International Journal of Academic Research in Business and Social Sciences
May 2014, Vol. 4, No. 5
ISSN: 2222-6990

The Long Run Relationship between Government Revenue and Expenditure in Iran: A Co integration Analysis in the Presence of Structural Breaks

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DOI: 10.6007/IJARBSS/v4-i5/855 URL: http://dx.doi.org/10.6007/IJARBSS/v4-i5/855

Abstract
The relationship between government revenue and government expenditure has been an important topic in
public economics, given its relevance for policy especially with respect to the budget deficit. The main purpose of this paper is to examine the relationship between government revenue and expenditure in Iran using annual time series data spanning from 1978 to 2011. The Iranian economy has been subject to a multitude of structural changes and regime shifts during the sample period. Thus, time series properties of the data are first analysed by Zivot-Andrews (1992) model. The empirical results based on this model indicate that there is not enough evidence against the null hypothesis of unit roots for all of the variables under investigation. Taking into account the resulting endogenously determined structural breaks; the Saikkonen and Luetkephol (2000) cointegration approach is then employed to determine the long-run Relationship between Government Expenditure (GE) and Government Revenue(TR). This cointegration technique accommodates potential structural breaks that could undermine the existence of a long-run relationship between Government Expenditure and Government Revenue.

JEL classification numbers: C12, C22, C52.
Key words: structural break, unit root tests, cointegration technique, and Iranian economy.

International Journal of Academic Research in Business and Social Sciences
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ISSN: 2222-6990

1. Introduction

To take a good decision and to improve their societies, the governments need to design the budget. To do its functions a government uses budget as a planning and financial tool. One of the debates of public finance is to find the relationship between government revenue and expenditure and considerable theoretical and empirical research has been carried out on this issue. If policymakers understand the relationship between government expenditure and government revenue, without a pause government deficits can be prevented. Hence the relationship between government expenditure and government revenue has attracted significant interest. This is due to the fact that the relationship between government revenue and expenditure has an impact on the budget deficit. Over the Past three decades, a large number of studies have investigated the relationship between government revenue and government expenditure. Understanding the relationship between government revenue and government expenditure is important from a policy point of view, especially for Asian countries, which is suffering from persistent budget deficits.

There is a budget deficit while the government revenues are less than the government expenditures. Vice versa, when the government expenditures less than its revenues it is said that the government has budget surplus. There are always the budget deficit for iran during all of years of this study. In other words, the budget deficit is a characteristic of Iran economics .Some time the governments to reduce the unemployment rate at their societies use the budget deficit policy but having the budget deficit in the long period not only is a policy but also is a problem for society that it needs to solve. To solve this problem the government should reduce its expenditures or it should increase its revenues resources. The budget revenue resources should be stationary and they must have the lowest fluctuations. Strongly dependent budget with the oil revenue shows the government have to change its expenditures or revenues. To achieve these aims the government should know the relationship between government revenues and expenditures. It has been observed that in some cases revenue increase or expenditures reduction affect on its corresponding variable and makes the adopted policy ineffective. So before to make a decision about reducing of the expenditure or increasing revenues it is important to know the amount of dependences of those variables that affect on the government expenditures. To obtain the appropriate financial policy to reduce or remove budget deficit it is necessary to find the relationship between government revenues and expenditures. The main purpose of this paper is to investigate The Long Run Relationship between Government Revenue and Expenditure in the Presence of Structural Breaks in Iran for the period from 1978-2011. The paper is divided into six sections. Following this introduction, literature review of relevant studies will be presented in section two and three. Section four will discuss data that is used in this research and Findings and Discussion are reported in section five. Section sex will conclude this exercise.

2. Theoretical Literature Review:

The causal relationship between revenues and government expenditure is a classic problem of Public Economics. There are four propositions that can potentially explain observed spending-revenue behavior. The propositions are briefly discussed as follows: Friedman leads the *tax-and-spend* school, which contends that raising taxes will simply lead to more spending. Friedman (1982) [cited in Narayan (2005: 1205)] puts his point in the following way: “You

cannot reduce the deficit by raising taxes Increasing taxes only results in more spending, leaving the deficit at the highest level conceivably accepted by the public. Political rule number one is government spends what government receives plus as much more as it can get away with". Also Milton Friedman (1982) suggests cutting taxes as a remedy to budget deficits, since taxes have a positive causal impact on government expenditure. According to Friedman, a cut in tax leads to higher deficits, which should influence government to reduce its level of spending, (Moalusi, 2004). Buchanan and Wagner (1977, 1978) put forward an alternative version of the tax-and-spend hypothesis. In contrast to Friedman (1978), they argue that tax increases would lead to spending reductions. The building block of the Buchanan and Wagner (1977, 1978) version of the tax-and-spend hypothesis is that taxpayers suffer from fiscal illusion. According to the authors, tax cuts lower the perceived price of government provided goods and services by the public, which in turn boosts the public demand for these goods and services. However, the public may actually incur even higher costs. One reason for this is the indirect inflation taxation that results if the government resorts to excessive money creation. Another reason is higher interest rates associated with government debt financing may crowd out private investment. To reduce expenditures, Buchanan and Wagner favor limiting the ability of the government to resort to deficit financing. In sum, while tax changes as before drive spending changes, the relationship between the two is a negative one.

The second school known as spend-and-tax school is built on the tenet that expenditure causes revenue proposed by Peacock and Wiseman (1961, 1979). According to the spend-and-tax hypothesis, the level of spending is first determined by the government and then tax policy and revenue are adjusted to accommodate the desired level of spending. A version of this hypothesis is suggested by Roberts (1978), and Peacock and Wiseman (1979) according to whom crisis situations (due to for example wars, natural disasters, or deep recessions) justify temporary increases in expenditures and taxes to pay for them. However, tax increases may become permanent; reflecting an upward adjustment in the level of tax tolerance of the citizens and their attitude towards the proper size of the government after the crisis has passed. This in turn allows for a permanent increase in the level of government expenditures. Another version of this hypothesis is based on the works of Barro (1974, 1979, 1986). In his tax smoothing hypothesis, government spending is considered as an exogenous variable to which taxes adjust. Moreover, the intertemporal budget constraint requires that an increase in current expenditures be matched by higher future taxes. Barro, therefore, rejects the notion that the taxpayers suffer from fiscal illusion. Quite the contrary, within the framework of the Ricardian equivalence theorem, he maintains that taxpayers are sophisticated, or rational, enough to see that an increase in the current debt in nothing but a delayed form of taxation. Taxpayers are, therefore, expected to fully capitalize the future tax liability. As pointed out by von Furstenberg et al. (1992), changes in spending can precede changes in taxes if a political majority raises pre-election expenditures, which are then paid for by subsequent post-election tax increases, or if they cut taxes as a compensation for earlier decisions to restrain expenditures. Since it is changes in expenditures that drive changes in taxes in this scenario, the preferred approach to fiscal deficit reduction relies on cutting expenditures.

Fiscal synchronization hypothesis as the third school of thought argues that governments may change expenditure and taxes concurrently (Meltzer & Richard, 1981; Musgrave, 1966). This implies bidirectional causality between government expenditure and revenue. Under the fiscal

synchronization hypothesis, citizens decide on the level of spending and taxes. This is done through comparing the benefits of government to citizen's marginal cost, (Narayan, 2005). Barro's (1979) tax smoothing model provided further credence to the fiscal synchronization hypothesis. His model was based on the Ricardian equivalence view that deficit financed government expenditure today results in future tax increases, (Narayan, 2005). The implication of this hypothesis is that causal relationship between government revenue and spending is bidirectional.

Finally, fourth school, fiscal neutrality school, proposed by Baghestani and McNown (1994) believe that none of the above hypotheses describes the relationship between government revenues and expenditure. Government expenditure and revenues are each determined by the long run economic growth reflecting the institutional separation between government revenues and expenditure that infers that revenue decisions are made independent are expenditure decisions. A major advocate of this view is Wildavsky (1988) who maintains that separate institutions such as the executive and legislative branches of the US government participate in the budgetary process to determine the level of taxation and spending. Budgeting can be incremental and adjustments can be made on the margin if these separate institutions reach a consensus on the fundamentals. In this case there is no causality between the two variables, and hence they are independent of one another.

3. Empirical Literature Review

Numerous empirical studies available on revenue and expenditure nexus all over the world but there is no consensus about the linkage between these variables. Though over the last three decades several studies have been carried out in different countries to investigate the issue in the public economics, findings vary from country to country and also within the country. Considerable empirical works have been done with respect to the four above mentioned hypotheses. Using different econometric methods, studies have reached to different results. Different studies have focused on different countries, time periods, and have used different proxy variables for government revenue and expenditure. The empirical outcomes of these studies have been varied and sometimes conflicting. The results differ even on the direction of causality and it is long-term versus short term impact on government policy. We now move on to review some of the empirical studies of the relationship between government revenue and expenditure.

Hasan and Lincoln (1997) carried out a research on this issue for United Kingdom by using cointegration technique and quarterly data from 1961-93 was used for this purpose. This study reveals that government tax revenue Granger causes government expenditures and vice versa. E.g. Shah and Baffes (1994) in their study for Latin American countries concluded bidirectional causality between government revenue and expenditure for Argentina over the 1913-1984 periods and for Mexico over the 1895-1984 periods; while for Brazil they found unidirectional causality running from revenue to expenditure. Owoye (1995) investigated the issue for the G7 countries. He found bidirectional causality for five of the seven countries and for Japan and Italy he found causality running from revenue to expenditure. Abdul Aziz and Shah Habibullah (2000) investigated causality between taxation and government spending by using an application of Toda-Yamamoto approach in Malaysia for the period 1960 to 1997. Their evidence generally supports the existence of bidirectional causality between government

spending and tax revenues. Kollias and Makrydakis (2000) examined tax and spending relationship in four countries namely; Greece, Portugal, Spain, Ireland which are comparatively poorer countries in European Union. They found that cointegration prevails in only Greece and Ireland cases and whereas there is no long run relationship in the models for Spain and Portugal. Moreover, bidirectional causality between government spending and revenue exists in Greece and Ireland. As far as Spain and Portugal cases are concerned, in the former country, causality runs from revenue to expenditure and in the later country, there is no causal link between these two important fiscal variables. Chang et al (2002) conducted a study to examine this relationship in ten industrialized countries including three newly industrialized Asian economies namely, Taiwan, South Korea and Thailand. In this study, GDP variable is also included in the model as a control variable along with government expenditures and tax variables and Johansen cointegration technique is exercised for analysis. They claimed that cointegration among the variables prevails for seven countries and found causality from government revenues to government expenditures for UK, USA, South Korea, Japan and Taiwan whereas causality runs from government expenditures to revenues for South Africa and Australia. This study also found independence between revenues and expenditures for New Zealand and Thailand. Maghyereh and Sweidan (2004) examined tax-spend, spend-tax and fiscal synchronization hypothesis for Jordan using annual time series data from 1969 to 2002. The authors used real GDP as control variable along with real government expenditures and real government revenues and Granger causality test based on Multivariate ECM. They conclude evidence in favor of bidirectional causality between revenue and expenditure. The result also suggests that there is long-run interdependence between output and fiscal variables indicating effectiveness of fiscal policy in Jordan. Carneiro *et al.* (2005) investigated this issue for Guinea-Bissau over the period 1981 to 2002. They found that Guinea-Bissau's experience is consistent with the "spend - tax" hypothesis. Barua (2005) examined revenue and expenditure causality in Bangladesh by using annual data over the period 1974-2004. The results of Johansen test suggest that there is a long-run relationship between government expenditure, revenue and GDP and the Granger Causality test on the corresponding Vector Error Correction (VEC) model suggests that there is no causal relationship between revenue and expenditure in the short run. It is also observed that the short run relation extends from both the fiscal variables to GDP, and not the other way around. Tsen and Kian-Ping (2005) examined this relationship in Malaysia for the period from 1965 – 2002. Augmented Dickey-Fuller and Phillips-Perron Unit root tests, Johansen cointegration and error correction models were applied to data. The results supported tax-spend hypothesis. Government revenue was found to Granger cause expenditure in Malaysia. In another study, Narayan and Narayan (2006) found tax-and-spend hypothesis for Mauritius, El Salvador, Chile, Paraguay and Venezuela. For Haiti, there is evidence for supporting the fiscal synchronization hypothesis, while for Peru, South Africa, Guatemala, Guyana, Uruguay and Ecuador there is evidence of neutrality by application of the Toda and Yamamoto (1995) test for Granger causality. Nyamongo et al. (2007) in a study of the government revenue and expenditure nexus in South Africa found different results. A monthly data was used, and modified unit root test and Vector Error Correction Model (VECM) were applied on data. It was found that government revenue and expenditure are cointegrated, and a long-run relationship exists between them. Applying Granger causality through VECM model, it was found bidirectional Granger causality which supports fiscal synchronization hypothesis. In

International Journal of Academic Research in Business and Social Sciences
May 2014, Vol. 4, No. 5
ISSN: 2222-6990

the short-run no Granger causality was found between variable, suggesting fiscal neutrality hypothesis in South Africa for the period of study. the study Wolde-Rufael (2008) for 13 African countries by using Toda and Yamamoto causality test show the direction of causation are mixed and his empirical evidence suggests that there was a bidirectional causality running between expenditure and revenue for Mauritius, Swaziland and Zimbabwe; no causality in any direction for Botswana, Burundi and Rwanda; unidirectional causality running from revenue to expenditure for Ethiopia, Ghana, Kenya, Nigeria, Mali and Zambia; and an un-directional causality running from expenditure to revenue for Burkina Faso only. Chaudhuri and Sengupta (2009), by using an error-correction model and Granger causality test for southern states in India reported that the tax-spend hypothesis is supported by the analysis and also the spend-tax hypothesis is valid for some states. Ravin thirakumaran (2011) examined the relationship between government revenue and expenditure in Sri Lanka for the period from 1977-2009. A time series methodology of Engle-Granger's approach of cointegration and error correction model framework is investigated. The study concluded that bidirectional causality exists between government revenue and expenditure and there is long-run equilibrium between the two variables in Sri Lanka economy. Subhani et al. (2012) found the opposite causality direction confirming the tax-spend hypothesis. They studied the causality direction between government expenditure and revenue for Pakistan. Annual data for the period from 1979-2010 were used, and Granger causality was applied to variables in question. The paper found that government revenue Granger cause government expenditure in Pakistan for the period under investigation.
To the best of the author's knowledge ,The evidence on the relationship between government revenue and expenditure for Iran is scarce. Zonnoor, S. H (1995) examined the growth of government expenditures and revenues in Iran over the period of 1970 - 1990 in light of conventional theories as to the nature of public sector economic activity. In his study simple forms of government expenditure and tax functions are estimated. They also examined the speed of the adjustment process by estimating a simple disequilibrium model of government expenditures and receipts. Using a constant shares model as well as a constant marginal shares model, they compared the pattern of expenditures and the revenues structure before and after the Iran's revolution.Elyasi and Rahimi (2012) found bidirectional causality between government revenue and expenditure in Iran. Annual data for the period from 1963-2007 were used, and variables were tested for stationarity. The paper included a comprehensive list of studies on causality between government revenue and expenditure for country specific and for multi-countries studies. The evidence cited on the direction of causality is mixed in those studies. Different data sets, econometric methodologies and different country characteristics are some of reasons cited for the different results on the direction of causality.

4. Data and Econometrics Methodology

This study aims to provide empirical evidence on the Long Run Relationship between Government Revenue and Expenditure in the Presence of Structural Breaks in Iran for the period from 1978-2011. However before going to estimate the data and Cointegration Analysis it is necessary to check the unit root presence in the data and for that in this study the Zivot-Andrews unit root test is used in order to know the order of integration of the series. Although, we employee Saikkonen and Lütkepohl test for Cointegration Analysis with Structural Breaks . Annual time series variables data which utilized in this paper are include the government

revenue (TR) and government expenditure (GE) gathered from web site Central Bank of Iran. The logarithm of the government expenditures and government revenues are used in the empirical analysis. The transformation of the series to logarithms is intended to eliminate the problem of heteroskedasticity. Annual data for the period from 1978 – 2011 are used in this study. We select these period because time series data on government revenue and government expenditure are only available for this period.

5. Findings and Discussion

5-1. Unit Roots Tests with Structural Break

The issue of structural break is of considerable importance in the analysis of macroeconomic time series. Such breaks occur in many time series for any number of reasons and this makes it difficult to test the null hypothesis of structural stability against the alternative of a one-time structural break. When present in the data generating process, but not allowed for in the specification of an econometric model, results may be biased towards the erroneous non-rejection of the non-stationarity hypothesis (Perron 1989; Perron 1997; Leybourne and Newbold; 2003). Peron (1989, 1994, 1997) and Zivot-Andrews (1992) attempt to overcome this difficulty. In the following section, The Zivot-Andrews methodology for testing the unit root hypothesis in the presence of structural break is explained and then this method is applied for the variables under investigation.

5-1-1 . Zivot-Andrews unit root test with structural break

Zivot and Andrews (1992) propose a variation of Perron's (1989) original test in which the time of the break is estimated, rather than known as an exogenous phenomenon. The null hypothesis in their method is that the variable under investigation contains a unit-root with a drift that excludes any structural break, while the alternative hypothesis is that the series is a trend stationary process with a one-time break occurring at an unknown point in time. By endogenously determining the time of structural breaks, ZA argue that the results of the unit root hypothesis previously suggested by earlier conventional tests such as the ADF test may change. In this methodology, *TB* (the time of break) is chosen to minimize the one-sided *t*-statistic of *a*=1. In other words, a break point is selected which is the least favorable to the null hypothesis. The ZA model endogenises one structural break in a series (such as *yt*) as follows:

$$H_0 : y_t = \mu + y_{t-1} + e_t \qquad (1)$$

H_1:

$$Model\ (A): y_t = \hat{\mu}^A + \hat{\theta}^A DU_t(\hat{T}_b) + \hat{\beta}^A t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \hat{C}^A{}_j \Delta y_{t-j} + \hat{e}_t \qquad (2)$$

$$Model\ (B): y_t = \hat{\mu}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_t(\hat{T}_b) + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \hat{C}^B{}_j \Delta y_{t-j} + \hat{e}_t \qquad (3)$$

$$Model\ (C): y_t = \hat{\mu}^C + \hat{\theta}^C DU_t(\hat{T}_b) + \hat{\beta}^C t + \hat{\gamma}^C DT_t(\hat{T}_b) + \hat{\alpha}^C y_{t-1} + \sum_{j=1}^{k} \hat{C}^C{}_j \Delta y_{t-j} + \hat{e}_t \qquad (4)$$

Equation (4), which is referred to as model C by ZA, accommodates the possibility of a change in the intercept as well as a trend break. ZA also consider two other alternatives where a

structural break impacts on the intercept only (model A) or trend only (model B). Model C is the least restrictive compared to the other two models; In above equations *DUt* is a sustained dummy variable capturing a shift in the intercept, and *DTt* is another dummy variable representing a shift in the trend occurring at time *TB*. Zivot and Andrews (ZA) (1992) argue that the results of the conventional unit root tests may be reversed by endogenously determining the time of structural breaks. The null hypothesis in the Zivot and Andrews test is a unit root without any exogenous structural change. The alternative hypothesis is a stationary process that allows for a one-time unknown break in intercept and/or slope. The alternative hypothesis is that the series, y_t, is I(0) with one structural break. TB is the break date, and the dummy variables are defined as Equation 5.

$$DU_t = \begin{cases} 1 & if\ t > TB_1 \\ 0 & if\ t \leq TB_1 \end{cases} \qquad and \qquad DT_t = \begin{cases} t - TB_1 & if\ t > TB_1 \\ 0 & if\ t \leq TB_1 \end{cases} \qquad (5)$$

The null is rejected if the *a* coefficient is statistically significant. The optimal lag length is determined on the basis of the t-test or SBC. The "trimming region" where we search for the minimum t ratio is assumed to be within 0.05T-0.95T or $0.05T \leq TB1 \leq 0.95T$. Based on the results reported in Tables 1, ZA models indicate that all series under investigation are non-stationary. The same unit root tests have been applied to the first difference of the variables and in most cases we rejected the null hypothesis of unit root. Hence, we maintain the null hypothesis that each variable is integrated of order one or I(1). the reported t statistics in Table 1 for $\hat{\mu}, \hat{\beta}, \hat{\theta}, \hat{\gamma}\ and\ \hat{\alpha}$ are significant in the majority of cases. Given the fact that all of the estimated coefficients for the indicator and trend dummy variables are statistically significant, one can argue that the estimated structural break dates are indeed statistically significant.

International Journal of Academic Research in Business and Social Sciences
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ISSN: 2222-6990

Table 1. The Zivot-Andrews Test Results

	Series	T	T_b	Lag	$\hat{\mu}$	$\hat{\beta}$	$\hat{\theta}$	$\hat{\alpha}$	$\hat{\gamma}$	$\hat{c}$
MODEL(A)	LTR	31	1993	1	2.24 (3.71)	0.06 (3.17)	0.43 (2.52)	-0.35 (3.53)	---	0.10 (0.62)
	LGE	31	1993	1	1.64 (3.79)	0.04 (2.80)	0.33 (3.05)	-.23 (- 3.66)	---	0.04 (0.25)
	ΔLTR	30	1989	1	0.22 (2.50)	-0.01 (-2.83)	0.59 (3.77)	-1.38** (-5.4)	---	0.20 (1.19)
	ΔLGE	30	1990	1	0.18 (2.71)	-0.01 (-2.47)	0.38 (3.44)	-1.09 (-4.26)	---	0.03 (0.20)
MODEL(B)	LTR	31	1987	1	2.53 (2.48)	0.02 (0.92)	---	-0.35 (-2.65)	0.06 (1.34)	0.26 (1.45)
	LGE	30	1986	1	2.43 (2.76)	0.003 (0.37)	---	-0.30 (-2.84)	0.07 (1.81)	0.30 (1.82)
	ΔLTR	30	1994	1	-0.09 (-0.4)	0.02 (1.56)	---	-1.02 (-3.66)	-0.03 (-1.59)	0.005 (0.03)
	ΔLGE	27	1994	4	-0.67 (-4.60)	0.07 (5.62)	---	-1.74** (-6.32)	-0.08 (-5.43)	0.42 (1.95)
MODEL(C)	LTR	31	1992	1	3.51 (2.80)	0.05 (2.82)	0.59 (2.74)	-0.51 (-2.94)	0.05 (1.41)	0.26 (1.31)
	LGE	31	1984	1	2.21 (2.74)	0.05 (0.81)	-0.26 (-1.67)	-0.3 (-3.09)	0.02 (0.33)	0.29 (1.76)
	ΔLTR	30	1989	1	0.64 (2.44)	-0.06 (-2.27)	0.77 (4.18)	-1.46** (-5.85)	0.05 (1.67)	0.26 (1.55)
	ΔLGE	27	1993	4	-0.55 (-3.41)	0.06 (4.58)	0.25 (2.30)	-2.08** (-6.02(	-0.08 (-5.23)	0.69 (2.78)

Notes : For Government Revenue and Government Expenditure we assumed break in both Intercept and trend. The 5% critical value, test is -5.080, For Government Revenue and Government Expenditure.They are obtained using 1-lag for both tests. Zivot-Andrews test the null hypothesis of unit-root.

International Journal of Academic Research in Business and Social Sciences
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ISSN: 2222-6990

5-2. **Cointegration Analysis with Structural Breaks**

As had been noted as far back as 1989 by Perron, ignoring the issue of potential structural breaks can render invalid the statistical results not only of unit root tests but of cointegration tests as well. Kunitomo (1996) explains that in the presence of a structural change, traditional cointegration tests, which do not allow for this, may produce "spurious cointegration". In the present research, therefore, considering the effects of potential structural breaks is very important, especially because the Iranian economy has been faced with structural breaks like revolution and war in addition to some policy changes. Saikkonen and Lütkepohl (2000a, b, c) have proposed a test for cointegration analysis that allows for possible shifts in the mean of the data-generating process. Because many standard types of data generating processes exhibit breaks caused by exogenous events that have occurred during the observation period, they suggest that it is necessary to take into account the level shift in the series for proper inference regarding the cointegrating rank of the system. They argued that "structural breaks can distort standard inference procedures substantially and, hence, it is necessary to make appropriate adjustment if structural shifts are known to have occurred or are suspected" (2000b: 451). The Saikkonen and Lütkepohl (SL) test investigates the consequences of structural breaks in a system context based on the multiple equation frameworks of Johansen-Jeslius, while earlier approaches like Gregory-Hansen (1996) considered structural break in a single equation framework and others did not consider the potential for structural breaks at all. According to Saikkonen and Lütkepohl (2000b) and Lütkepohl and Wolters (2003), an observed n-dimensional time series yt = (y1t,…., ynt), yt is the vector of observed variables (t=1,…, T) which are generated by the following process:

$$y_t = \mu_0 + \mu_1 t + \gamma_1 d_{1t} + \gamma_2 d_{2t} + \gamma_3 d_{3t} + \delta Dt_{ot} + \delta_2 Du_{1t} + x_t$$

Where *DT0t* and *DU1t* are impulse and shift dummies, respectively, and account for the existence of structural breaks.and account for the existence of structural breaks. *DT0t* is equal to one, when t=T0, and equal to zero otherwise. Step (shift) dummy (Du_{1t}) is equal to one when (t>T1), and is equal to zero otherwise. The parametersγ_i (I=1,2,3), μ_0, μ_1, and δ are associated with the deterministic terms. The seasonal dummy variables *d1t, d2t,* and *d3t,* are not relevant to this research since our data are yearly. According to SL (2000b), the term *xt* is an unobservable error process that is assumed to have a VAR (p) representation as follows:

$$x_t = A_1 x_{t-1} + \cdots + A_p x_{t-p} + \varepsilon_t \quad , \quad t = 1,2$$

By subtracting xt-1 from both sides of the above equation and rearranging the terms, the usual error correction form of the above equation is given by:

$$\Delta x_t = \prod x_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta x_{t-j} + u_t$$

This equation specifies the cointegration properties of the system. In this equation, *ut* is a vector white noise process; *xt= yt -Dt* and*Dt* are the estimated deterministic trends. The rank of $\Pi$is the cointegrating rank of xt and hence of yt (SL, 2000b). The possible options in the SL procedure, as in Johansen, are three: a constant, a linear trend term, or a linear trend orthogonal to the cointegration relations. In this methodology, **t**he critical values depend on the

kind of the above-mentioned deterministic trend that included in the model. More interestingly, in SL, the critical values remain valid even if dummy variables are included in the model, while in the Johansen test; the critical values are available only if there is no shift dummy variable in the model. The SL approach can be adopted with any number of (linearly independent) dummies in the model. It is also possible to exclude the trend term from the model; that is, μ=0 maybe assumed *a priori*. In this methodology, as in Johansen's, the model selection criteria (SBC, AIC, and HQ) are available for making the decision on the VAR order. In the following section, we have applied SL tests for the cointegration rank of a system in the presence of structural breaks.

5-2-1. Empirical Results based on the SL Procedures

As explained above Saikkonen and Lütkepohl (2000b) derived the likelihood ratio (LR) test in order to determine the number of cointegrating relations in a system of variables, by considering for the presence of the potential structural breaks. We now apply a maximum likelihood approach; based on SL; for testing and determining the long-run relationship in the model under investigation. As mentioned earlier, in this procedure SL assumed that the break point is known a priori. In the last section, we determined the time of the break endogenously by Zivot-Andrews (1992) procedure. Following the SL procedure we consider three cases: impulse dummy and shift with intercept included; impulse dummy and shift with trend and intercept included; and finally, impulse dummy and shift with a trend statistically independent (orthogonal) to cointegration relation included. The cointegration results in these three cases are presented in tables (2) The optimal number of lags is determined by SBC, which is more appropriate for the short span of the data. The hypothesis of the long-run relationship among non-stationary variables is tested and the result is reported in table (2). These tables indicates that the hypothesis of no cointegration (r=0) is rejected at the 10% significance level at C (Intercept included) and CO (Trend orthogonal to cointegration relation) Models . therefore the existence of one cointegration vector is not rejected in any of the three cases mentioned above.

Table 2. Saikkonen and Lutkephol cointegration test results

null hypothesis		LR	Critical values		
			10%	5%	1%
Intercept included (C)	$r = 0$	12.07	*10.47	12.26	16.10
	$r = 1$	1.36	2.98	4.13	6.93
Intercept and trend included	$r = 0$	11.58	13.88	15.76	19.71
	$r = 1$	1.44	5.47	6.79	9.73

(C/T)					
Trend orthogonal to cointegration relation (C/O)	$r = 0$	10.86	*8.18	**9.84	13.48
	$r = 1$	----	----	----	----

Note: *, ** Indicates that the corresponding null hypothesis is rejected at10% and 5% level. Critical values are tabulated by SL (2000b). The optimal number of lags (searched up to 1 lags) is determined by the SBC.

6. Conclusion

The objective of this paper was to examine the long-run Relationship between Government Expenditure (GE) and Government Revenue(TR) for Iran using annual data over the period 1978-2011 employing the Saikkonen and Lutkephol (2000) cointegration method. Prior to the cointegration analysis, the Zivot-Andrews (1992) test was applied in order to endogenously determine the most significant structural breaks. The empirical results based on the ZA model indicate that we cannot find enough evidence against the null hypothesis of unit root for all of the variables under investigation. The same unit root tests have been applied to the first difference of the variables and in most cases we rejected the null hypothesis of unit root. Hence, we maintain the null hypothesis that each variable is integrated of order one or I(1). These results provide complementary evidence to models employing exogenously imposed structural breaks in the Iranian macroeconomy. Finally, we employed the Saikkonen and Lutkephol (2000) cointegration approach to determine the long-run Relationship between Government Expenditure (GE) and Government Revenue(TR) in Iran. It is important to use this approach in our cointegration test as during the sample period, the Iranian economy has been subject to serious structural breaks such as: the upheavals of the 1979 Islamic Revolution and the Iran/Iraq war beginning in 1980, among others. In the presence of such structural breaks, the SL cointegration tests conducted in this paper indicate that there is one cointegrating vector which links Government Expenditure and Government Revenue.

Acknowledgements

The authors would like to acknowledge the financial support of university of Tehran for this research under the grant number 4401012/1/29 .

International Journal of Academic Research in Business and Social Sciences
May 2014, Vol. 4, No. 5
ISSN: 2222-6990

References

Al-Yousif Y., Does Government Expenditure Inhibit or Promote Economic Growth: Some Empirical Evidence from Saudi Arabia. *Indian Economic Journal* 48(2) (2000)

Anderson, W., M.S. Wallace, and J.T. Warner. 1986 "Government Spending and Taxation: What Causes What?", Southern Economic Journal, Vol. 52, pp. 630-639.

Baghestani,, H., and R. McNown. 1994 "Do Revenue or Expenditures Respond to Budgetary Disequilibria?" Southern Economic Journal 60, pp. 311-322.

Cheng, Benjamin S. 1999 "Causality between Taxes and Expenditures: Evidence from Latic American Countries", Vol. 23, No. 2, pp. 184-192.

Furstenberg George M, von, R. Jaffery Green and Jin Ho Jeong 1986 "Tax and Spend, or Spend and Tax" The Review of Economics and Statistics, May, No. 2, pp. 179-188.

Johansen, S. 1988. Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*, *12*(1), 231-54.

Johansen, S., Juselius, K. 1990. Maximum Likelihood Estimation and Inference on Cointegration-with Application to the Demand for Money. *Oxford Bulletin of Economics and Statistics*, *52*(2), 169-210.

Joulfaian, D., and R. Mookerjee 1990 "The Intertemporal Relationship Between State and Local Government Revenues and Expenditures: Evidence from OECD Countries." Public Finance, Vol. 45, pp. 109-117.

Kunitomo, N. (1996) Tests of unit roots and cointegration hypotheses in econometric models, *Japanese Economic Review*, 47(1): 79-109.

Lee, J., Strazicich, M. C. 2004. Minimum LM Unit Root Test with One Structural Break, *Appalachian State University Working Papers*, No.04-17. Retrieved from: http://econ.appstate.edu/RePEc/pdf/wp0417.pdf (Accessed 13.09.2009)

Leybourne, S.J and Newbold, P. (2003) Spurious rejections by cointegration tests induced by structural breaks, *Applied Economics*, 35(9): 1117-1121.

Lütkepohl, H., and Wolters, J. (2003) Transmission of German monetary policy in the pre-Euro period, *Macroeconomic Dynamics*, 7: 711-733

Lutkepohl H. (2004). Vector Autoregressive and Vector Error Correction Model, in Lutkepohl, H. and M. Kratzig (ed.), Applied Time Series econometrics, Cambridge University Press.

Owoye, O. 1995 "The Causal Relationship between Taxes and Expenditures in the G7 Countries: Co-integration and Error Correction Models", Applied Economic Letters, 2, pp. 19-22.

Pahlavani, M (2005) Cointegration and Structural Change in the Exports-GDP Nexus: The Case of Iran. *International Journal of Applied Econometrics and Quantitative Studies*, 2-3, forthcoming.

Pahlavani M., Wilson E. J., A. Valadkhani, *International Journal of applied Business and Economic Research* 4(1) (2006) 23-44.

Peacock, S.M., and J. Wiseman. 1979 "Approaches to the Analysis of Government Expenditures Growth.", Public Finance Quarterly, Vol. 7, pp. 3-23.

Perron, P. (1997) Further evidence on breaking trend functions in macroeconomic variables. *Journal of Econometrics* 80(2): 355-385.

Ram. R. 1988 "Additional Evidence on Causality between Government Revenue and Government Expenditure", Southern Economic Journal, 54(3), pp. 763-69.

Saikkonen, P. and Lütkepohl, H. (2000a) Testing for the cointegrating rank of a VAR process with an intercept, *Econometric Theory* 16(3): 373-406.
Saikkonen, P. and Lütkepohl, H. (2000b) Testing for the cointegrating rank of a VAR process with structural shifts, *Journal of Business and Economic Statistics* 18(4): 451-464.
Saikkonen, P. and Lütkepohl, H. (2000c) Trend adjustment prior to testing for the cointegrating rank of a vector autoregressive process, *Journal of Time Series Analysis* 21: 435-456.Zivot, E., Andrews, D., *Journal of Business and Economic Statistics* 10 (1992) 251-70.
Schwarz, G. 1978 “Estimating the Dimensions of a Model” Annals of Statistics, 6, pp. 461-64.
Zivot, E., Andrews, D. W. K. 1992. Further Evidence on the Great Crash, the Oil-Price
Shock, and the Unit-Root Hypothesis. *Journal of Business and Economic Statistics, 10*(3), 251-70.