be consistent only with a downturn economy.

In this paper we will try to test the relationship between construction activity and economic growth in Jordan. First, we will describe the construction activity in Jordan including construction contribution to economic growth, tax revenues. Second, we will perform simple regression analysis to verify the economic growth test.

In Jordan economy, construction sector has been the focus of economic researchers for its important role in the national economy. However the literature focuses to a large degree on the estimation of the production function of the construction sector Bani- Hani and Shamia (1989) and Al-Galodi (1996). A study conducted by Bashier Al-Abdulrazaq (2003) to investigate the impact of the Jordanian government on construction activities. The study showed a positive but statistically insignificant impact of government investment in construction on construction sector of Jordan.

It's cleared from above that even the construction sector is important for the economy of Jordan, there is no study, to the best of our knowledge, has been done to investigate the relationship between construction sector and economic growth. Thus, the purpose of this paper is to investigate empirically the effect of construction sector in Jordan economic growth during the period 2002-2015. The paper will be organized as fallows. In section 2 the literature review about the study topic will be summarized. An overview of construction contribution to economic growth in Jordan is presented in section 3. The Relationship between GDP and the Construction Sector is presented in section 4. The study Empirical Results and Discussions are presented in section 5.

2. Literature Review

Construction is an important sector that participates heavily in the economic growth of both developed and developing economies Existing research's that have been dealt with the construction sector important in the economy can be classified into three main types. The first type of these studies has dealt with the impact of construction sector and economic growth. The most mentioned examples of these studies are the work of Drewer (1980) and Bon (1992). The second type of these studies has devoted to investigate the causality relationship between construction and economic growth, such as the work of Hille Brandt (2000) and lean (2001). The third segment of studies has conducted to examine the role construction in the overall national economy. The most noted one of these studies are the work of Bon and Yashiro (1996) and Pietroforte and Gregori (2003).

A study conducted by Isil Erol Unal (2015) to investigate the causal relationship between construction investment and growth in Turkey from 1998 Q1 to 2014 Q2. The authors employed three variables, real GDP growth, construction industry growth and real interest rate to investigate the causal relationships between construction growth and GDP growth .The paper concludes that economic growth in Turkey has proceeded construction activities with two four quarters lags, but no vice versa.

Another study made by Okoye Ngwa, and Ezeokili (2016) to investigate the impact of economic fluctuations on the growth and performance of construction sector in Nigerian economy during the period 2010 to 2015 shows that growth rate of construction sector is more volatile compared to that of GDP as a whole. Mahalia Jackman (2010) conducted a study in order to investigate the relationship between residential construction and economic growth for Barbados. The study shoes that there has been bi-directional causality exists between residential construction and economic growth.

Byoungki Kim (2006) argued that even though the relationship between infrastructure and economic growth is still frequently debated, the developing countries should learn from the experience of infrastructure development in Korea and Japan. According to Byungki Kim "infrastructure development is essential for attainment of the objectives of development policy in developing countries such as sustainable development equitable distribution of income and preservation of environment".

Construction contribution to Economic growth:

The contribution of the construction sector in economic growth amounted to 5% of GDP during 2014-2016, this compared to 16%, 14% contribution of manufacturing and transportation.

Table (1): Contribution of the Main Economic Sectors to the GDP

Sector	The Sectors Contribution (%)		
	2014	2015	First Three Quarters 2016
Agriculture	3.3	3.3	3.0
Mining And Quarrying	1.5	1.7	1.3
Manufacturing	16.7	16.5	16.2
Electricity And Water	2.1	2.3	2.4
Construction	4.9	4.7	4.5
Wholesale & Retail Trade, Restaurants & Hotels	10.1	9.9	10.4
Transport, Storage & Communications	14.4	14.5	14.6
Finance, Insurance, And Business Services	20.0	20.2	20.7
Community, Social And Personal Services	4.4	4.4	4.5
Producers Of Government Services	11.4	11.4	10.8
Producers Of Private Non-Profit Services To Households	0.5	0.5	0.5
Domestic Services Of Households	0.5	0.5	0.5
Imputed Bank Service Charge	5.5-	5.5-	5.3-
Net Taxes On Products	15.7	15.6	16.0
Total	100	100	100

* Source: Department of statistics

Construction contribution to economic growth is less than the industrial and transportation sectors due the fact that construction activity is a short-term however, the use of technology is limited compared to industry and transportation. Furthermore, construction is also characterized by a great number of migrant workers and the extent of subcontracting this a phoneme in Jordan as the construction sector employ Egyptians and most recently Syrians.

3.1 Revenue from Real-Estate in Jordan

The total amount of revenues according to Lands & Survey Department reached JD 52.3 million during first two months of 2017, by a decrease of 2% of the revenues at the same period of 2016. The taxes and fees exemptions for the same period reached almost JD 12.6 million, at 6% less than the same period of 2016.

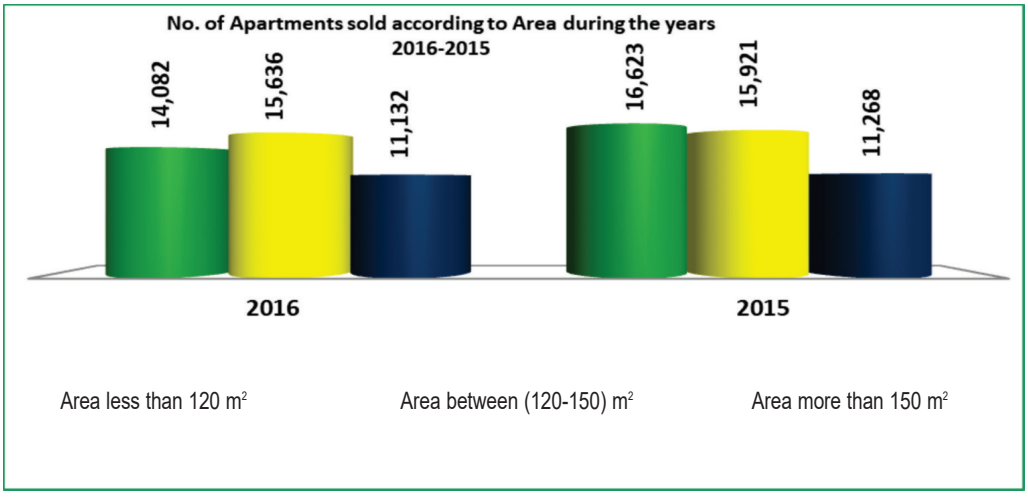
North Amman LRD came in the first place with revenues of JD10.3 million. It was followed by Amman LRD JD 8.5 million then the West Amman LRD at JD 6.1 million.

The real-estates sale transaction during first two months of 2017 increased 5%, apartments' sales increased 1%, whereas an increase of 7% on sales of lands compared the same period of 2016.

The total revenues of Lands & Survey Department in 2016 reached JD 332.95 million, by a 12% decrease compared to the previous year. The exemptions of taxes and fees for aforementioned year reached almost JD

105.4 million, by a 12% decrease compared to its predecessor. North Amman LRD provided the highest revenues at JD 62.3 million, followed by Amman LRD with JD 43.1 million, and West Amman LRD JD 40.8 million.

Graph (1): Number of Apartments sold



As shown in the graph, the total number of property sale for non-Jordanians in 2016 reached (3,657) transactions, (2,655) transactions were on apartments, and (1,002) transaction on lands, by 11% decrease compared to the previous year.

Iraqi nationality ranked first with total of 1,530 transactions. Saudi Arabian came second with a total of 694 transactions, Kuwaiti nationality ranked third by a total of 269 transactions.

3.2 Real-Estates Contribution to Domestic Revenues

The government revenues from real-estates sector decline to JD 331 million in 2016 compared to JD 370.9 million in 2015. That also yielded a decline in the total domestic revenue. This result is driven by the regional circumstances that started with the Arab Spring.

Table (2) Total revenue from real-estates Sector (JD million)

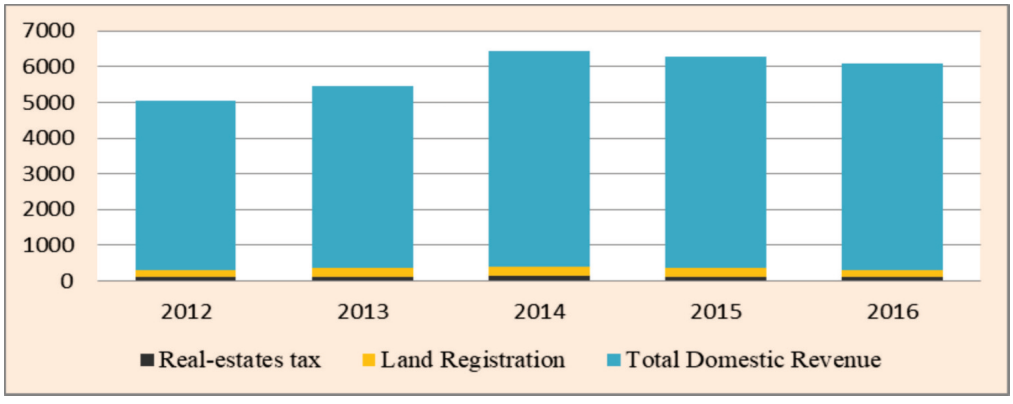
	2012	2013	2014	2015	2016*
Real-estates tax	102.8	112.7	132.1	124.7	116.7
In % of total domestic revenue	2.2	2.2	2.2	2.1	2.0
Land Registration	212.4	237.4	274.7	246.2	214..6
In % of total domestic revenue	4.5	4.6	4.6	4.2	3.7
Total Domestic Revenue	4726.9	5119.8	6031.1	5910.1	5780.9

Source: General Government finance bulletin

*Preliminary

The percentage of total real-estates revenue did not exceed 7% of the total domestic revenue during the years (2012-2016).

Graph (2) Total Domestic Revenue



3. The Relationship between GDP and the Construction Sector

Literature review proved a significant relationship between construction activity and economic growth. As an investment sector, construction has the potential to impact positively on short-run growth. Construction can thus be regarded as a major component of investment.

According to the Keynesian theory, just like any other sector, the increased spending in the construction sector stimulates economic growth. The construction sector deals mainly with the provision of capital infrastructure which has an impact on economic growth. The delivery of such infrastructure creates significant employment opportunities for the population which in turn generate further investments in other economic sectors through the multiplier effect.

Table (3) shows the slowdown of average growth of construction sector in the last three years, but maintaining the same contribution to the GDP.

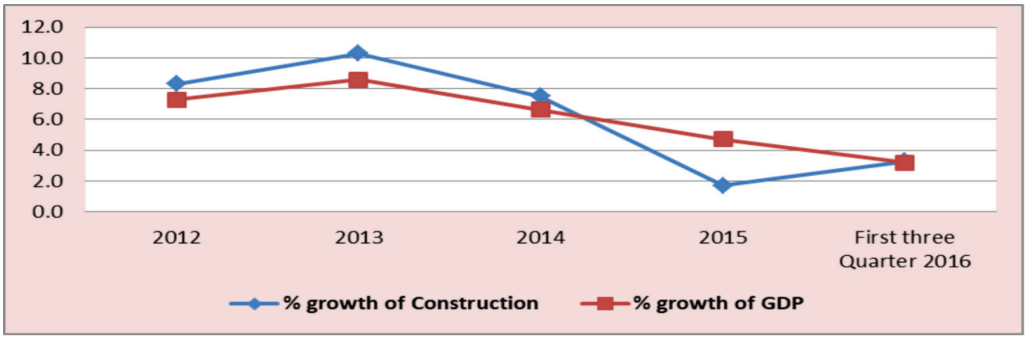
Table (3) The Real-estates Sector Contribution of GDP (JD Million)

	2013	2014	2015	First three quarter 2016
Construction	1060.6	1140.0	1159.6	872.4
Average growth	10.3	7.5	1.7	3.3
Nominal GDP	23851.6	25437.1	26637.4	20166.5
Average growth	8.6	6.6	4.7	3.2
In % Construction of GDP	4.4	4.5	4.4	4.3

* Source: Department of statistics

The correlation between economic growth and growth of construction activity is positive as indicated below.

Graph (3): Average growth



4. Empirical Results and Discussions

There is a minimum required level of investment in construction in developing countries (measured in terms of construction value added as a percentage of GDP) in order to achieve, in the long-term, sustainable growth in the economy.

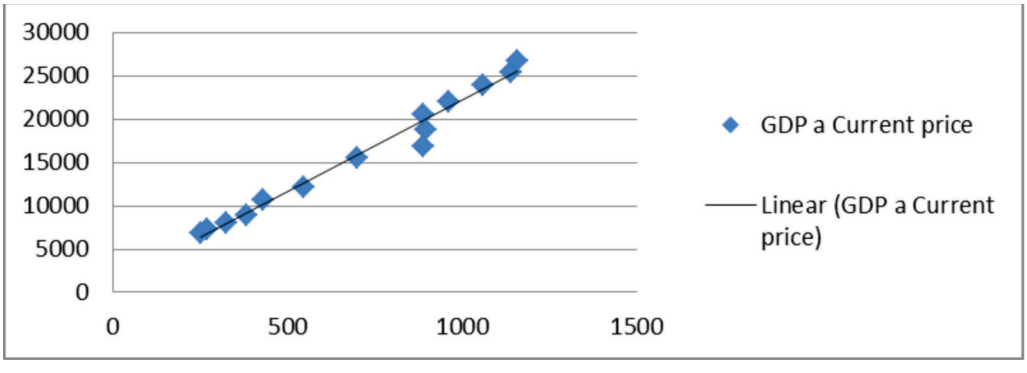
We will conduct two approaches to test the relationship between the construction sector and economic growth. First is simple OLS analysis and Second the Co-integration analysis.

Dalmini (2012) mobilizes research three economic growth theories in trying to explain the relationship between the construction sector and economic growth, namely: Harrod–Domar model, Solow growth model and Endogenous growth model. Central to the research is to ascertain how national governments stimulate economic growth, with a view to enabling policy-makers to make better use of the construction sector.

5.1 OLS Analysis: GDP and the Construction Sector

To verify the relationship between economic growth and construction we will perform an ordinary least square regression analysis utilizing a proxy of construction activity to GDP (Con) and the GDP during 2002-2015. The analysis indicates a significant relationship between the construction sector and economic growth relationship. The OLS elasticity is almost 5% meaning an increase of 1% in construction activity will induce a 5% increase in economic growth.

This significant outcome proves that GDP is dependent on construction sector in Jordan. This relationship can be witness in the scatter diagram which reveals a significant linear relationship between real GDP and construction activity.



5.2 Augmented Dickey Fuller (ADF) Test:

In this study, the Augmented Dickey Fuller (ADF) unit root test was used to test for the time series properties of model variables.

The null hypothesis is that the variable under investigation has a unit root against the alternative that it does not. The decision rule is to reject the null hypothesis if the ADF statistic value exceeds the critical value at a chosen level of significance (in absolute term). These results are presented in table (4) below.

Table (4.2) Unit Root Test using Augmented Dickey Fuller Test

	LEVEL		First difference	
Variable	Without Intercept and Trend	With Intercept and Trend (5%)	Without Intercept and Trend	With Intercept and Trend (5%)
GDP	-1.958088	-3.644963	-1.958088	-3.632896
	(0.8085)	(0.5460)	(0.5975)	(0.0727)
CON	-1.957204	-3.632896	-1.957204	-3.644963
	(0.9107)	(0.4540)	(0.0490)	(0.1216)

The results of table (4.2) above show that all the variables are non-stationary in level form since their ADF values are less than the critical values at 5%, the null hypothesis of a unit root was accepted for all the variables but was rejected in 1st difference. Thus, we conclude that the variables under investigation are integrated of order one. Since the variable are integrated of the same order. And therefore, examine their co-integrating relationship using Johansen co- integration procedure.

5.3 Co-integration Test Result

A necessary but insufficient condition for co-integrating test is that each of the variables be integrated of the same order. The Johansen co-integration test uses two statistics test namely: the trace test and the likelihood Eigen-value test. The first row in each of the table test the hypotheses of no co-integrating relation, the second row test the hypothesis of one co-integrating relation and so on, against the alternative of full rank of co-integration. The results are presented in table (4.3) below. Table 3: Co-integrating Test Result between the Variables: GDP and CON.

Table (4.3.1) Co-integration Test Result

Hypothesized Number of Co integrating Equations	Trace Statistic	5% Critical Value	Probability
None*	24.96350	15.49471	0.0014
At Most 1	2.151172	3.841466	0.1425

Trace test indicates 1 co integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table (4.3.2) Co-integration Test Result

Hypothesized Number of Co integrating Equations	Max-Eigen Statistic	5% Critical Value	Probability
None*	22.81233	14.26460	0.0018
At Most 1	2.151172	3.841466	0.1425

Max-eigenvalue test indicates 1 co integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

The Trace Test and The Maximum Eigenvalue Test indicate the existence of 1 co- integrating equation at the 5% significance level. This co-integrating equation means that one linear combination exists between the variables

Interpretation of co-integrating results from table (3) above, the likelihood statistics indicates the presence of one co integrating equation at 5% significance level which implies that GDP and CON are co-integrated. This shows that there is a long-run relationship between CON and GDP in Jordan.

5. Conclusions and recommendations.

The analysis indicates a significant relationship between the construction sector and economic growth relationship. The OLS elasticity is almost 5% meaning an increase of 1% in construction activity will induce a 5% increase in economic growth. This significant outcome proves that GDP is dependent on construction sector in Jordan. This relationship can be witness in the scatter diagram which reveals a significant linear relationship between real GDP and construction activity.

This result implies that the government of Jordan should give more attention to construction sector in order to increase economic growth and to reduce the high level of unemployment in the Jordanian economy.

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Appendix I

Variables

- Dependant variable = Y = GDP
- Independent variable = X = Construction

Hypotheses

- H0: $Y \neq X$ (no a relationship between GDP and Construction)
- H1: $Y = X$ (there is a relationship between GDP and Construction)

Data

Years	CONS0	GDP0
1992	217.1	3610.5
1993	285.6	3884.2
1994	301.8	4357.4
1995	300.1	4714.7
1996	254.8	4911.3
1997	240.5	5137.4
1998	214.6	5609.9
1999	207.1	5778.1
2000	203.3	5998.6
2001	231	6363.7
2002	251.7	6794
2003	268.3	7228.7
2004	324.4	8090.7
2005	382.1	8925.4
2006	429	10675.4
2007	544.8	12131.4
2008	697.9	15593.4
2009	887.9	16912.2
2010	896.2	18762
2011	888	20476.6
2012	961.7	21965.5
2013	1060.6	23851.6
2014	1140	25437.1
2015	1159.6	26637.4

Equation

Y= a+bX

CON= 12.46064+0.043999GDP

Dependent Variable: CONS0
Method: Least Squares
Date: 03/26/17 Time: 11:45
Sample: 1992 2015
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.46064	22.25371	0.559935	0.5812
GDP0	0.043999	0.001630	26.99601	0.0000

R-squared	0.970697	Mean dependent var	514.5042
Adjusted R-squared	0.969365	S.D. dependent var	342.0955
S.E. of regression	59.87611	Akaike info criterion	11.10209
Sum squared resid	78873.28	Schwarz criterion	11.20026
Log likelihood	-131.2251	Hannan-Quinn criter.	11.12813
F-statistic	728.7847	Durbin-Watson stat	0.575160
Prob(F-statistic)	0.000000		

Appendix 2
GDP level

Null Hypothesis: GDP0 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.042270	0.5460
Test critical values:	1% level	-4.467895	
	5% level	-3.644963	
	10% level	-3.261452	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP0)
Method: Least Squares
Date: 03/26/17 Time: 09:04
Sample (adjusted): 1995 2015
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP0(-1)	-0.106353	0.052076	-2.042270	0.0580
D(GDP0(-1))	0.163867	0.217827	0.752283	0.4628

D(GDP0(-2))	0.496443	0.227336	2.183740	0.0442
C	-223.6751	308.7037	-0.724562	0.4792
@TREND("1992")	142.4585	59.06917	2.411723	0.0283

R-squared	0.676731	Mean dependent var	1060.952
Adjusted R-squared	0.595914	S.D. dependent var	831.3912
S.E. of regression	528.4965	Akaike info criterion	15.58221
Sum squared resid	4468938.	Schwarz criterion	15.83090
Log likelihood	-158.6132	Hannan-Quinn criter.	15.63618
F-statistic	8.373614	Durbin-Watson stat	2.173242
Prob(F-statistic)	0.000765		

non

Null Hypothesis: GDP0 has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.473473	0.8085
Test critical values:	1% level	-2.679735	
	5% level	-1.958088	
	10% level	-1.607830	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP0)
Method: Least Squares
Date: 03/26/17 Time: 09:06
Sample (adjusted): 1995 2015
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP0(-1)	0.014539	0.030707	0.473473	0.6416
D(GDP0(-1))	0.303482	0.240760	1.260519	0.2236
D(GDP0(-2))	0.526329	0.256504	2.051935	0.0550

R-squared	0.525867	Mean dependent var	1060.952
Adjusted R-squared	0.473186	S.D. dependent var	831.3912
S.E. of regression	603.4400	Akaike info criterion	15.77473
Sum squared resid	6554517.	Schwarz criterion	15.92395
Log likelihood	-162.6347	Hannan-Quinn criter.	15.80712
Durbin-Watson stat	1.908874		

1
Null Hypothesis: D(GDP0) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.432239	0.0727
Test critical values:	1% level	-4.440739	
	5% level	-3.632896	
	10% level	-3.254671	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP0,2)
Method: Least Squares
Date: 03/26/17 Time: 09:08
Sample (adjusted): 1994 2015
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP0(-1))	-0.814219	0.237227	-3.432239	0.0028
C	-62.40292	282.6235	-0.220799	0.8276
@TREND("1992")	72.98584	30.52968	2.390652	0.0273

R-squared	0.385128	Mean dependent var	42.11818
Adjusted R-squared	0.320404	S.D. dependent var	713.6325
S.E. of regression	588.3015	Akaike info criterion	15.71848
Sum squared resid	6575874.	Schwarz criterion	15.86726
Log likelihood	-169.9033	Hannan-Quinn criter.	15.75353
F-statistic	5.950362	Durbin-Watson stat	2.057670
Prob(F-statistic)	0.009850		

Null Hypothesis: D(GDP0) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=2)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-0.212925	0.5975
Test critical values:	1% level	-2.679735	
	5% level	-1.958088	
	10% level	-1.607830	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP0,2)
Method: Least Squares
Date: 03/26/17 Time: 09:10
Sample (adjusted): 1995 2015
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP0(-1))	-0.022162	0.104085	-0.212925	0.8337
D(GDP0(-1),2)	-0.604300	0.192603	-3.137540	0.0054

R-squared	0.377983	Mean dependent var	34.62381
Adjusted R-squared	0.345245	S.D. dependent var	730.3680
S.E. of regression	590.9915	Akaike info criterion	15.69187
Sum squared resid	6636148.	Schwarz criterion	15.79135
Log likelihood	-162.7647	Hannan-Quinn criter.	15.71346
Durbin-Watson stat	1.983286		

Con
Null Hypothesis: CONS0 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic -based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.224644	0.4540
Test critical values:	1% level	-4.440739	
	5% level	-3.632896	
	10% level	-3.254671	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CONS0)
Method: Least Squares

Date: 03/26/17 Time: 09:16
Sample (adjusted): 1994 2015
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONS0(-1)	-0.138426	0.062224	-2.224644	0.0391
D(CONS0(-1))	0.480622	0.192171	2.501015	0.0223
C	-20.29696	20.75849	-0.977767	0.3411
@TREND("1992")	8.711611	3.070156	2.837514	0.0109

R-squared	0.547219	Mean dependent var	39.72727
Adjusted R-squared	0.471756	S.D. dependent var	59.23160
S.E. of regression	43.04978	Akaike info criterion	10.52556
Sum squared resid	33359.10	Schwarz criterion	10.72393
Log likelihood	-111.7811	Hannan-Quinn criter.	10.57229
F-statistic	7.251441	Durbin-Watson stat	1.825351
Prob(F-statistic)	0.002168		

Null Hypothesis: CONS0 has a unit root
Exogenous: None
Lag Length: 1 (Automatic -based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.001619	0.9107
Test critical values:	1% level	-2.674290	
	5% level	-1.957204	
	10% level	-1.608175	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CONS0)
Method: Least Squares
Date: 03/26/17 Time: 09:17
Sample (adjusted): 1994 2015
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONS0(-1)	0.026491	0.026448	1.001619	0.3285
D(CONS0(-1))	0.548821	0.217941	2.518207	0.0204

R-squared	0.331783	Mean dependent var	39.72727

Adjusted R-squared	0.298372	S.D. dependent var	59.23160
S.E. of regression	49.61431	Akaike info criterion	10.73294
Sum squared resid	49231.59	Schwarz criterion	10.83213
Log likelihood	-116.0624	Hannan-Quinn criter.	10.75631
Durbin-Watson stat	1.578992		

Null Hypothesis: D(CONS0) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.967153	0.0490
Test critical values:	1% level	-2.674290	
	5% level	-1.957204	
	10% level	-1.608175	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CONS0,2)
Method: Least Squares
Date: 03/26/17 Time: 09:19
Sample (adjusted): 1994 2015
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CONS0(-1))	-0.290741	0.147798	-1.967153	0.0625

R-squared	0.154097	Mean dependent var	-2.222727
Adjusted R-squared	0.154097	S.D. dependent var	53.94860
S.E. of regression	49.61814	Akaike info criterion	10.69098
Sum squared resid	51701.15	Schwarz criterion	10.74057
Log likelihood	-116.6008	Hannan-Quinn criter.	10.70266
Durbin-Watson stat	1.677184		

Null Hypothesis: D(CONS0) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-3.147481	0.1216
Test critical values:	1% level	-4.467895	
	5% level	-3.644963	
	10% level	-3.261452	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CONS0,2)
Method: Least Squares
Date: 03/26/17 Time: 09:21
Sample (adjusted): 1995 2015
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CONS0(-1))	-0.798695	0.253757	-3.147481	0.0059
D(CONS0(-1),2)	0.365983	0.224053	1.633471	0.1208
C	-18.58983	25.61833	-0.725646	0.4779
@TREND("1992")	3.927480	2.223748	1.766154	0.0953

R-squared	0.371606	Mean dependent var	0.161905
Adjusted R-squared	0.260713	S.D. dependent var	54.07972
S.E. of regression	46.49873	Akaike info criterion	10.68637
Sum squared resid	36756.25	Schwarz criterion	10.88533
Log likelihood	-108.2069	Hannan-Quinn criter.	10.72955
F-statistic	3.351026	Durbin-Watson stat	1.880652
Prob(F-statistic)	0.043678		

Date: 03/26/17 Time: 08:39
Sample (adjusted): 1994 2015
Included observations: 22 after adjustments
Trend assumption: Linear deterministic trend
Series: CONS0 GDP0
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.645456	24.96350	15.49471	0.0014
At most 1	0.093152	2.151172	3.841466	0.1425

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.645456	22.81233	14.26460	0.0018
At most 1	0.093152	2.151172	3.841466	0.1425

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

CONS0	GDP0
-0.014452	0.000505
0.011214	-0.000670

Unrestricted Adjustment Coefficients (alpha):

D(CONS0)	27.23633	-4.978585
D(GDP0)	-55.30148	-172.7126

1 Cointegrating Equation(s):	Log likelihood	-269.2390

Normalized cointegrating coefficients (standard error in parentheses)

CONS0	GDP0
1.000000	-0.034949
	(0.00265)

Adjustment coefficients (standard error in parentheses)

D(CONS0)	-0.393629
	(0.08841)
D(GDP0)	0.799236
	(1.93271)