Tax elasticity in Venezuela:
A dynamic cointegration approach

María Antonia Moreno[1]
Miriam Adriana Maita Bolívar[2]

September, 2014

Abstract

Gaining knowledge of the tax elasticity is essential for designing fiscal policies and projecting public budgets. The findings of studies based on dynamic cointegration and applied to the experience in Latin America show that long-run tax elasticity estimated in this way are generally higher than those found in conventional cointegration. In the case of Venezuela, such findings are counterintuitive, considering the usual perception of its tax system's incapability to play a stabilizing role in the public finances, given the country's high fiscal dependence on oil revenues and the lack of political will to increase domestic taxes. Both considerations strongly motivate this work, which aims to give greater scope both in the span time as well as in the coverage of the tax system. The main contribution of this paper is identifying the elasticity of long and short term along time and the presence of short-run asymmetries in the responsiveness of the tax system to the swings in the business cycle. The results of our estimations confirm those expectations, long-run estimates show an increasing elastic tax system and they are higher than the short-run ones. Though these features tell a partial story on the efficiency of the Venezuelan tax system, they should be considered in the future design of tax policies. The study remains open to the examination of other factors that also contribute to tax efficiency, but are out of the scope of this study.

Keywords: Tax elasticity, value added tax, income tax, cointegration, dynamic OLS (DOLS), Autoregressive distributed lag (ARDL).

JEL classification code: E62, H2, H24, H29.

[1] Senior Economist Research of the Macroeconomic Analysis and Programming Management Office at Central Bank of Venezuela, mamoren@bcv.org.ve.
[2] Economic Analyst of Economic Analysis Department at Central Bank of Venezuela, mmaita@bcv.org.ve.

Resumen

Conocer la elasticidad del sistema tributario es esencial en el diseño de las políticas fiscales y las proyecciones de los presupuestos públicos. Los hallazgos de estudios que aplican métodos de cointegración dinámica a la experiencia de América Latina muestran que la elasticidad tributaria de largo plazo es generalmente más alta que los valores encontrados con técnicas de cointegración convencional. En el caso de Venezuela, estos resultados son contra-intuitivos, si se tiene en cuenta la percepción habitual de la incapacidad de su sistema tributario para jugar un papel estabilizador en las finanzas públicas; esto en vista de la alta dependencia fiscal de los ingresos petroleros y de una supuesta falta de voluntad política para aumentar los impuestos internos. Ambas consideraciones motivan este trabajo, cuyo objetivo es dar un mayor alcance en términos temporales y de cobertura del sistema tributario en relación con los estudios realizados previamente. Su principal contribución consiste en identificar la existencia de las elasticidades de corto y largo plazo y la presencia de asimetrías en la capacidad de respuesta del sistema tributario en el corto plazo a los vaivenes del ciclo económico. Los resultados de las estimaciones confirman esos hallazgos, sugiriendo un sistema tributario progresivamente elástico y con elasticidades de largo plazo mayores que las de corto. Aunque estos aspectos tocan parcialmente el tema de eficiencia tributaria, ellos deberían tomarse en cuenta en el diseño futuro de las políticas fiscales en el país. El estudio permanece abierto al examen de otros factores que también contribuyen a la eficiencia del sistema tributario, pero que están fuera del alcance de esta investigación.

Palabras claves: Elasticidad tributaria, impuesto al valor agregado, impuesto sobre la renta, cointegración, OLS dinámico (DOLS), modelo autorregresivo de rezagos distribuidos (ARDL).

Códigos de clasificación JEL: E62, H2, H24, H29.

List of Variables

NOT:	Non-oil taxes
IT:	Income tax
VAT:	Value added tax
TVAT:	Total VAT
DVAT:	Domestic VAT
EVAT:	External VAT
NOGDP:	Non-oil GDP
VOBP:	Venezuelan oil basket price
LRvariable_L:	Log of the level-variable's real value
LRvariable_SA:	Log of the seasonal-adjusted-variable's real value
DLRvariable_L:	Difference of LRvariable_L
DLRvariable_SA:	Difference of LRvariable_SA
D_SByear:	Dummy for structural break in annual models
D_SBquarter:	Dummy for structural break in quarterly models
Dyear or Dquarter:	Dummy for exogenous events
D_AC-SE:	Dummy for asymmetric cycle in short elasticity

Introduction

Gaining knowledge of the tax elasticity is essential for designing fiscal policies and projecting public budgets. A tax system with a high elasticity prevents the disadvantages of frequent discretionary changes in fiscal policy to achieve macroeconomic stability; the implementation of those changes, in addition to being affected by institutional delays, does not get reversed when the macroeconomic environment improves (Machado & Zuloeta, 2012).

The findings of studies based on dynamic cointegration and applied to the experience in Latin America show that long-run tax elasticity estimated in this way are generally higher than those found in conventional cointegration. These results suggest that the 1990s tax reforms indeed achieved objectives of improving the stabilizing capacity of the tax systems where they were applied.

In the case of Venezuela, such findings are counterintuitive, considering the usual perception of its tax system's incapability to play a stabilizing role in the public finances, given the country's high fiscal dependence on oil revenues and the lack of political will to increase domestic taxes (Zambrano, 2009; Ochoa 2010). Notwithstanding, some stylized features of the country's taxation suggest that this would not be the case, and that, quite on the contrary, the recent estimations performed for the Venezuelan case are more aligned to the general findings commented earlier. Those facts refer to: the growing weight of domestic taxation in the financing of government spending, despite the efforts of the authorities to capture more oil revenues (especially from mid of two thousand years on); an increase more pronounced in the tax collection than in the fiscal spending in periods of severe restriction of oil revenues; and finally, the significant positive and permanent impact of the tax reform in early to mid-nineties, with the creation of the Value Added Tax (VAT), the reduction of the gap in the Income Tax (IT) brackets and recent efforts to reduce tax evasion (Moreno, 2013).

Both considerations – the lessons from the estimation of tax elasticity under a dynamic cointegration approach and the stylized facts of the Venezuelan tax system – strongly motivate this work, which aims to give greater scope both in the span time as well as in the coverage of the tax system. The main goal of the work is to estimate tax elasticity indicators in order to develop timely fiscal indicators (sustainable fiscal balance) for the purposes of fiscal policy design and international comparison, which gives indirect guidance on the optimality of the tax policy.

The estimations are in quarterly and annual data and include overall non-oil tax revenues (NOT), IT and VAT: total (TVAT), domestic (DVAT) and external (EVAT). By estimating NOT we overcome information restrictions concerning the rest of non-oil taxes and gain intuition on their elasticities.

The main contribution of this paper, besides examining the existence of cointegration between domestic taxes and NOGDP by means of DOLS estimations, is identifying the varying long and short-run mean indicators along time, and the presence of short-run asymmetries in the responsiveness of the tax system to the swings in the business cycle.

Our estimation strategy is developed in two stages. First, by means of conventional techniques, we confirm the existence of cointegration. Second, we check that the models can be improved by using DOLS.

The results of our estimations confirm our expectations. Long-run estimates show an increasing elastic tax system, which would be related to tax reforms and decisions implemented since the nineties. In all the cases, the short-run elasticities are lower than the long-run ones. As for short-run asymmetries, we only found statistical significance in the annual IT, in which there is more responsiveness in economic upturns than in downturns. A less responsive tax system in the short run could mean that economic agents act according to the Ricardian Equivalence or that the prevailing tax system has smoothing properties; either one, requires more testing. Interestingly, the speed of adjustment of the elasticities toward their long-run values in overall taxation (NOT) is in between those of IT and VAT's values, the latter of which indeed reflects its strong weight in total tax revenues.

Those features raise new questions concerning the existence of potential inefficiencies in the tax system. Although, they point to a more elastic tax system than to what is generally accepted, this tells a partial story about the efficiency of the Venezuelan tax framework. This should be considered in the future design of tax policies; particularly, rather than considering raising the tax rates or even introducing new taxes, the authorities should explore other features that contribute to the efficiency of the tax system, but that are out of the scope of this study.

The remainder of the paper is organized as follows. In Section 1, a brief overview of the DOLS approach is presented. Section 2 is devoted to summarize the main stylized facts of the Venezuelan non-oil tax system. The econometric model is described in Section 3 and methodological data considerations and conventional estimations are presented in Section 4 and 5, respectively. The Section 6 discusses the results and Section 7 concludes the work.

1. The dynamic cointegration approach

The conventional cointegration model (Engle-Granger two steps) used to estimate the tax elasticity is represented by the set of equations (1) and (2) where $Ln(X)$, $Ln(Y)$ stand for the logarithms of the tax revenue and the tax base, β_L the long-run tax elasticity coefficient, β_S the short-run tax elasticity coefficient, ε and u the tax elasticity long and short error terms, Δ symbol the difference of the corresponding level variable, and, finally, γ the coefficient of the long-run lagged error term.

$$Ln(X_t) = \alpha + \beta_L Ln(Y_t) + \varepsilon_t \quad (1)$$
$$\Delta Ln(X_t) = \alpha + \beta_S \Delta Ln(Y_t) + \gamma \varepsilon_{t-1} + u_t \quad (2)$$

In the presence of non-stationarity in the level of variables, as is usually the case, model (1)-(2) poses two important limitations. First, its single long-term tax elasticity does not capture the presence of significant and asymmetric fluctuations of tax collection over the business cycle, neither the more/less variability in some specific tax collection than in others. Second, the error term's serial correlation gives rise to biased coefficient estimates and inconsistent coefficients' standard error, situation that typically relates to the endogeneity of the variables used in the estimations. Under these circumstances, this model produces asymptotically biased parameters, inconsistent standard errors and artificially high R-Squared (Stock & Watson, 1993; Sobel & Hocombe, 1996; Bruce, Fox & Tuttle, 2006).

Overcoming those problems not only requires estimating short and long-term elasticity separately, but also adding independent variables' leads and lags terms, in order to correct for endogeneity. Models constructed in this way, are known as dynamic models of cointegration (DOLS); they, of course, preserve the correction of the bias caused by the short-run deviations of the endogenous variable from its long-term equilibrium relationship, by incorporating the long-run error correction term lagged one period into the short-run estimation.

The findings of studies based on DOLS to evaluate the experience in Latin America show that long-run tax elasticity estimates are generally higher than those found in conventional cointegration models, suggesting that the 1990s tax reforms indeed achieved objectives of improving the stabilizing capacity of the tax systems where they were applied (Machado & Zuloeta 2012; Fricke & Süssmuth 2014). The findings for the Venezuelan case are similar, but they are counterintuitive, considering the usual perception of its tax system's incapability to play a stabilizing role in the public finances that arises from the country's high fiscal dependence on oil revenues and the lack of political will to increase domestic taxes (Zambrano, 2009; Ochoa 2010). Both, the importance of knowing the tax elasticity for the design of fiscal policies and the planning of government budgets and the findings for the Venezuelan case, obliges a reexamination of the country tax collection's experience.

2. Stylized facts of Non-Oil Tax revenues (NOT) in Venezuela

The main stylized features that we summarize in this section seem to be more aligned to the general findings commented earlier. They cover a growing weight of domestic taxation in the financing of government spending, despite the efforts of the authorities to capture more oil revenues (especially from mid of two thousand years); an increase more pronounced in the tax collection than in the fiscal spending in periods of severe restriction of oil revenues; and finally, a significant positive and permanent impact of the tax reform in early to mid-nineties, with the creation of the Value Added Tax (VAT), the reduction of the gap in the Income Tax (IT) brackets and recent efforts to reduce tax evasion (Moreno, 2013).

In the last two decades, the share of the Venezuelan NOT in GDP is under the Latin America's average (Figure 1). When we include the tax on oil income, the indicator is closer to the Latin-American one, particularly, since the end of the nineties. Notwithstanding, the increasing trend of the NOT shows that the legal reforms implemented since 1990 paid off, which shows in the significant raise that the tax collection's share in GDP from the nineties to the 2000s (about 6% per year). Such a trend is similar to the one seen in other Latin-American countries that also implemented tax reforms around the same time. The gap between total taxes and NOT, on the other hand, has been closing; this result mainly owes to the reduction of the legal tax rate on oil income that came into effect since 2002.

The Venezuelan public finance has been heavily dependent on oil resources; revenues stemming from this source account for more than 60% of total government revenue per year between 1950 and 2012. Figure 2 shows this, but also the increasing share of NOT since the mid-1990s, which can be attributed to the tax reform that began to be implemented after 1990 and, especially with the introduction of the VAT.

Figure 3 also shows how the structure of NOT has evolved as a percentage of GDP; by the end of the period, specifically, since 1996, the IT and VAT together constitute almost 75% of total non-oil taxes. It is actually clear that the push in NOT owes almost to the creation of the VAT. On the other hand, customs and other taxes show a high variability, they slowdown in the sixties and seventies and recover somehow in the nineties and 2000s, but without reaching their fifties' average.

In real terms, both as a proportion of GDP and in real Bs. of 1997, the Venezuelan NOT presents a similar trend, except between 1950 and 1980. During this period, while the tax collection as % of GDP was fairly stable – over 6% per year – its real per capita value increased steadily; the divergence is explained by the real-per-capita NOT's higher growth rates than those recorded for the real GDP. It has to be noted that the approval of a new Law of Income Tax in 1966 does not seem to have a noticeable impact in the collection of the tax (Figure 4).

Both indicators experienced a big push between 1984 and 1988, and after 1990. In the first case, the rise obeyed to a fiscal adjustment that took place after a significant decline in the oil rent; in the second case, the results are mainly explained by the creation of the VAT which started to be collected effectively since 1993. In opposition to this result, the reform to the Tax on Income Law (1990) and the reduction in the custom rates (1989-1990) resulted in a strong reduction of these tributes that also impacted the NOT. A plan implemented in 2003 toward reduction of evasion (*Plan Evasión Cero*) seems to have had a positive impact in the total tax collection, especially, between 2005 and 2007. In general, the real NOT, both in per capita and levels, began to report more volatility after the nineties (Table 1).

Table 1

Venezuela - Real NOT

1997=100

	Average		Standard Deviation		Coeff of Variation	
	Per cápita	Level	Per cápita	Level	Per cápita	Level
1950 2012	122	2,385	65	2,259	0.53	0.95
1950 1966	64	458	9	145	0.14	0.32
1967 1989	99	1,431	17	495	0.17	0.35
1990 2012	186	4,762	63	2,095	0.34	0.44

The evolution of the tax regulatory framework gives some intuitions about that variability. Excluding considerations on the possible impact of exogenous economic shocks, the number of changes in the Corporate IT's base amounts to 10 after 1956, and to 9 in its marginal rates; the Personal IT experienced 9 and 6 changes in its base and marginal rates as well, counting from the same year (Table 2). In the VAT case, there have been 10 changes in the standard rates, since it started to be in effect in 1993.

Table 2

Changes of Tax Laws

IT Laws

Modification	Date	Implemented	Corporate income		Personal income		
			Tax Base	Rate	Tax Base	Rate	
Original Law	7/17/1942	1/1/1943					
1 partial reform	7/31/1944	8/1/1944		x	x	x	
2 partial reform	12/31/1946	1/1/1947		x		x	
Law	11/12/1948	11/12/1948		x			a)
Law	8/8/1955	1/1/1956	x	x	x	x	
1 partial reform	7/10/1958	7/10/1958	x		x		
Law	12/19/1958	1/1/1959		x		x	
1 partial reform	2/17/1961	2/17/1961	x	x	x	x	
Law	12/23/1966	1/1/1967	x	x	x	x	
1 partial reform	12/18/1970	12/30/1970		x			a)
2 partial reform	8/27/1974	8/29/1974			x		
3 partial reform	1/25/1975	1/27/1975		x			a)
4 partial reform	8/20/1976	8/22/1976		x			a)
Law	6/23/1978	7/1/1978		x		x	
1 partial reform	12/23/1981	1/1/1982	x		x		a)
2 partial reform	10/3/1986	10/16/1986		x	x		
3 partial reform	8/13/1991	9/1/1991	x	x	x	x	
4 partial reform	9/9/1993	9/9/1993					a)
5 partial reform	5/27/1994	7/1/1994	x	x		x	
6 partial reform	12/18/1995	12/18/1995	x				
7 partial reform	10/22/1999	10/22/1999	x				
8 partial reform	11/13/2001	1/1/2002		x			a)
9 partial reform	12/28/2001	12/28/2001	x		x		
10 partial reform	9/25/2006	9/25/2006	x				a)
11 partial reform	2/16/2007	2/16/2007	x				

a) Changes in the tax on the oil industry

Source: Income Laws.

VAT Laws

Modification	Date	Implemented	Tax Base	Rate
Original Law	9/30/1993	10/1/1993		
1 partial reform	12/30/1993	1/1/1994	x	x
ICSVM Law	5/27/1994	8/1/1994	x	
1 partial reform	9/28/1994	9/28/1994	x	x
2 partial reform	11/27/1996	11/28/1996	x	x
VAT Law	5/5/1999	6/1/1999	x	x
1 partial reform	8/3/2000	8/1/2000	x	x
2 partial reform	7/9/2002	7/10/2002	x	x
3 partial reform	8/26/2002	8/27/2002	x	x
4 partial reform	8/11/2004	8/12/2004	x	x
5 partial reform	9/1/2005	9/2/2005		x
6 partial reform	4/26/2006	4/27/2006	x	
7 partial reform	2/13/2007	2/14/2007	x	x
8 partial reform	2/26/2007	3/1/2007	x	x

Source: VAT Laws.

In general, the maximum and minimum rates tended to converge, especially, after the tax reforms of the nineties (Figure 5). In the international comparison (Figure 6), the situation differs for the maximum and minimum rates; in the first case, the Venezuelan Corporate IT rates are among the highest in 1997 and 2014, but in the second case, the situation is the opposite: its minimum Corporate IT rates are among the lowest. As for the Personal IT, Venezuela's maximum rates changed position from the middle in 1992 to the highest in 2014; this is due to the reduction in other countries that took place between those years. The minimum rates, on the other hand, were among the highest in 1992 but in 2014 are among the lowest. These changes in rates converged in the same direction – simplification, convergence and reduction in the IT rates – that mainstream approaches demand for efficiency gains.

No enough information is available to know if the legal changes concerning the bases of IT and VAT improved its efficiency; however, it can be said that most of them got reduced, due to the incorporation of many exemptions to those taxes.

It should be noted that most of the impact of changes in the IT laws should come from those occurred in the Corporate IT case, given that more than 80% of those revenues originate in the latter (Figure 7).

The VAT, although relatively new in the tax history of Venezuela, has experienced more legal changes compared to those occurred in other taxes. Between 1993 and 2014, the rates have changed on average every two years, with maximum of 16.5% and minimum of 9%, and mostly in response to overcome the impact of fiscal restrictions. The authorities increased in 2002 the rates to cope with the consequences of general strike in 2002-2003; also, in 2009 they raised again, after the global crisis hit the oil revenues (Figure 8). In the international comparison, the Venezuelan rates have been close to the Latin-American average (excluding the year 2000), which is slightly lower than the OECD ones (Table 3).

Before 1994, there was no way for Venezuelan taxpayers to avoid the impact of inflation in their tax obligations; but that was also true for the government. Such impact has not been estimated. After the creation of the tax unit (*Unidad Tributaria)* that year, the authorities attempted to correct those distortions, by adjusting the indicator to current inflation. In the last years, specifically since 2005, the tax unit's correction for inflation has been lagging (Figure 9), probably causing net real losses to tax payers.

Two lasts things remain to consider in this section. From one part, what would be the sign of the relationship between NOT and the oil rent? This question addresses the possible influence of oil fluctuations in the design of fiscal policies. Figure 10 shows a raising trend of NOT during the 1980s and part of the 1990s, periods during which a substantial decline of fiscal oil revenues occurred and fiscal adjustments were indeed implemented (1983-84, 1994-95, 1996-97). The continuous increasing trend of NOT during the 2000s, when oil prices experienced a great boom, also paralleled a domestic tax policy's orientation to broaden the tax space, as opposed to what happened in the sixties and seventies. These movements suggest that the sign of a relationship between NOT and oil fiscal variables cannot be unambiguously established a priori.

Table 3
VAT standard rate

Country	Implemented	Initial rate	1992	2000	2011	2014
High rate						
Hungary	1988	25	25	25	25	27
Norway	1970	20	20	23	25	25
Portugal	1986	16	16	17	23	23
Italy	1973	12	19	20	20	22
Uruguay	1987	21	22	23	22	22
Argentina	1975	16	18	21	21	21
Spain	1986	12	13	16	18	21
Brasil'	1967	15	20,5	20,5	20,5	20
United Kingdom	1973	8	17,5	17,5	20	20
France	1968	20	18,6	20,6	19,6	20
Average (OCDE)		15,4	16,3	17,8	18,5	**19,1**
Chile	1975	20	18	18	19	19
Germany	1968	11	14	16	19	19
Average rate						
Peru	1976	20	18	18	18	18
Dominican Republic	1983	6	6	8	16	18
Colombia	1975	10	12	15	16	16
México	1980	10	10	15	16	16
Average Latin America		11,1	12,3	14,4	15	**15,1**
Nicaragua	1975	6	10	15	15	15
Luxembourg	1970	10	15	15	15	15
Honduras	1976	3	7	12	12	15
Bolivia	1973	10	14,9	14,9	13	13
Costa Rica	1975	10	8	13	13	13
El Salvador	1992	10	10	13	13	13
Ecuador	1970	10	10	12	12	12
Guatemala	1983	7	7	10	12	12
Venezuela	1993	10	-	15,5	12	**12**
Low rate						
Australia	2000	10	-	10	10	10
Paraguay	1993	10	-	10	10	10
Korea	1977	10	10	10	10	10
Switzerland	1995	6,5	-	7,5	8	8
Panama	1977	5	5	5	7	7
Canada	1991	7	7	7	5	5
Japan	1989	3	3	5	5	5

Source: ECLAC and OECD.

On the other hand, it is not possible conjecture a priori a tax-smooth orientation in the tax strategies of the country. In effect, it is possible to see (Figure 10) that resorting to public credit has been, rather, more intense during periods of oil booms (1976-1978 and 2000s), which reveals a pro-cyclical orientation in the public indebtedness process instead.

3. The model

The estimation of long-run elasticities (Equation 3) relies on DOLS techniques (Stock & Watson 1993). Standard errors are estimated using Heteroskedasticity and Autocorrelation Consistent Standard Errors (HACSE). A standard error correction model (ECM) is used to estimate short-run elasticities (Equation 4). Additionally, we allow short-run elasticities to vary for different states of economic conditions. Following Bruce, Fox & Tuttle (2006), state-dependent asymmetries are taken into account, according to the position of actual revenue to respective long-run value.

$$Ln(T_t) = \alpha_L + \beta_L Ln(Y_t) + \sum_{g=-j}^{j} \gamma_g \,\Delta LnY_{t+g} + \theta_L X_t + \varepsilon_t^L \quad (3)$$
$$\Delta Ln(T) = \alpha_S + \beta_S \Delta Ln(Y_t) + \varphi\varepsilon_{t-1} + \theta_S X_t + \omega V_t + \varepsilon_t^S \quad (4)$$

T denotes revenues from tax and *Y* real GDP, and the subscripts L and S are used to identify the same coefficients in the long (3) and short-term (4) models, respectively: namely, β_L and β_S stand for long and short-run elasticity of taxes to GDP. In the long-run equation (3), there is a term which refers to the lag and lead-operator (polynomial of first log differences of real GDP), and whose coefficient (γ) is estimated to control for potential endogeneity problems and autocorrelation. The last term in this equation represents a vector *X* of variables that are intended to represent structural changes in the series of tax collection (dummies) and other control variables, to account for changes in tax legislation on tax rates and/or tax bases and other exogenous events such as oil shocks. The number of lags and leads is determined by the Schwarz-Bayesian information criterion (BIC).

The short-run model - Equation (4) -, besides testing for intra-period effects, assesses the speed of adjustment of tax collection towards its long-term level: the larger the φ coefficient in absolute value, the faster tax revenues moves to their long-run equilibrium. The vector *X* includes dummies to control for the impact of exogenous variables and events and structural breaks; and the vector *V*, equal to $\Delta Ln(Y_t) * C$, is meant to identify the existence of cyclical asymmetries in the tax collection, where *C* is a dummy that takes a zero (one) value if tax revenues are below (above) their steady state level. Both the errors in equations (3-4), ε_t^L and ε_t^S, represent i.i.d. random variables.

4. The data

The basic series for the analysis are tax collection data as published by the Ministry of Finance; as for the rest of the variables, the main source is the Central Bank of Venezuela, unless it is otherwise noticed. The NOGDP was chosen as the closest tax base proxy for NOT, IT and VAT[3]. A unique base-year for this series does not exist in Venezuela[4]; the 1997 homogenization was done by adjusting the 1950-1996's series for its growth rates.

The available tax series primarily refer to the collection of the most important ones (NOT, IT Personal and Corporative, VAT and customs, both on accrual and cash basis; but there is no available information to calculate their corresponding average effective rates and tax bases, except in the case of the VAT rates. Due to this, for example, it is not possible to

[3] Although our estimation approach might suggest that we are estimating tax buoyancy (we try to identify the tax responsiveness to growth in GDP), rather than a proper elasticity, this is not the case. We considered the tax policy actions with the inclusion of dummy variables.
[4] The available official series for the real NOGDP have the following base-years: 1957, 1968, 1984 and 1997.

calculate the elasticity of the VAT on imports separately since no sound data on imports' effective exchange rate during exchange control periods is available; for the same reason we cannot include the elasticity of customs in our estimations separately. At least in the VAT case, these limitations can be somehow overcome by estimating the elasticity separately for the Total VAT (TVAT) and the Domestic VAT (DVAT); additionally, only in the VAT case we can include the average nominal tax rate as an exogenous variable in its elasticity model. All the tax series used in our estimations are accrual based, because they are more homogeneous than the cash-based ones. The latter, for example, exclude payment of taxes with public bonds or other kind of government credits and arrears.

The size of the data samples are broader than those considered in previous work – Machado & Zuloeta (2012) and Fricke & Süssmuth (2014), who include Venezuela in their studies, use 1998q1-2010q3 and 1993q1-2009q1, respectively –. The periods used in our estimations are specified in Table 4: the annual model is estimated only for the cases of NOT and IT, since for the VAT there are not enough observations. In the quarterly models, the sample goes from 1991q1 to 2013q4 in the cases of NOT, because there is no available official quarterly data of NOGDP before 1991. The only case in which we extend the quarterly data to 1984q1 is in the case of IT, whose estimations were not unambiguous; thus, we use NOGDP estimates for the period 1984q1-1990q4, obtained from the Department of Statistics of the Central Bank of Venezuela[5]. In the case of VAT, the sample starts in 1993q4, period in which it started to be collected.

Table 4

	NOT	IT	TVAT	DVAT
Annual	1950-2012	1950-2012		
Quarterly	1991q1-2013q4	1984q1-2013q4	1993q4-2013q4	1993q4-2013q4

All quarterly series were seasonal adjusted by means of the standard ARIMA X-13 method. Specifically, in the IT's case, the filing for its remaining compliance yearly obligations has to be done within the first quarter of the next fiscal year; as for the VAT, since 2005 we observe a seasonal increase in the last quarter of the year. Finally, we employ the consumer price index base 1997 to deflate the nominal variables.

The graphics of the models' variables (NOT, IT, VAT, NOGDP) are presented in annual (Figures 11) and quarterly frequencies (Figures 12). NOGDP follows three clear directions: first, grows steadily up to the end of the seventies (1978); second, from then up to 2003 grows less and turns more volatile; and third, jumps again since then with a strength that lasts until 2008. These shifts appear to be correlated with the behavior of oil cycles; since the early eighties oil prices grew at very low rates for almost two decades and afterwards up to 2008 rose significantly in the years thousands. As for the tax variables, the NOT and IT

[5] This decision was not applied to the NOT case, because we wanted to avoid the use of manipulated data as possible.

series have a similar path until 1991, but divorce since then, which is mainly explained by the appearance of the VAT collection. The Venezuelan oil basket price (VOBP) series is also in log level and differences; both in annual and yearly frequencies, present a strong variability.

Those features show in the tests of stationarity (Table 5), which reported non-conclusive results in some cases, particularly, in the annual series. The NOGDP annual series resulted I(1) in all the tests, except for the model with intercept in which case the ADF and PP proofs rejected the null. The same thing happened with NOT and VOBP; in the first case, the series ended up being I(1) in the models that excluded the trend term and only passed the KPSS test in the model with trend and intercept. In the second case, the series is unambiguously I(1) in the model without trend and intercept; in the rest of the models, only the KPSS rejected the null. As for the IT, TVAT and DVAT, the tests reported that they are I(1) in all of the cases, both in annual and quarterly frequencies. NOT quarterly is also I(1).

The ambiguous results of the annual series' stationarity tests are to some extent reasonable, since the period under study is really long and during which many structural changes and exogenous events have taken place. This and different variability patterns in the tax series made us considering the identification of structural breaks in our estimations. The strategy turned out to be adequate, as some of the breaks found turned out to be statistically significant in the cointegration tests.

Table 5
Stationarity (Engle-Granger)

	NOGDP	NOT	IT	TVAT	DVAT	VOBP
Annual						
Intercept	I(0)*** ADF I(0)**PP I(1)*KPSS	I(1)	I(1)	I(1)	I(1)	I(1)ADF,PP I(0)**KPSS
Trend and intercept	I(1)	I(0)**ADF I(0)*PP I(1)*KPSS	I(0)**ADF I(0)*PP I(1)*KPSS	I(1)	I(1)	I(1)ADF,PP I(0)KPSS
None	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)
Quarterly						
Intercept	I(1)	I(1)	I(1)	I(1)	I(1)	
Trend and intercept	I(1)	I(1)	I(1)	I(1)	I(1)	
None	I(1)	I(1)	I(1)	I(1)	I(1)	

Note: when the series is stationary at all confidence levels, the cell is simply filled with "I(1)"
p-value at 1%(*), 5%(**) and 10%(***)
ADF: Augmented Dickey-Fuller
PP: Phillips-Perron
KPSS: Kwiatkowski–Phillips–Schmidt–Shin

The identification of structural breaks is based on the Bai & Perron (2003), which overcomes the limitations present in VAR estimations. In these models, the existence of multiple breaks may induce Type-II errors, i.e. accepting the hypothesis of no cointegration relationships in the long-term, when, in fact, they are present.

The results of the tests (Table 6 and Table 1A in Appendix) show the presence of 2 (Sequential proof) to 5 breaks (Global proof) in the annual series[6]. We applied the same test to the quarterly series and found out some pertinent structural breaks too.

Figures 13 back-up the intuition of a cointegration relationship between the taxes considered in this study and NOGDP, since they share a common trend, both in annual and quarterly frequencies. On the other hand, preliminary Granger-Causality tests reported that causality runs from NOGDP to all taxes considered and in all frequencies.

Table 6

Structural breaks (Bai-Perron)

	Sequential		Global (Weighted)	
	# of breaks	Break dates	# of breaks	Break dates
Annual				
NOT	2	1964, 1994	5	1964, 1973, 1983, 1994, 2004
IT	1	1989	1	1989
Quarterly				
NOT	3	1994q2, 2004q1, 2007q3	5	1994q2, 1998q3, 2002q4, 2006q1, 2009q2
IT	2	1989q1, 2003q2	2	1989q1, 2003q2
TVAT	2	2003q1,2007q2	2	2003q1,2007q2
DVAT			1	2003q1

Note: the tests were performed allowing heterogenous error distributions across breaks.

5. Conventional estimations

The elasticity estimates obtained by means of ARDL and VAR-VEC models confirm the existence of cointegration (Tables 7 and 8; 2A); and, in general, the elasticity coefficients are lower than those found in DOLS estimations. These findings are consistent with those of other studies mentioned at the outset.

It is worth mentioning some particular differences with DOLS, which refer to the absence of short-run coefficients in some of the models, as well as, to the statistical significance of some structural breaks. Additionally, in the EVAT case, we found a cointegration vector not present in the DOLS estimation; in this case, notwithstanding, a more suitable model is required, given the long-run low coefficient obtained (0.57 in ARDL and 0.644 in VAR-VEC). All these results might be related to the incapability of these models to properly capture changes in the business cycle.

[6] The econometric output is shown in Table 1A in the Appendix.

Table 7

Elasticity Estimations (Conventional methods)

	ARDL model		VAR-VEC model	
	LR Elasticity	SR Elasticity	LR Elasticity	SR Elasticity
NOT				
Annual				
1950-1963	1.105			
1964-1972	0.467	1.208	0.845	-
1973-2003	0.543			
2004-2012	1.148			
Quarterly				
1991q1-1994q2	0.678			
1994q3-2003q2	0.867	0.793	0.786	1.093
2004q3-2006q4	1.057			
2007q1-2013q4	0.893			
IT				
Annual				
1950-2012	1.585	1.672	1.936	1.627
Quarterly				
1984q1-2013q4	1.623	1.239	-	-
TVAT				
Quarterly				
1993q4-2002q4	1.709	1.299	1.613	-
2003q1-2013q4	1.817			
DVAT				
Quarterly				
1993q4-2002q4	1.903	1.157	1.983	-
2003q1-2013q4	2.140			
EVAT				
Quarterly				
1993q4-2013q4	0.570	1.937	0.644	0.809

(-) There is no statistically significant relationship.

Table 8

Cointegration Test (ARDL)

	Bound Test	
	I(1)	
Critical value bounds	F Statistic	
	90%	95%
A) Unrestricted intercept and no trend *	**4.78**	**5.73**
B) No intercept and no trend **	**3.28**	**4.11**
NOT		
Annual		
1950-2012	16.158**	
Quarterly		
1991q1-2013q4	13.057**	
IT		
Annual		
1950-2012	7.662 *	
Quarterly		
1984q1-2013q4	7.312 *	
TVAT		
Quarterly		
1993q4-2013q4	4.514 **	
DVAT		
Quarterly		
1993q4-2013q4	9.335 *	
EVAT		
Quarterly		
1993q4-2013q4	7.515 *	

6. The DOLS results

The DOLS estimations confirm the existence of cointegration between domestic taxes and NOGDP, structural breaks in all the models which translate into varying long and short-run mean indicators along time, and only one short-run asymmetry (Table 3A and 4A). Oil prices were not statistically significant in any of the models; a possible interpretation is that their impact might be already captured in the NOGDP series. In general, the long-run estimates show an increasing elastic tax system, which would be related to tax reforms and decisions implemented since the nineties (Table 9).[7]

The estimations' outputs report a NOT's long-run elasticity higher than one (1.69) for the period that goes from 1950 to 1963, that reduces to 1.21 between 1964 and 1973, and that increasingly rises to 1.39, 2.4 and 3.3, respectively, in the periods 1974-1993, 1994-2003 and, lastly, 2004-2012. This result might be related to the following economic events: part of the set of incentives to private activities of the Import Substitution Model of the sixties came in the form of a low tax burden; the tax reforms initiated in 1990 that effectively would have consolidated the next decade; and the Zero Tax Evasion Program of 2003

[7] Except in the quarterly estimation of NOT, in which case the 2007q1-2013q4 parameter (2.165) decreases from its previous value (2.542). This could be associated to a reduction in tax collection between the end of 2006 and 2010 (Figure 12), to which the global crisis of 2008-2009 might have contributed.

would have been effective in raising the tax collection. The progressive gains in this matter looks supported by the results of the quarterly estimations. It has to be warned though, that lags in the tax unit – the indicator that corrects the tax payments for inflation – has not been fully adjusted with the observed increase in prices in the last years; for that reason, the tax payers might have ended up paying more than their obligations in real value. Thus, it is possible that the long-run quarterly estimate of the period 2003q3-2006.q4 (2.5) registers the impact of such lags.

Roughly speaking, IT has long-run elasticities similar to those of the NOT's, in the annual estimates. This would not be an unreasonable result if the other taxes were less responsive to NOGDP in that frequency. The NOT and IT cannot be properly compared in the quarterly estimations, because of their divergent periods and breaks; although the 2003 break is present in both models. Likely, the VAT and NOT estimates are closer and more or less present some coincident structural breaks.

In all the cases, the short-run elasticities are lower than the long-run ones, except in the case of the annual IT that is more responsive in the expansive phase of the business cycle than in economic contractions. A less responsive tax system in the short run could mean that economic agents act according to the Ricardian Equivalence or that the prevailing tax system has smoothing properties; either one, requires more testing.

Interestingly, the speed of adjustment of the elasticities toward their long-run values in overall taxation (NOT) is in between those of IT and VAT's values, the latter of which indeed reflects its strong weight in total tax revenues.

In both cases, IT and VAT, the elasticity resulted a little bit lower than those obtained by Machado & Zuloeta 2012 and Frickle & Süssmuth 2014; the differences may obey to the ampler sample used in this work which extended it to 2013 in the quarterly estimations. In addition, compared to those studies, we show that the elasticities change over time. One coincidence with them is that, in general, there are no asymmetries in the short-run models, except in the IT case. This tax is more elastic when the NOGDP is above the long-run equilibrium.

Some dummies were required to be included in the annual NOT estimations (D1957, D1987) that we could not identify with exogenous events, but in its short-run model the D1989 can be attributed to the adjustment program of 1989. In the IT and VAT cases, the dummies are clearly related to legal changes.

Table 9

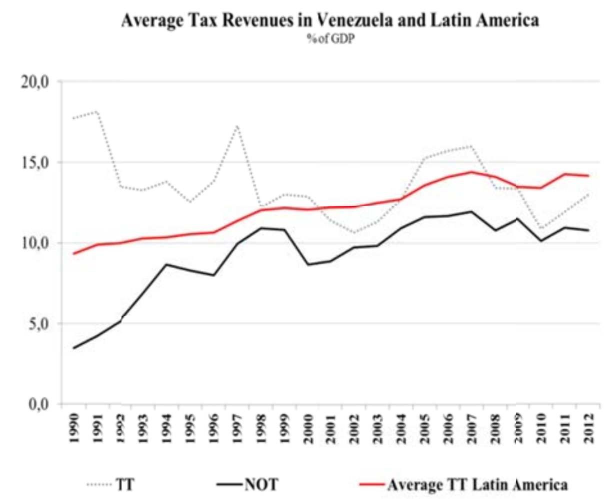
Elasticity Estimations (DOLS)

	LR Elasticity	SR Elasticity		Adjustment speed (%)
		Below equilibrium	Above equilibrium	
NOT				
Annual				
1950-1963	1.685			
1964-1973	1.212			
1974-1993	1.385	1.195	1.195	47.66
1994-2003	2.399			
2004-2012	3.323			
Quarterly				
1991q1-1993q3	1.629			
1993q4-1994q1	2.117			
1994q2-2003q2	2.171	1.255	1.255	38.323
2003q3-2006q4	2.542			
2007q1-2013q4	2.165			
IT				
Annual				
1950-1988	1.657	0.935	2.132	72.6
1989-2012	2.746			
Quarterly				
1984q1-1988q4	2.339			
1989q1-2003q1	2.245	1.384	1.384	85.2
2003q2-2013q4	2.314			
TVAT				
Quarterly				
1993q4-2002q4	2.348			
2003q1-2007q1	2.382	1.322	1.322	28.5
2007q2-2013q4	2.349			
DVAT				
Quarterly				
1993q4-2002q4	2.033	0.955	0.955	22.8
2003q1-2013q4	2.087			

7. Conclusions

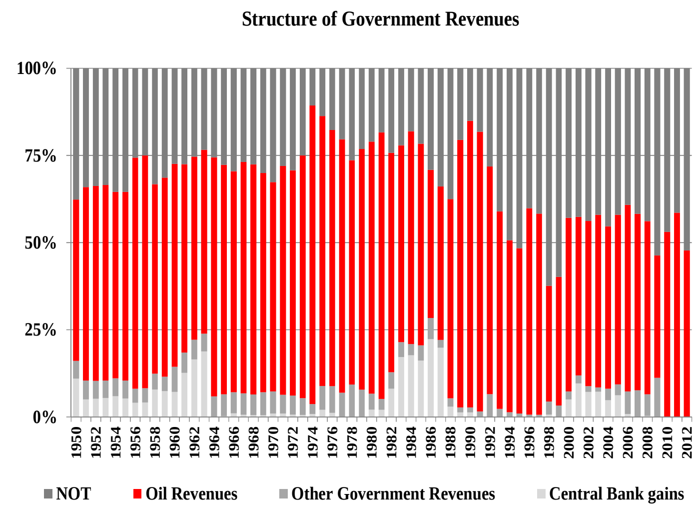
The previous findings allow arriving to some important conjectures. First, the obtained results show a counter-cyclical-type of fiscal behavior absent in previous reflections. Second, events that might have reducing the overall tax responsiveness to NOGDP could refer to a progressive tightening of the tax bases – such as the establishment of para-fiscal taxes or indiscriminate exemptions in the most important taxes –. Third, these results do not give account of inefficiency-related problems in the tax system; i.e., tax effective rates and bases might not be optimal. Although these conjectures raise new questions, the fact that we proved the Venezuelan tax system is more elastic than what is generally accepted, should be considered in the future design of tax policies. Particularly, rather than considering raising the tax rates or even introducing new taxes, the authorities should explore other features that contribute to the efficiency of the tax system, but that are out of the scope of this study.

Figure 1



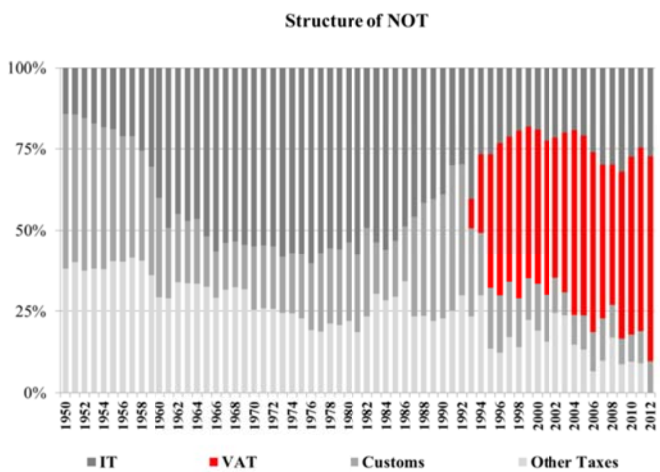
Source: Venezuelan Ministry of Finance and ECLAC.

Figure 2



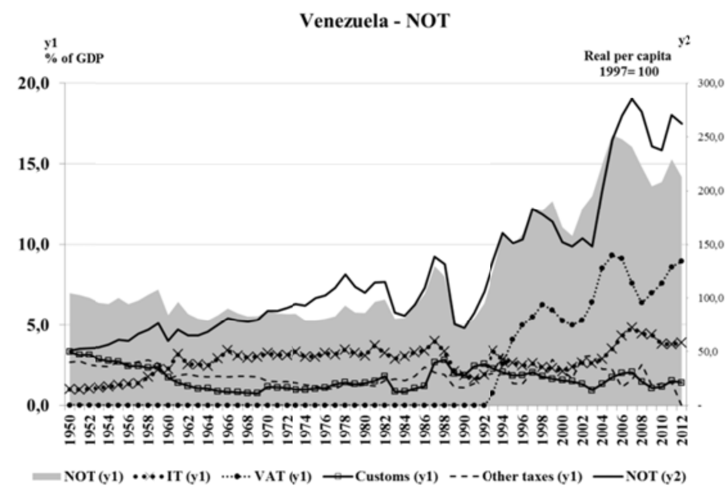
Source: Venezuelan Ministry of Finance and Central Bank of Venezuela.

Figure 3



Source: Venezuelan Ministry of Finance and Central Bank of Venezuela.

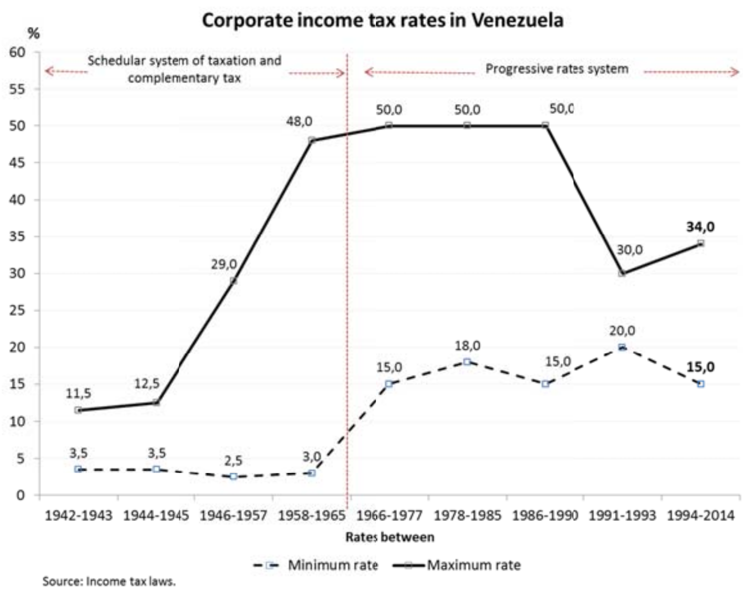
Figure 4



Source: Venezuelan Ministry of Finance and ECLAC.

Figure 5

Evolution of the IT rates



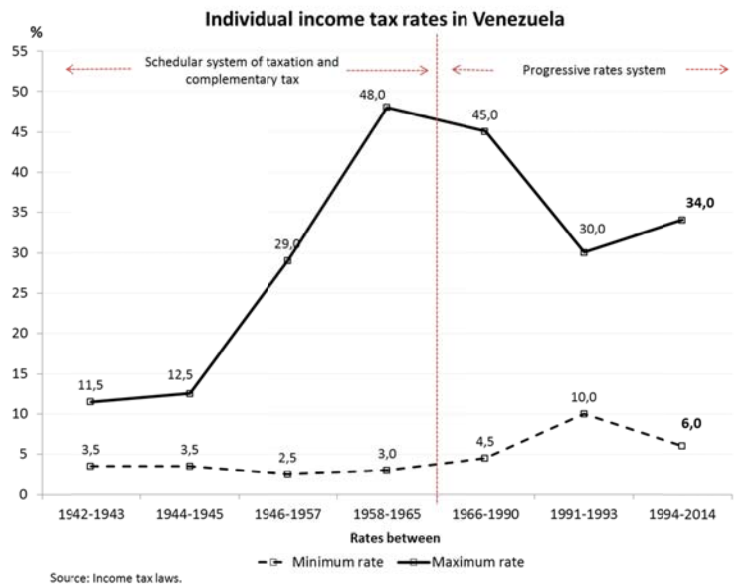


Figure 6

International Comparison of IT rates

Figure 7

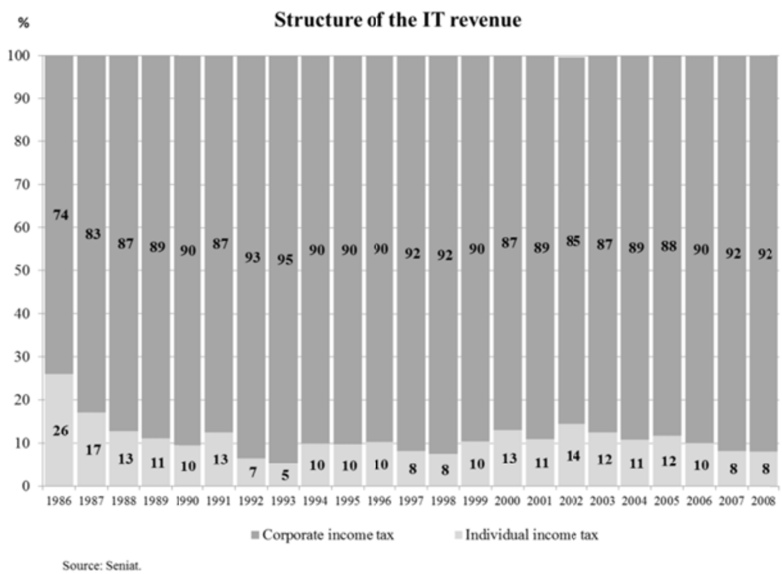


Figure 8

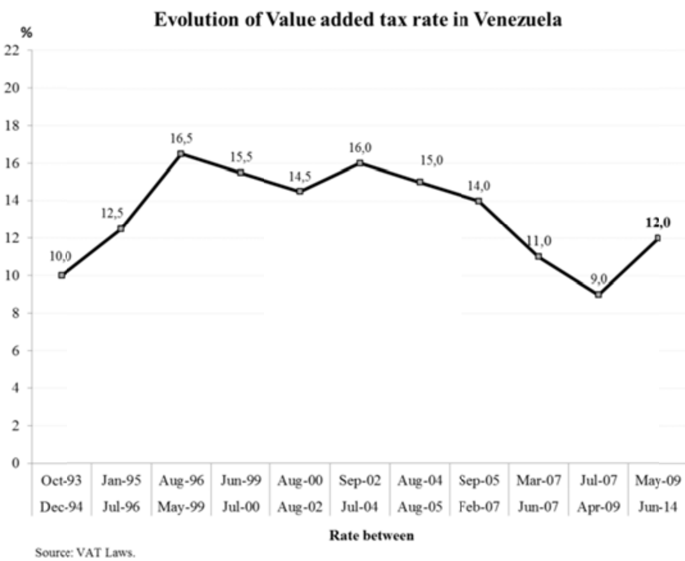


Figure 9

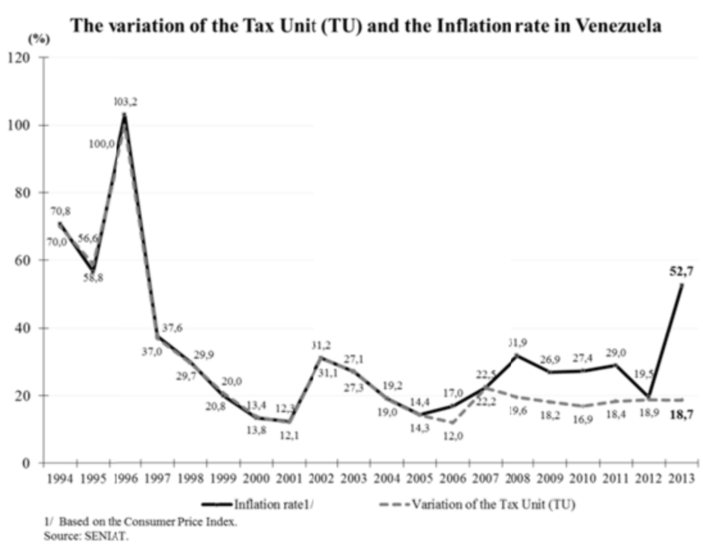


Figure 10

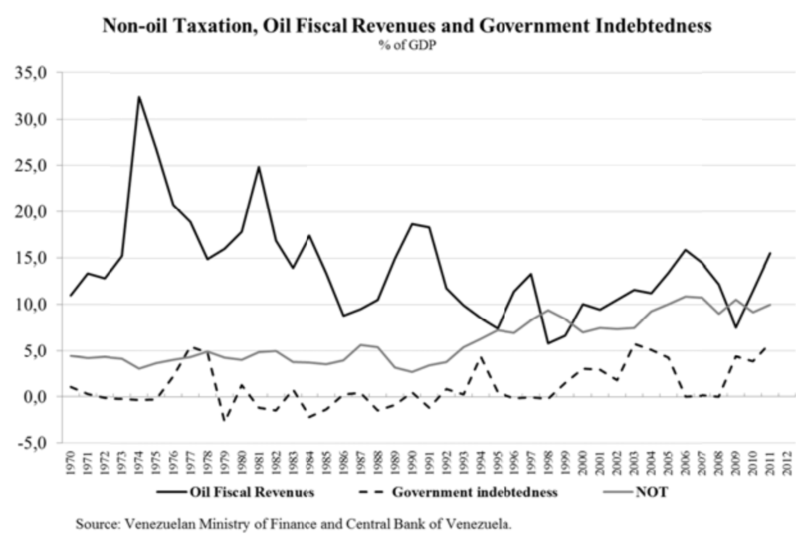
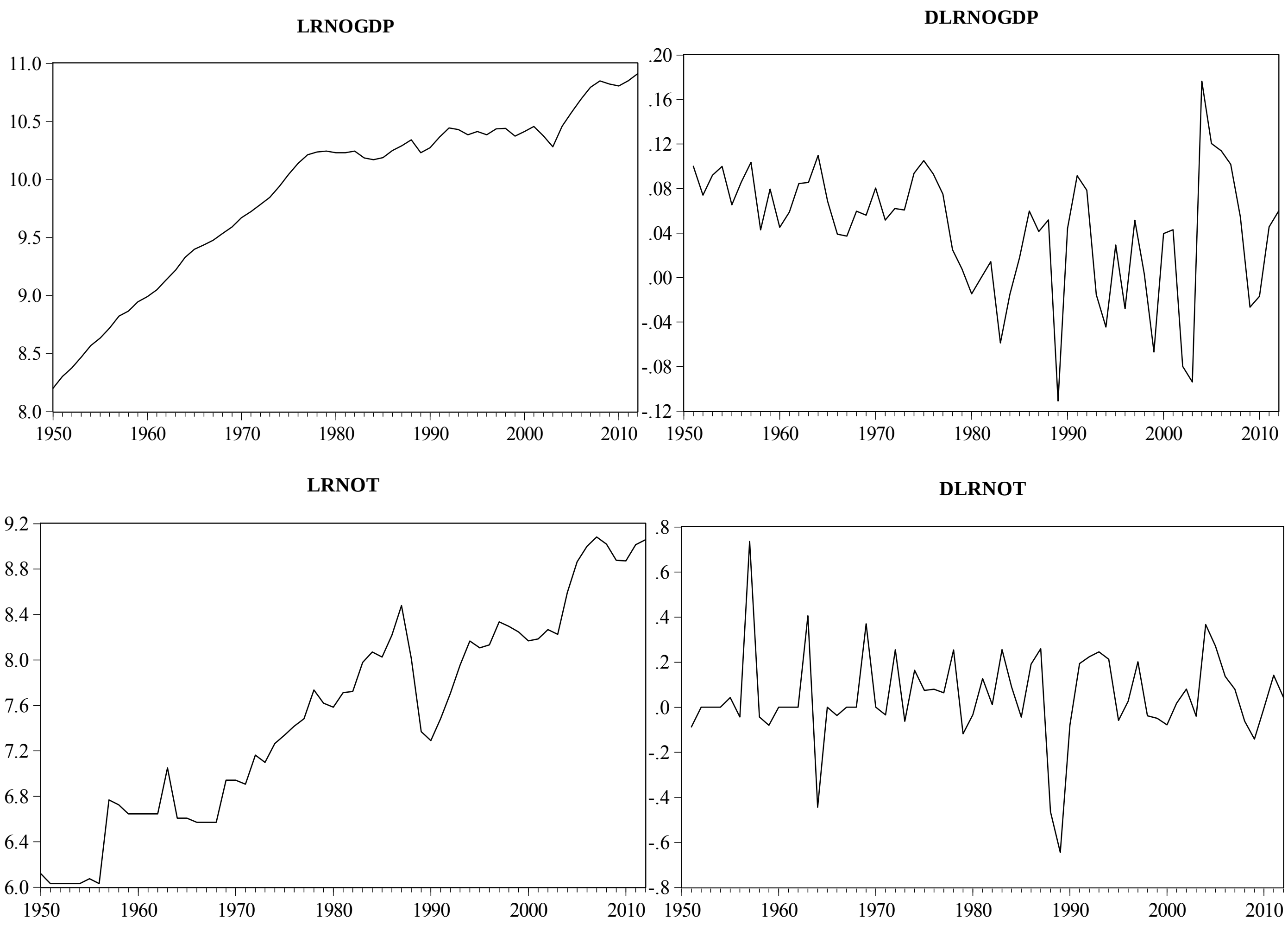


Figure 11
Variables in annual frequency



…Figure 11

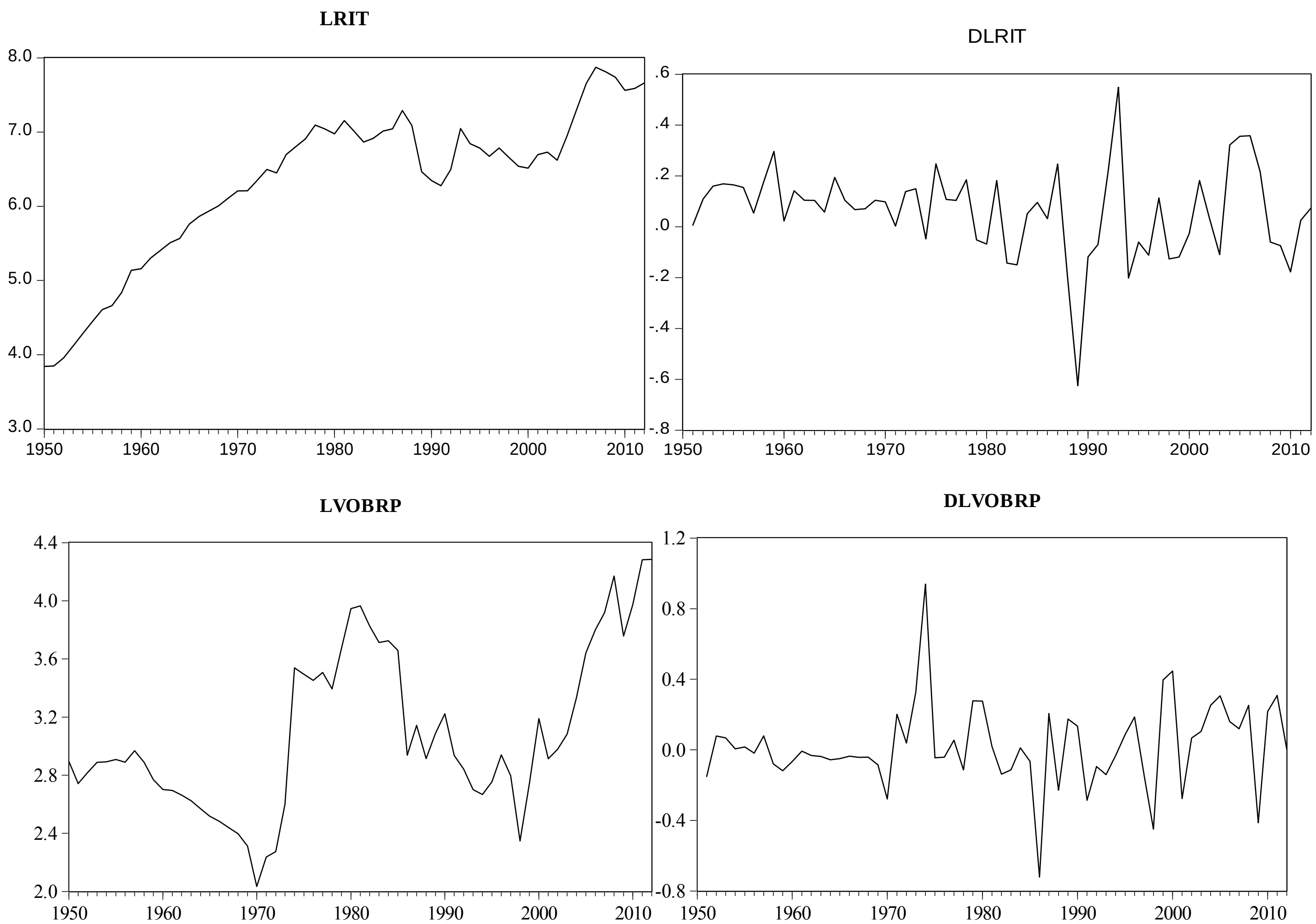
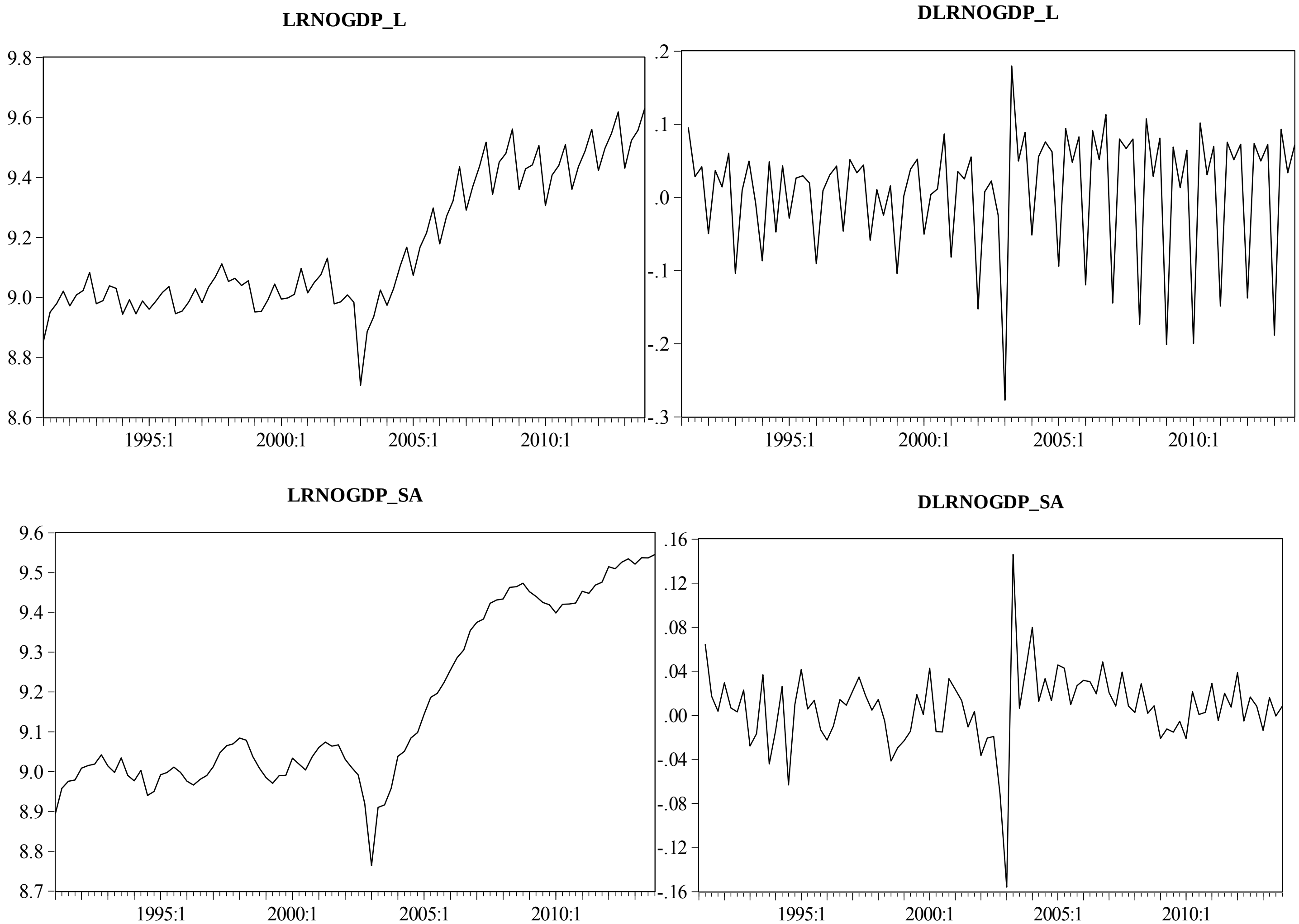
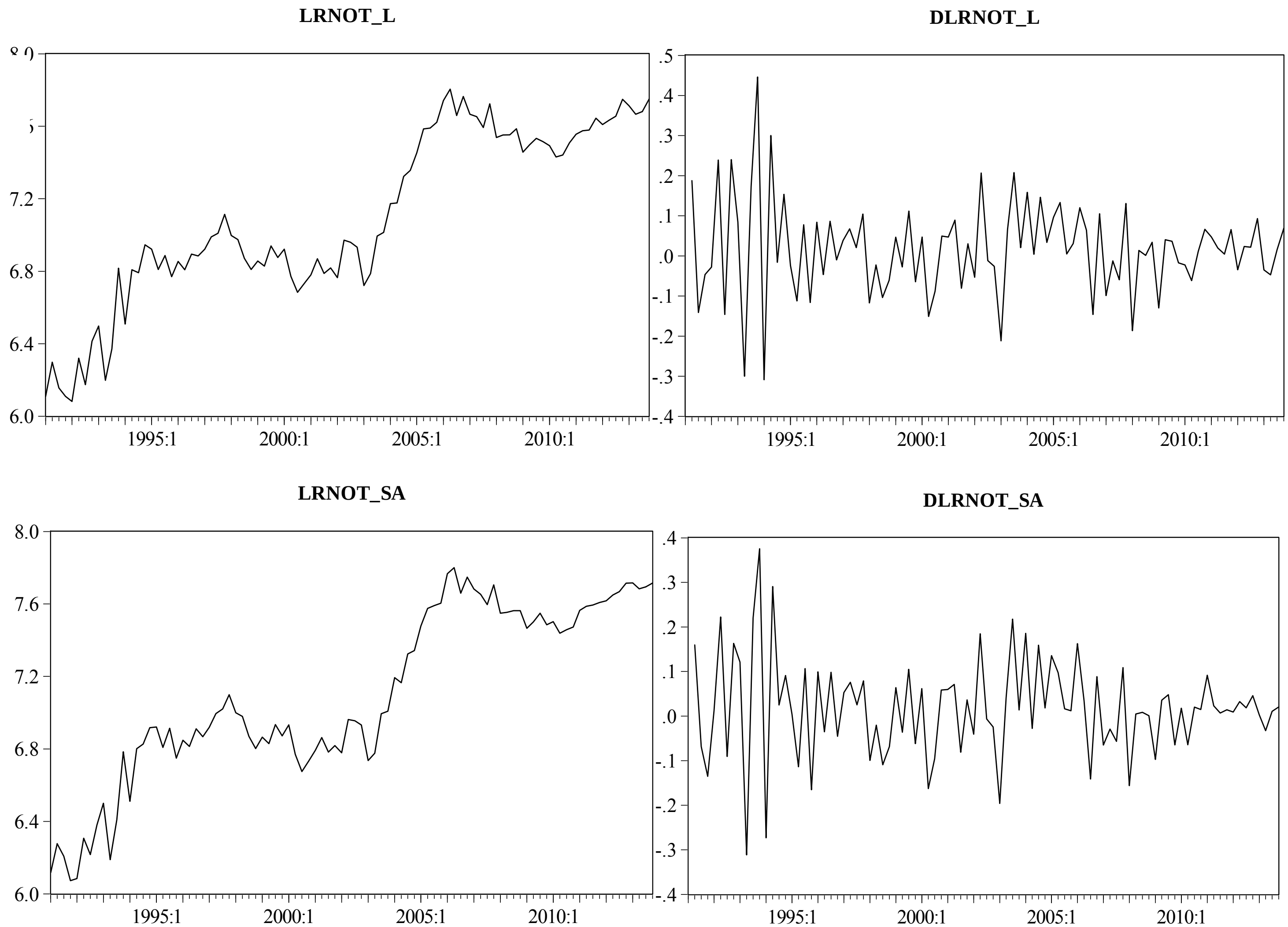

LRIT
8.0
7.0
6.0
5.0
4.0
3.0
1950 1960 1970 1980 1990 2000 2010
DLRIT
.6
.4
.2
.0
-.2
-.4
-.6
-.8
1950 1960 1970 1980 1990 2000 2010
LVOBRP
4.4
4.0
3.6
3.2
2.8
2.4
2.0
1950 1960 1970 1980 1990 2000 2010
DLVOBRP
1.2
0.8
0.4
0.0
-0.4
-0.8
1950 1960 1970 1980 1990 2000 2010

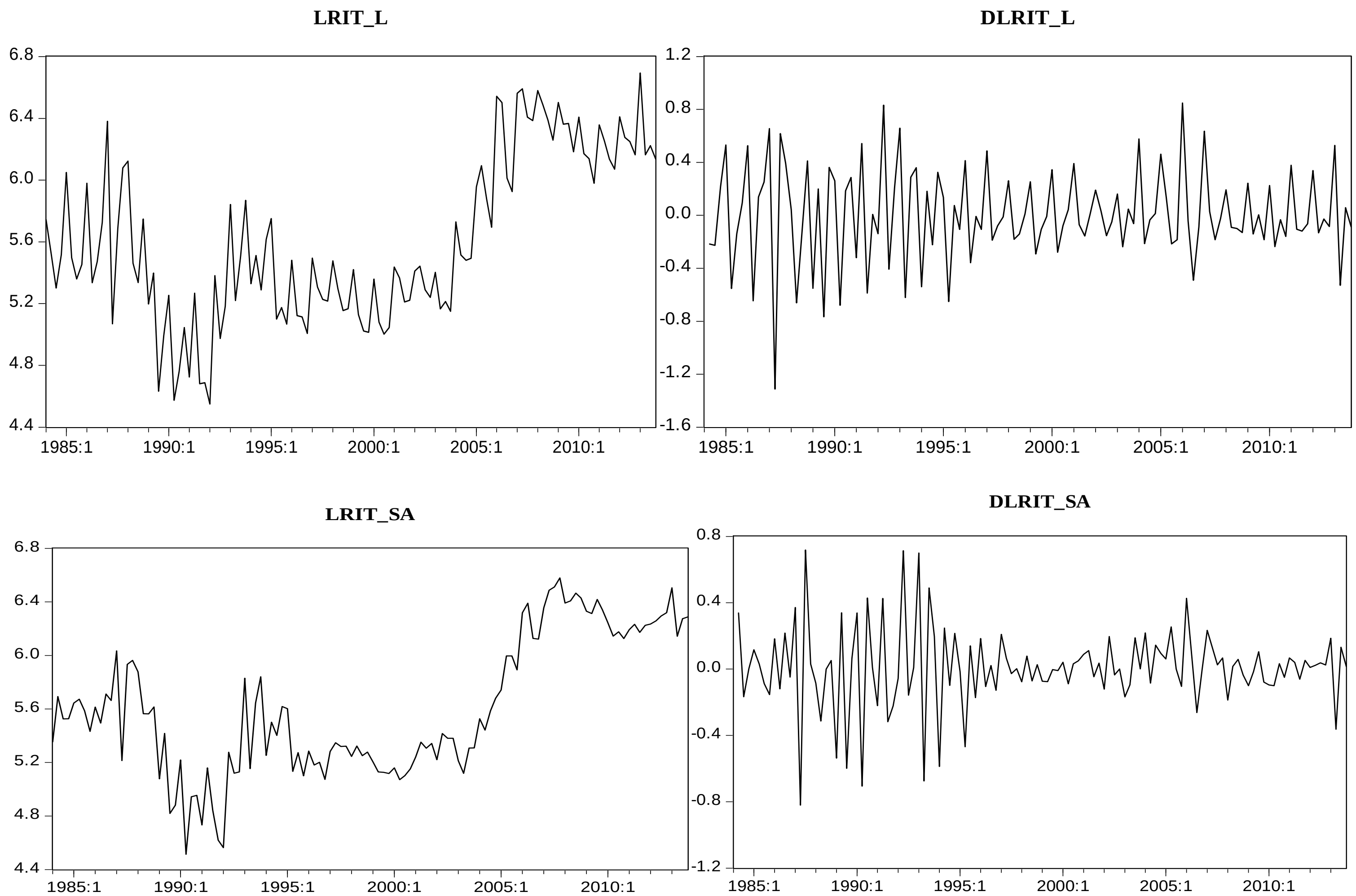
Figure 12
Variables in quarterly frequency



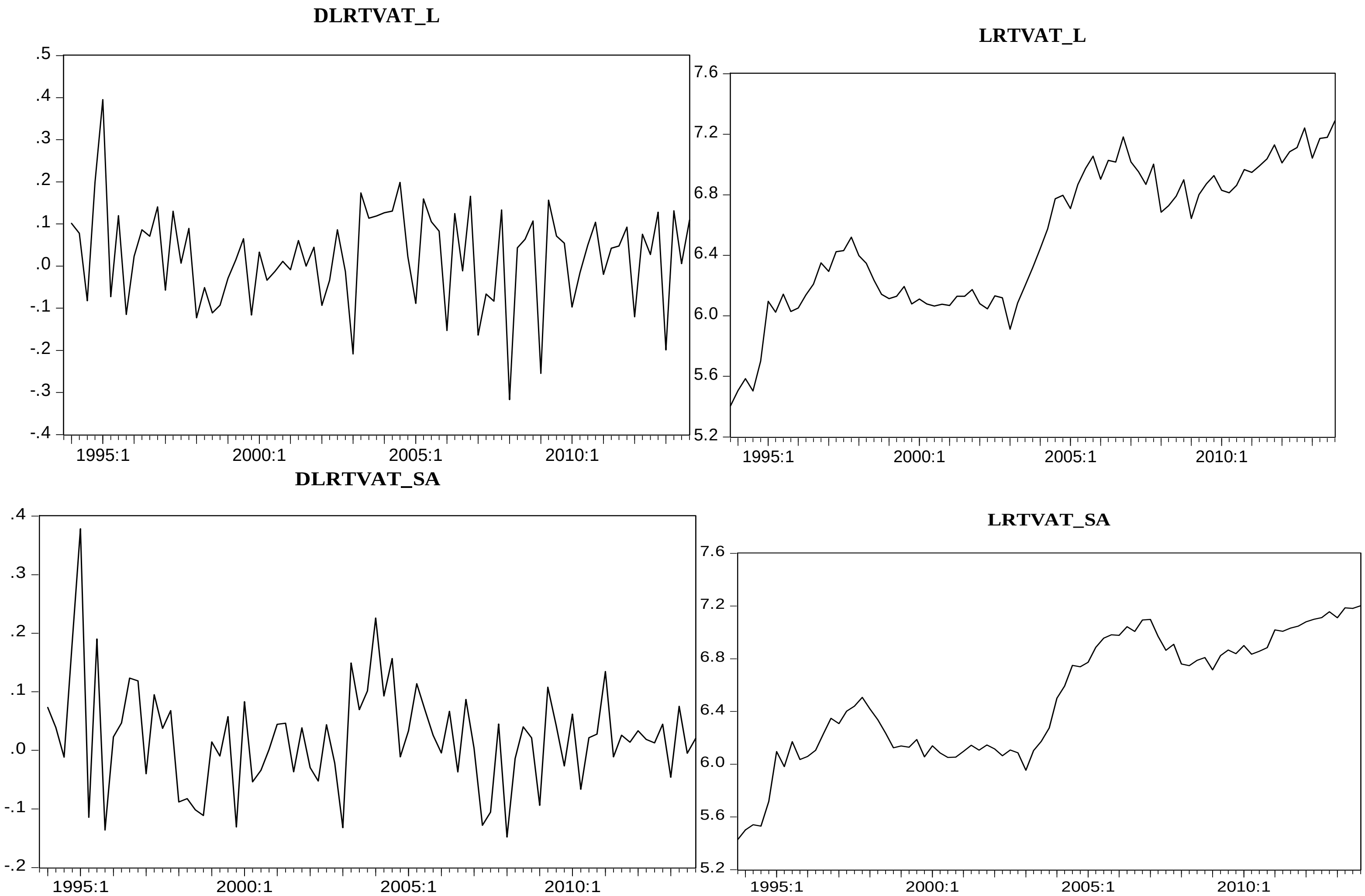
…Figure 12


LRNOT_L
8.0
7.6
7.2
6.8
6.4
6.0
1995:1
2000:1
2005:1
2010:1
DLRNOT_L
.5
.4
.3
.2
.1
.0
-.1
-.2
-.3
-.4
1995:1
2000:1
2005:1
2010:1
LRNOT_SA
8.0
7.6
7.2
6.8
6.4
6.0
1995:1
2000:1
2005:1
2010:1
DLRNOT_SA
.4
.3
.2
.1
.0
-.1
-.2
-.3
-.4
1995:1
2000:1
2005:1
2010:1

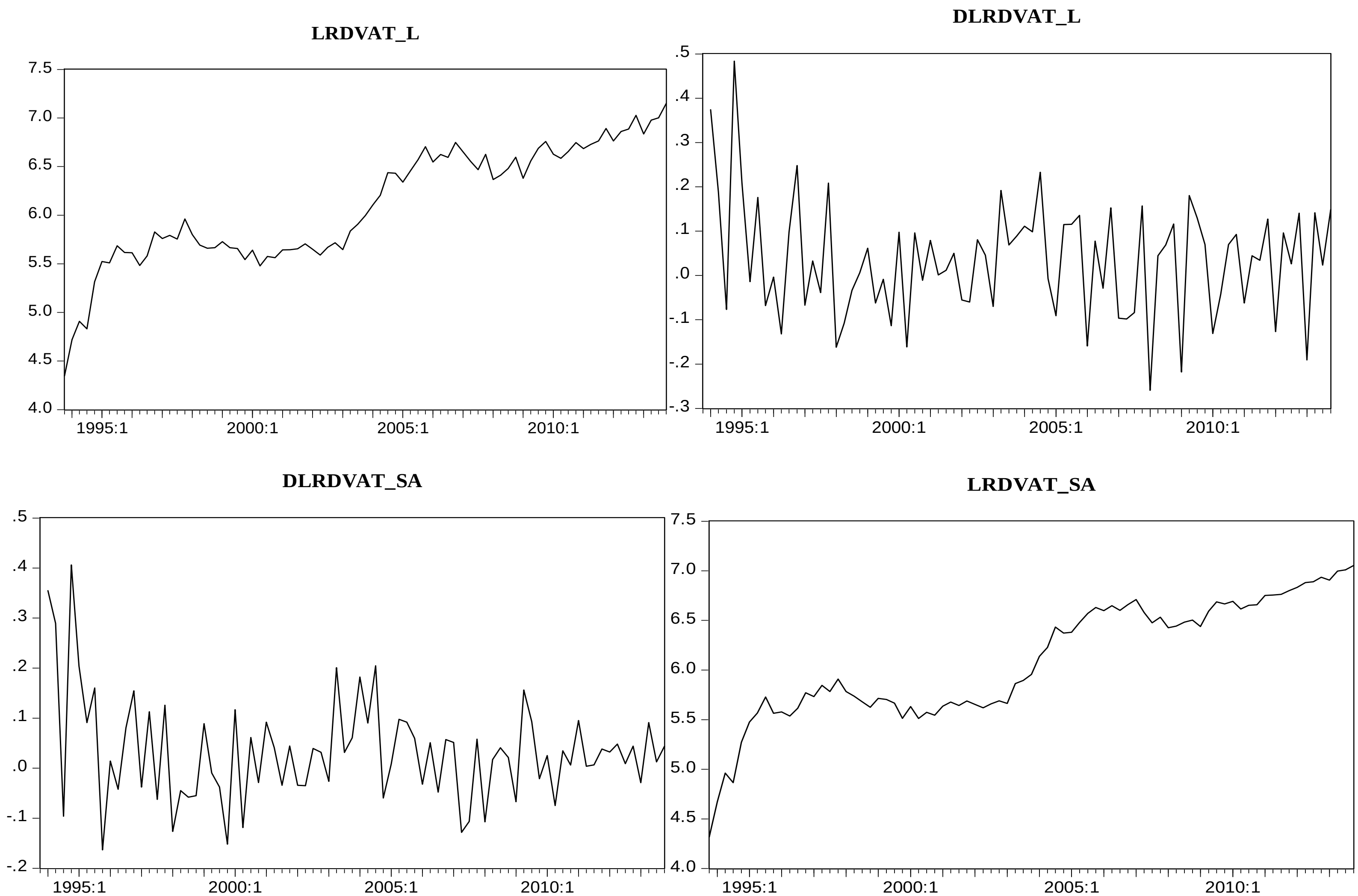
…Figure 12


LRIT_L
6.8
6.4
6.0
5.6
5.2
4.8
4.4
1985:1
1990:1
1995:1
2000:1
2005:1
2010:1
DLRIT_L
1.2
0.8
0.4
0.0
-0.4
-0.8
-1.2
-1.6
1985:1
1990:1
1995:1
2000:1
2005:1
2010:1
LRIT_SA
6.8
6.4
6.0
5.6
5.2
4.8
4.4
1985:1
1990:1
1995:1
2000:1
2005:1
2010:1
DLRIT_SA
0.8
0.4
0.0
-0.4
-0.8
-1.2
1985:1
1990:1
1995:1
2000:1
2005:1
2010:1

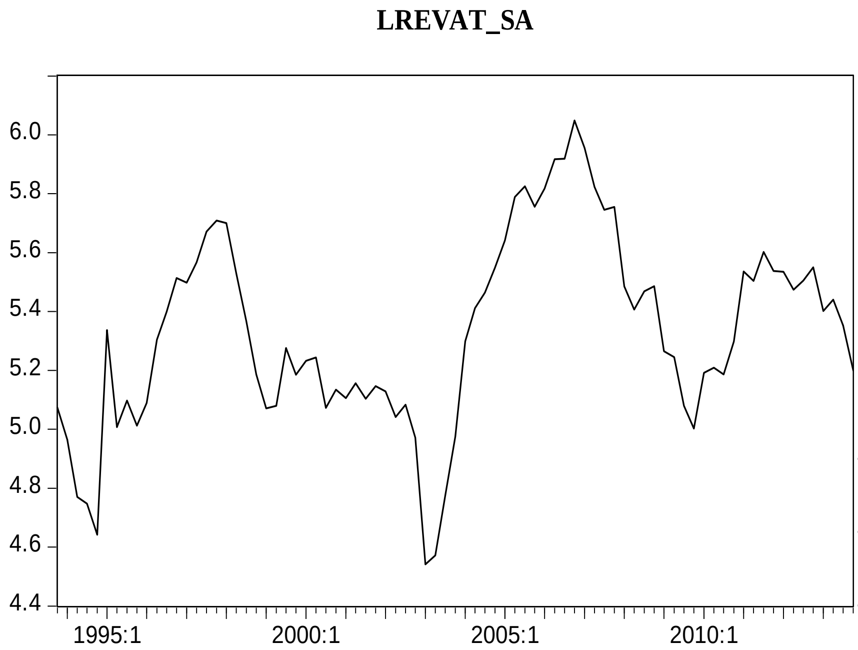
…Figure 12

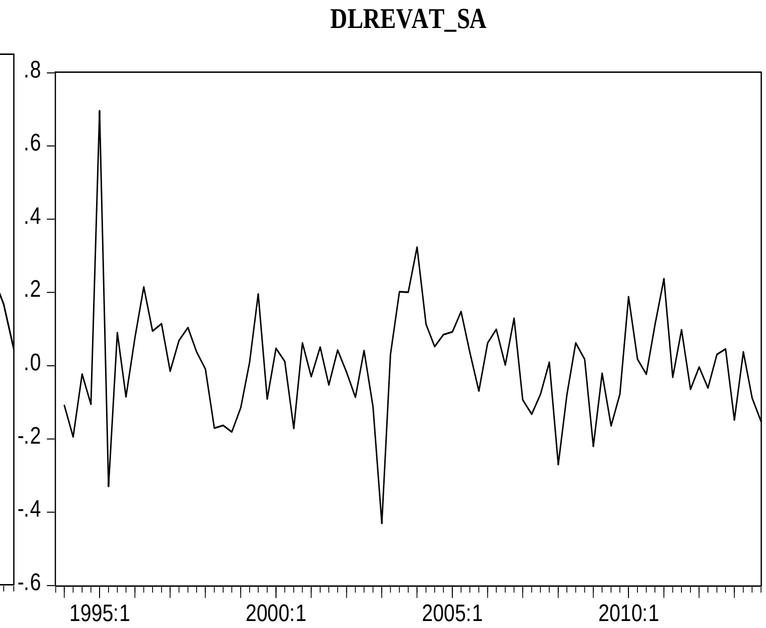

DLRTVAT_L
.5
.4
.3
.2
.1
.0
-.1
-.2
-.3
-.4
1995:1
2000:1
2005:1
2010:1
LRTVAT_L
7.6
7.2
6.8
6.4
6.0
5.6
5.2
1995:1
2000:1
2005:1
2010:1
DLRTVAT_SA
.4
.3
.2
.1
.0
-.1
-.2
1995:1
2000:1
2005:1
2010:1
LRTVAT_SA
7.6
7.2
6.8
6.4
6.0
5.6
5.2
1995:1
2000:1
2005:1
2010:1

…Figure 12


LRDVAT_L
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
1995:1
2000:1
2005:1
2010:1
DLRDVAT_L
.5
.4
.3
.2
.1
.0
-.1
-.2
-.3
1995:1
2000:1
2005:1
2010:1
DLRDVAT_SA
.5
.4
.3
.2
.1
.0
-.1
-.2
1995:1
2000:1
2005:1
2010:1
LRDVAT_SA
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
1995:1
2000:1
2005:1
2010:1

…Figure 12


LREVAT_SA
6.0
5.8
5.6
5.4
5.2
5.0
4.8
4.6
4.4
1995:1
2000:1
2005:1
2010:1


DLREVAT_SA
.8
.6
.4
.2
.0
-.2
-.4
-.6
1995:1
2000:1
2005:1
2010:1

…Figure 12

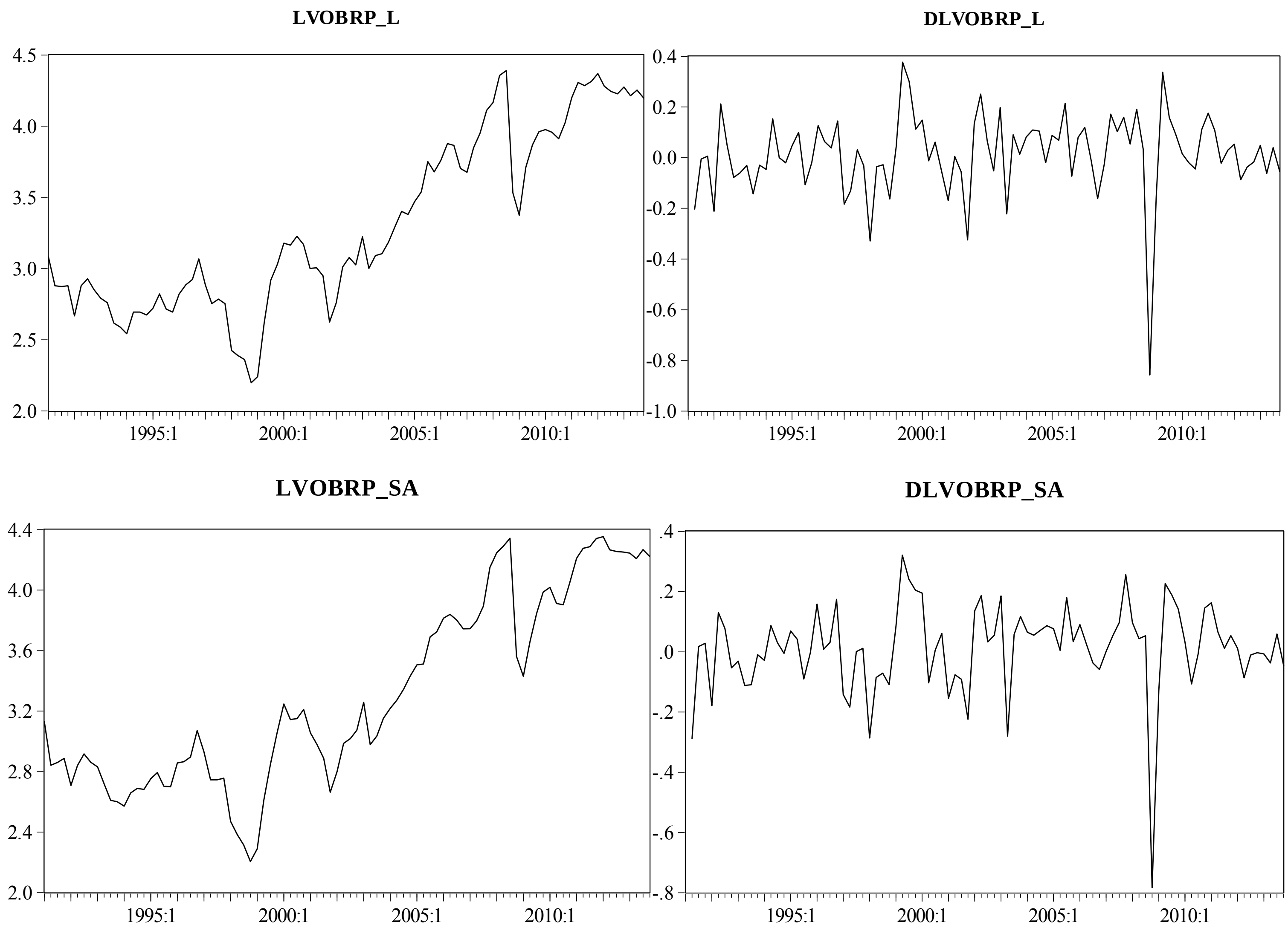
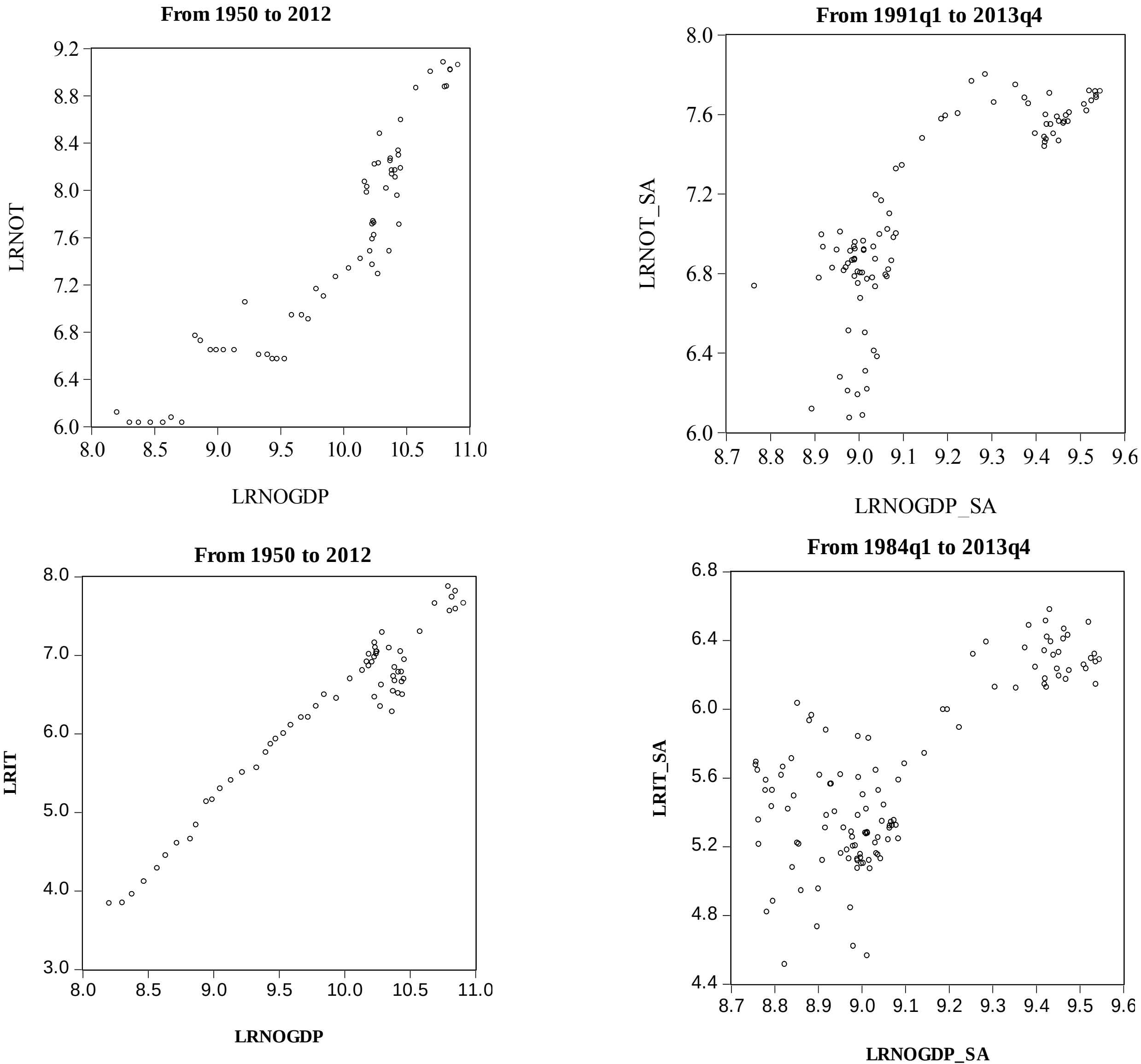
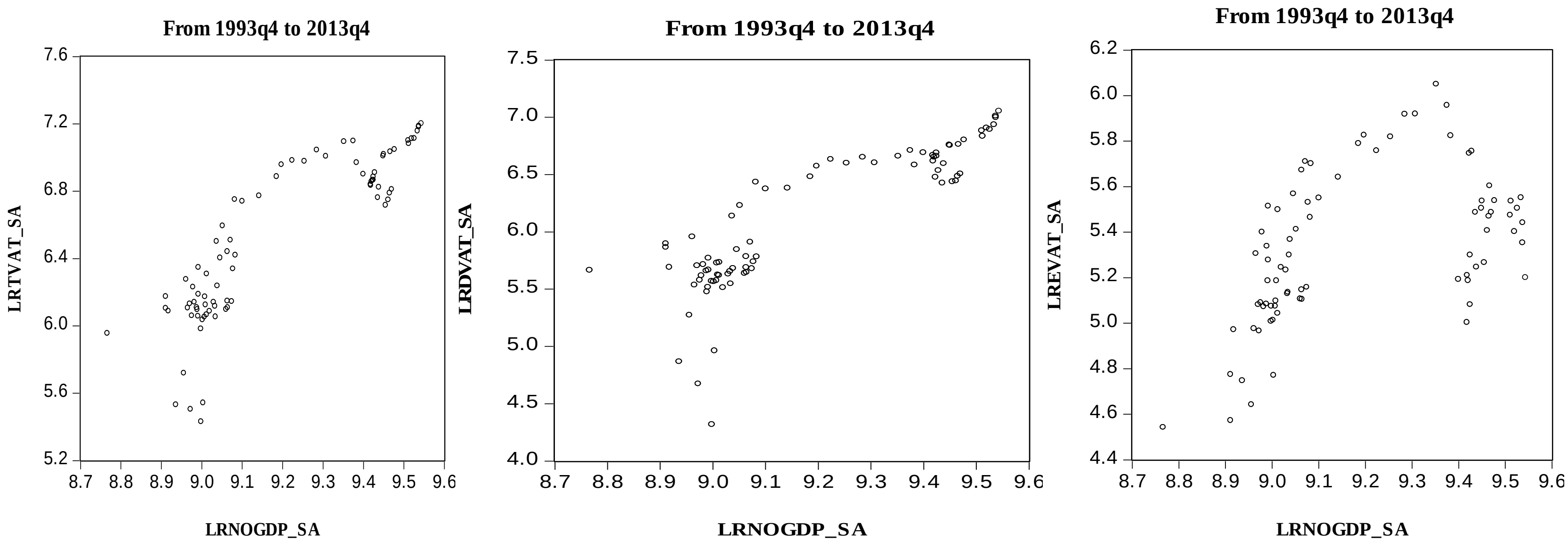

LVOBRP_L
DLVOBRP_L
LVOBRP_SA
DLVOBRP_SA
4.5
4.0
3.5
3.0
2.5
2.0
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
4.4
4.0
3.6
3.2
2.8
2.4
2.0
.4
.2
.0
-.2
-.4
-.6
-.8
1995:1
2000:1
2005:1
2010:1

Figure 13


From 1950 to 2012
LRNOT
LRNOGDP
From 1991q1 to 2013q4
LRNOT_SA
LRNOGDP_SA
From 1950 to 2012
LRIT
LRNOGDP
From 1984q1 to 2013q4
LRIT_SA
LRNOGDP_SA

…Figure 13


From 1993q4 to 2013q4
LRTVAT_SA
LRNOGDP_SA
From 1993q4 to 2013q4
LRDVAT_SA
LRNOGDP_SA
From 1993q4 to 2013q4
LREVAT_SA
LRNOGDP_SA

References

Bai, Jushan & Pierre Perron. (2003). Computation and analysis of multiple structural change models. Journal of Applied Econometrics 18: 1-22.

Bettendorf, L. & van Limbergen, D. (2013). The Stability of Tax Elasticities in The Netherlands. *CPB Discussion Paper*, 256.

Bruce, D, Fox, W. F., & Tuttle, M. H. (2006). Tax Base Elasticities: A Multi-State Analysis of Long-run and Short-run Dynamics. *Southern economic Journal*, 73(2): 315-341.

Daude, C., A. Melguizo & A. Neut (DMN). 2010. *Fiscal Policy in Latin America: Countercyclical and Sustainable at Last?* OECD Development Centre Working Paper No. 270. Paris, France: Organization for Economic Co-operation and Development.

Engle, R.F. & C. Granger (1987). Cointegration and error correction: Representation, estimation and testing, *Econometrica* 55: 251–76.

Fonseca, F. J. & Ventosa-Santaularia, D. (2011). Revenue elasticity of the main federal taxes in Mexico. *Latin American journal of economics*, 48 (1): 89-111.

Fricke, H. & Süssmuth, B. (2014). Growth and volatility of tax revenues in Latin America. *World Development*, 54: 114-138.

Koester, G. B., Priesmeier, C., & Bundesbank, D. (2012). *Estimating dynamic tax revenue elasticities for Germany*. Deutsche Bundesbank, Discussion Paper N° 23/2012.

Machado, R. & Zuloeta, J. (2012). *The impact of the business cycle on elasticities of tax revenue in Latin America*. IDB Working Paper No. IDB-WP-340.

Moreno, M. A., (2013). *Venezuela: retos de la política fiscal para el Siglo XXI*, en proceso de arbitraje.

Ochoa, O., 2010, La institución fiscal y el rentismo en el desempeño económico de Venezuela, versión revisada y ampliada de artículo publicado en Revista *Nueva Economía*, Academia de Ciencias Económicas y Sociales, N° 28, noviembre.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of le-vel relationships. *Journal of applied econometrics*, 16 (3): 289-326.

Stock, J, H. & Mark W. Watson (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica*, Vol. 61, No. 4, July, 783-820.

Sobel, R. S. & Holcombe, R. G. (1996). Measuring the growth and variability of tax bases over the business cycle. *National Tax Journal* 49(4): 535-552.

Vladkova-Hollar, I. & J. Zettelmeyer (VHZ). 2008. *Fiscal Positions in Latin America: Have*

They Really Improved? IMF Working Paper WP/08/137. Washington, DC: International Monetary Fund.

Wolswijk, K. 2009. Short- and Long-run Tax Elasticities: The Case of the Netherlands. *Economics Bulletin,* 29(3): 1960–1970.

Zambrano, L (2009). *Estructura e incidencia de la política fiscal en Venezuela*. Trabajo presentado como requisito para la incorporación como individuo de Número de la Academia Nacional de Ciencias Económicas de Venezuela.

Venezuelan Bolivarian Republic,
Ministry of Finance, Annual Reports
Central Bank of Venezuela, Annual Reports

Appendix

Table 1A
Multiple break point Bai-Perron test

Model NOT/NOGDP 1950-2012

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 07/01/14 Time: 12:04
Sample: 1950 2012
Included observations: 63
Breakpoint variables: C LRNOGDP_L
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05
Allow heterogeneous error distributions across breaks

Sequential F-statistic determined breaks: 2

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	32.84852	65.69704	11.47
1 vs. 2 *	15.4382	30.8764	12.95
2 vs. 3	5.19373	10.38746	14.03

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	1978	1964
2	1964	1994

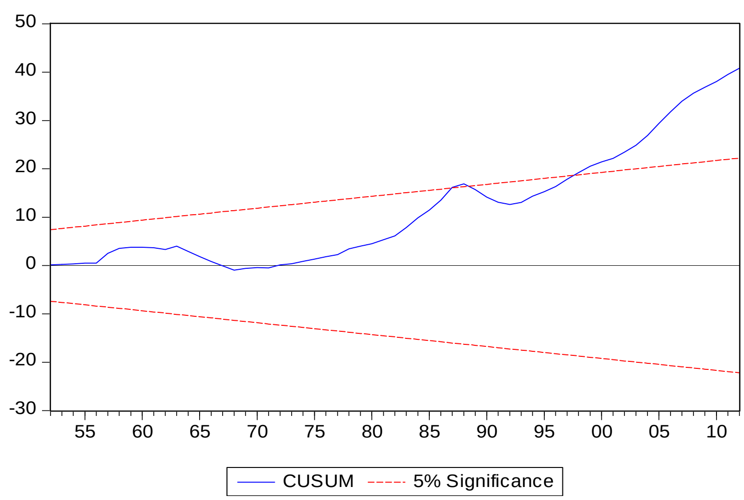
Multiple breakpoint tests
Bai-Perron tests of 1 to M globally determined breaks
Date: 07/01/14 Time: 12:06
Sample: 1950 2012
Included observations: 63
Breakpoint variables: C LRNOGDP_L
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05
Allow heterogeneous error distributions across breaks

Sequential F-statistic determined breaks: 5
Significant F-statistic largest breaks: 5
UDmax determined breaks: 3
WDmax determined breaks: 5

Breaks	F-statistic	Scaled F-statistic	Weighted F-statistic	Critical Value
1 *	32.84852	65.69704	65.69704	11.47
2 *	21.78955	43.57910	51.26690	9.75
3 *	43.52619	87.05238	119.4367	8.36
4 *	31.17368	62.34735	99.46094	7.19
5 *	38.55804	77.11609	151.2003	5.85
UDMax statistic*		87.05238	UDMax critical value**	
WDMax statistic*		151.2003	WDMax critical value**	

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1: 1964
2: 1964, 1994
3: 1964, 1983, 1994
4: 1964, 1980, 1989, 1998
5: 1964, 1973, 1983, 1994, 2004



Model NOT/NOGDP 1991q1-2013q4

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 07/01/14 Time: 12:09
Sample: 1991Q1 2013Q4
Included observations: 92
Breakpoint variables: C LRNOGDP_SA
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05
Allow heterogeneous error distributions across breaks

Sequential F-statistic determined breaks: 3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	54.42290	108.8458	11.47
1 vs. 2 *	51.00700	102.0140	12.95
2 vs. 3 *	24.26462	48.5293	14.03
3 vs. 4	6.314071	12.6281	14.85

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	1994Q2	1994Q2
2	2004Q1	2003Q3
3	2007Q3	2007Q3

Multiple breakpoint tests
Bai-Perron tests of 1 to M globally determined breaks
Date: 07/01/14 Time: 12:15
Sample: 1991Q1 2013Q4
Included observations: 92
Breakpoint variables: C LRNOGDP_SA
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05
Allow heterogeneous error distributions across breaks

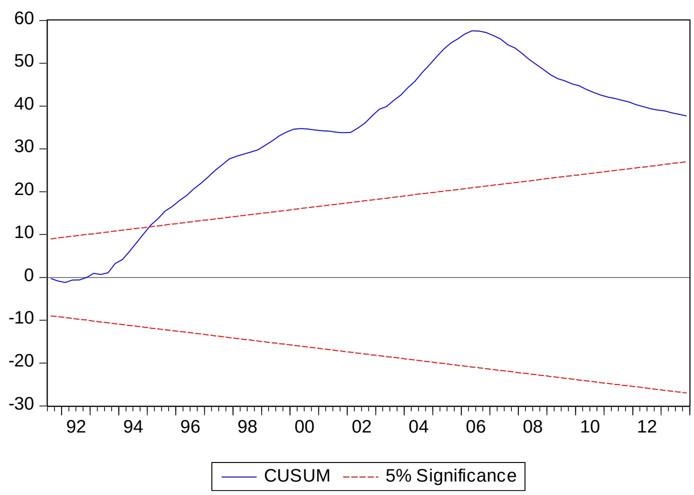
Sequential F-statistic determined breaks: 5
Significant F-statistic largest breaks: 5
UDmax determined breaks: 4
WDmax determined breaks: 4

Breaks	F-statistic	Scaled F-statistic	Weighted F-statistic	Critical Value
1 *	54.42290	108.8458	108.8458	11.47
2 *	53.68901	107.3780	126.3206	9.75
3 *	73.10008	146.2002	200.5880	8.36
4 *	85.29006	170.5801	272.1216	7.19
5 *	55.47858	110.9572	217.5519	5.85

UDMax statistic* 170.5801 UDMax critical value**
WDMax statistic* 272.1216 WDMax critical value**

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1: 1994Q2
2: 1994Q2, 2004Q1
3: 1994Q2, 2003Q3, 2007Q1
4: 1994Q2, 2003Q2, 2006Q3, 2009Q4
5: 1994Q2, 1998Q3, 2002Q4, 2006Q1, 2009Q2



Model IT/NOGDP 1950-2012

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 07/01/14 Time: 08:38
Sample: 1950 2012
Included observations: 63
Breakpoint variables: LRNOGDP_L C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:			1
		Scaled	Critical
Break Test	F-statistic	F-statistic	Value**
0 vs. 1 *	84.92622	169.8524	11.47
1 vs. 2	5.460013	10.92003	12.95

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

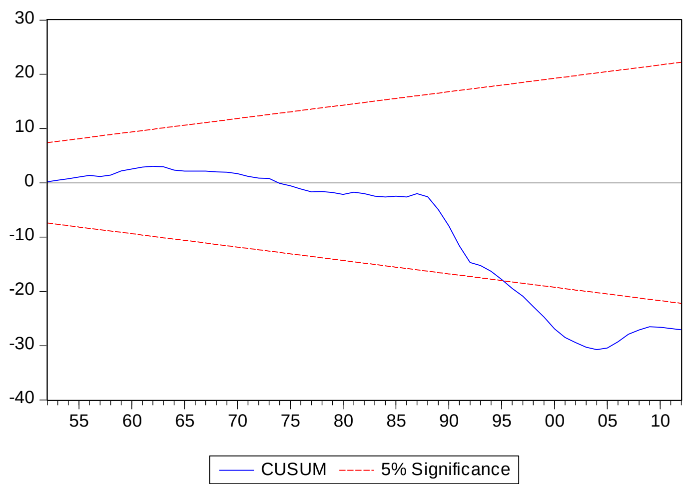
	Sequential	Repartition
1	1989	1989

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L globally determined breaks
Date: 07/01/14 Time: 08:40
Sample: 1950 2012
Included observations: 63
Breakpoint variables: LRNOGDP_L C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:			1
Significant F-statistic largest breaks:			1
		Scaled	Critical
Break Test	F-statistic	F-statistic	Value**
0 vs. 1 *	84.92622	169.8524	11.47
1 vs. 2	5.460013	10.92003	12.95
2 vs. 3	4.858878	9.717755	14.03
3 vs. 4	0.815506	1.631012	14.85
4 vs. 5	0.000000	0.000000	15.29

* Significant at the 0.05 level
** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1: 1989
2: 1989, 2002
3: 1959, 1989, 2002
4: 1959, 1974, 1989, 2002
5: 1959, 1968, 1978, 1989, 2002



Model IT/NOGDP 1984q1-2013q4

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 06/30/14 Time: 14:27
Sample: 1984Q1 2013Q4
Included observations: 120
Breakpoint variables: LRNOGDP_SA C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks: 3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	60.65916	121.3183	11.47
1 vs. 2 *	12.45605	24.91209	12.95
2 vs. 3 *	7.63777	15.27554	14.03
3 vs. 4	5.179195	10.35839	14.85

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	1989Q1	1989Q1
2	2002Q2	2002Q2
3	2009Q1	2009Q1

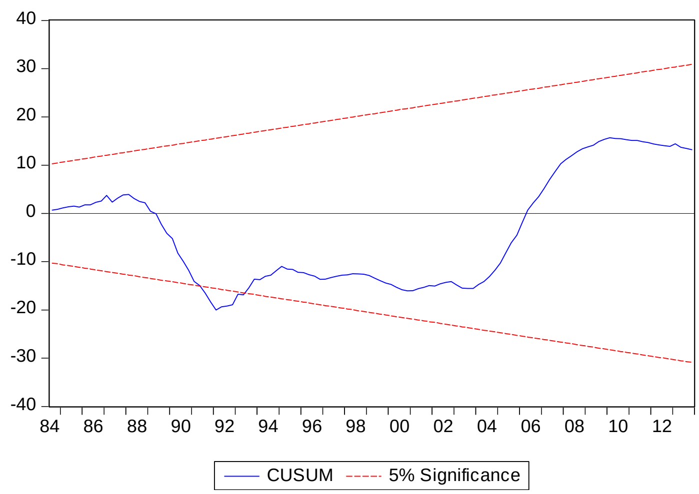
Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L globally determined breaks
Date: 07/01/14 Time: 09:03
Sample: 1984Q1 2013Q4
Included observations: 120
Breakpoint variables: LRNOGDP_SA C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks: 3
Significant F-statistic largest breaks: 3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	60.65916	121.3183	11.47
1 vs. 2 *	12.45605	24.91209	12.95
2 vs. 3 *	7.63777	15.27554	14.03
3 vs. 4	5.179195	10.35839	14.85
4 vs. 5	1.881522	3.763043	15.29

* Significant at the 0.05 level
** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1: 1989Q1
2: 1989Q1, 2002Q2
3: 1989Q1, 2002Q2, 2009Q1
4: 1989Q1, 1993Q3, 2003Q2, 2009Q1
5: 1989Q1, 1993Q3, 1998Q1, 2003Q3, 2009Q1



Model TVAT/NOGDP 1993q4-2013q4

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 06/30/14 Time: 14:34
Sample: 1993Q4 2013Q4
Included observations: 81
Breakpoint variables: LRNOGDP_SA C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks: 3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	21.63805	43.2761	11.47
1 vs. 2 *	14.21941	28.43882	12.95
2 vs. 3 *	7.35579	14.71158	14.03
3 vs. 4	5.808344	11.61669	14.85

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	2002Q4	1998Q4
2	2007Q2	2004Q1
3	1998Q4	2007Q2

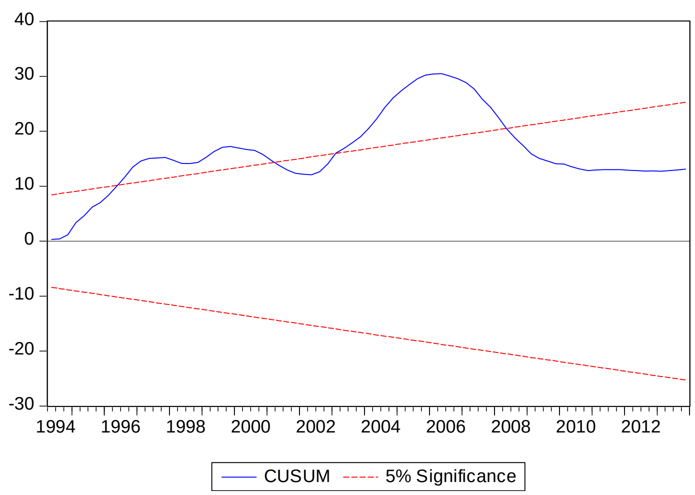
Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L globally determined breaks
Date: 07/01/14 Time: 09:30
Sample: 1993Q4 2013Q4
Included observations: 81
Breakpoint variables: LRNOGDP_SA C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks: 3
Significant F-statistic largest breaks: 3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	21.63805	43.2761	11.47
1 vs. 2 *	14.21941	28.43882	12.95
2 vs. 3 *	7.35579	14.71158	14.03
3 vs. 4	4.657162	9.314324	14.85
4 vs. 5	5.428828	10.85766	15.29

* Significant at the 0.05 level
** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1: 2002Q4
2: 2002Q4, 2007Q2
3: 1998Q4, 2004Q1, 2007Q3
4: 1996Q4, 1999Q4, 2004Q1, 2007Q3
5: 1996Q4, 1999Q4, 2003Q3, 2006Q4, 2011Q1



Model DVAT/NOGDP 1993q4-2013q4

Multiple breakpoint tests
Compare information criteria for 0 to M globally determined breaks
Date: 06/30/14 Time: 14:32
Sample: 1993Q4 2013Q4
Included observations: 81
Breakpoint variables: LRNOGDP_SA C
Break test options: Trimming 0.15, Max. breaks 5

Schwarz criterion selected breaks:				2	
LWZ criterion selected breaks:				1	
		Sum of		Schwarz*	LWZ*
Breaks	# of Coefs.	Sq. Resids.	Log-L	Criterion	Criterion
0	2	7.283795	-17.37774	-2.300292	-2.21848
1	5	3.97029	7.198189	-2.744348	-2.538604
2	8	3.229411	15.56302	-2.78813	-2.456895
3	11	2.856305	20.53525	-2.748143	-2.289727
4	14	2.487081	26.14123	-2.723805	-2.136369
5	17	2.378617	27.94714	-2.605638	-1.887176

* Minimum information criterion values displayed with shading

Estimated break dates:
1: 2002Q4
2: 1996Q4, 2003Q2
3: 1996Q4, 2004Q1, 2009Q3
4: 1996Q4, 2003Q1, 2006Q2, 2009Q3
5: 1996Q4, 1999Q4, 2003Q2, 2006Q2, 2009Q3

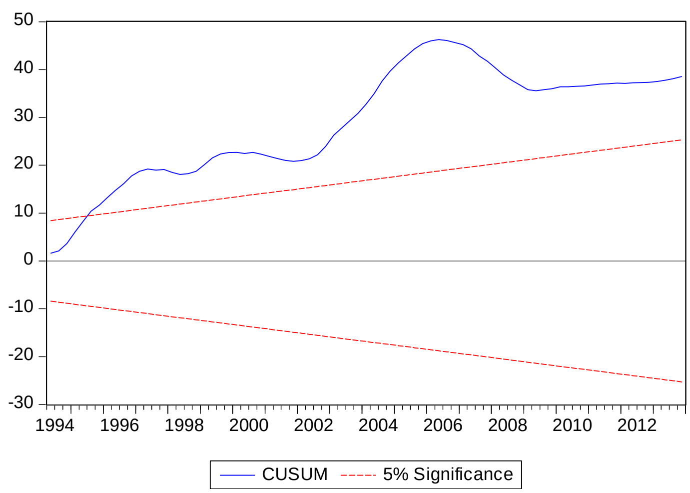


Table 2A
ARDL Output

NOT- Annual frequency

Dependent Variable: LRNOT_L
Method: Least Squares
Date: 09/30/14 Time: 11:46
Sample (adjusted): 1951 2012
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.581334	0.414936	-6.221042	0.0000
LRNOT_L(-1)	0.209714	0.091815	2.284091	0.0266
LRNOGDP_L	0.872966	0.106224	8.218172	0.0000
D1987	0.354148	0.126260	2.804922	0.0071
D1989	-0.660018	0.125044	-5.278277	0.0000
D1990	-0.642769	0.138898	-4.627614	0.0000
D1991	-0.512700	0.147218	-3.482598	0.0010
D1992	-0.397422	0.142711	-2.784809	0.0075
D_SB1964	-0.406210	0.063108	-6.436765	0.0000
D_SB1973	-0.329658	0.061152	-5.390768	0.0000
D_SB2004	0.274586	0.061428	4.470036	0.0000

R-squared	0.984621	Mean dependent var	7.553984
Adjusted R-squared	0.981605	S.D. dependent var	0.898395
S.E. of regression	0.121847	Akaike info criterion	-1.212568
Sum squared resid	0.757184	Schwarz criterion	-0.835173
Log likelihood	48.58961	Hannan-Quinn criter.	-1.064393
F-statistic	326.5142	Durbin-Watson stat	1.869304
Prob(F-statistic)	0.000000		

Dependent Variable: D(LRNOT_L)
Method: Least Squares
Date: 09/30/14 Time: 11:46
Sample (adjusted): 1952 2012
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRNOGDP_L)	1.208008	0.342937	3.522540	0.0008
ECM_LRNOT_L(-1)	-0.511321	0.216744	-2.359100	0.0216

R-squared	0.165896	Mean dependent var	0.049617
Adjusted R-squared	0.151759	S.D. dependent var	0.202635
S.E. of regression	0.186627	Akaike info criterion	-0.487175
Sum squared resid	2.054943	Schwarz criterion	-0.417966
Log likelihood	16.85883	Hannan-Quinn criter.	-0.460051
Durbin-Watson stat	1.624648		

NOT – Quarterly frequency

Dependent Variable: LRNOT_SA
Method: Least Squares
Date: 09/30/14 Time: 12:01
Sample (adjusted): 1991Q3 2013Q4
Included observations: 90 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.300513	1.111244	-2.070213	0.0416
LRNOT_SA(-1)	0.439280	0.082414	5.330137	0.0000
LRNOT_SA(-2)	0.195981	0.085126	2.302242	0.0239
LRNOGDP_SA	0.513066	0.148837	3.447174	0.0009
D1993Q2	-0.268263	0.079008	-3.395382	0.0011
D1993Q4	0.418496	0.078834	5.308597	0.0000
D_SB1994Q2	0.188857	0.049735	3.797248	0.0003
D_SB2003Q3	0.378861	0.069412	5.458179	0.0000
D_SB2007Q1	0.214626	0.074138	2.894952	0.0049

R-squared	0.977669	Mean dependent var	7.114923
Adjusted R-squared	0.975464	S.D. dependent var	0.463857
S.E. of regression	0.072658	Akaike info criterion	-2.311453
Sum squared resid	0.427620	Schwarz criterion	-2.061472
Log likelihood	113.0154	Hannan-Quinn criter.	-2.210646
F-statistic	443.2905	Durbin-Watson stat	1.691695
Prob(F-statistic)	0.000000		

Dependent Variable: D(LRNOT_SA)
Method: Least Squares
Date: 09/30/14 Time: 12:01
Sample (adjusted): 1991Q4 2013Q4
Included observations: 89 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012195	0.010885	1.120310	0.2657
D(LRNOGDP_SA)	0.792547	0.320549	2.472471	0.0154
ECM_LRNOT_SA(-1)	-0.408639	0.155811	-2.622660	0.0103

R-squared	0.149460	Mean dependent var	0.017323
Adjusted R-squared	0.129680	S.D. dependent var	0.108111
S.E. of regression	0.100858	Akaike info criterion	-1.717079
Sum squared resid	0.874821	Schwarz criterion	-1.633193
Log likelihood	79.41003	Hannan-Quinn criter.	-1.683267
F-statistic	7.556110	Durbin-Watson stat	2.259773
Prob(F-statistic)	0.000948		

IT- Annual frequency

Dependent Variable: LRIT_L
Method: Least Squares
Date: 09/30/14 Time: 11:41
Sample (adjusted): 1951 2012
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.909981	0.793822	-7.444970	0.0000
LRIT_L(-1)	0.353425	0.075401	4.687260	0.0000
LRNOGDP_L	1.025068	0.128021	8.007013	0.0000
D1989	-0.490794	0.058604	-8.374731	0.0000
D1993	0.460589	0.106110	4.340688	0.0001
D2003	0.294726	0.045143	6.528668	0.0000

R-squared	0.990874	Mean dependent var	6.350429
Adjusted R-squared	0.990059	S.D. dependent var	1.009389
S.E. of regression	0.100639	Akaike info criterion	-1.662786
Sum squared resid	0.567181	Schwarz criterion	-1.456935
Log likelihood	57.54638	Hannan-Quinn criter.	-1.581964
F-statistic	1216.080	Durbin-Watson stat	1.455725
Prob(F-statistic)	0.000000		

Dependent Variable: D(LRIT_L)
Method: Least Squares
Date: 09/30/14 Time: 12:02
Sample (adjusted): 1951 2012
Included observations: 62 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.038305	0.018093	-2.117193	0.0386
ECM_LRIT(-1)	-0.251497	0.097120	-2.589551	0.0122
D(LRNOGDP_L)	1.672190	0.260961	6.407812	0.0000
D1989	-0.442548	0.047704	-9.276981	0.0000
D1993	0.505078	0.047581	10.61518	0.0000

R-squared	0.667420	Mean dependent var	0.061615
Adjusted R-squared	0.644081	S.D. dependent var	0.174037
S.E. of regression	0.103828	Akaike info criterion	-1.614947
Sum squared resid	0.614479	Schwarz criterion	-1.443404
Log likelihood	55.06337	Hannan-Quinn criter.	-1.547595
F-statistic	28.59684	Durbin-Watson stat	1.837427
Prob(F-statistic)	0.000000		

IT – Quarterly frequency

Dependent Variable: LRIT_SA
Method: Least Squares
Date: 09/25/14 Time: 10:49
Sample (adjusted): 1984Q2 2013Q4
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.173816	0.934283	-2.326721	0.0218
LRIT_SA(-1)	0.760879	0.059457	12.79714	0.0000
LRNOGDP_SA	0.388046	0.128217	3.026468	0.0031
D1987Q2	-0.639518	0.214859	-2.976456	0.0036
D1990Q2	-0.707257	0.209468	-3.376441	0.0010
D1993Q1	0.601956	0.209358	2.875249	0.0048

R-squared	0.842352	Mean dependent var	5.608377
Adjusted R-squared	0.835376	S.D. dependent var	0.511064
S.E. of regression	0.207359	Akaike info criterion	-0.259629
Sum squared resid	4.858732	Schwarz criterion	-0.119505
Log likelihood	21.44791	Hannan-Quinn criter.	-0.202729
F-statistic	120.7570	Durbin-Watson stat	2.256173
Prob(F-statistic)	0.000000		

Dependent Variable: D(LRIT_SA)
Method: Least Squares
Date: 09/30/14 Time: 12:24
Sample (adjusted): 1984Q3 2013Q4
Included observations: 118 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM_LRIT_SA(-1)	-0.159925	0.057013	-2.805047	0.0059
D(LRIT_SA(-1))	-0.253828	0.080964	-3.135084	0.0022
D(LRNOGDP_SA)	1.239416	0.526073	2.355977	0.0202
D1987Q2	-0.608203	0.191748	-3.171895	0.0020
D1987Q3	0.571183	0.203327	2.809184	0.0059
D1990Q2	-0.592331	0.188781	-3.137666	0.0022
D1993Q2	-0.523635	0.196872	-2.659768	0.0090

R-squared	0.459421	Mean dependent var	0.005054
Adjusted R-squared	0.430201	S.D. dependent var	0.246768
S.E. of regression	0.186273	Akaike info criterion	-0.465721
Sum squared resid	3.851423	Schwarz criterion	-0.301358
Log likelihood	34.47752	Hannan-Quinn criter.	-0.398985
Durbin-Watson stat	2.163257		

TVAT – Quarterly frequency

Dependent Variable: LRTVAT_SA
Method: Least Squares
Date: 09/29/14 Time: 10:01
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.664602	0.793768	-3.356902	0.0013
LRTVAT_SA(-1)	0.751405	0.048811	15.39432	0.0000
LRNOGDP_SA	1.242859	0.203806	6.098240	0.0000
LRNOGDP_SA(-1)	-0.818093	0.197507	-4.142094	0.0001
ALICUOTA	2.418379	0.535578	4.515459	0.0000
D1995Q1	0.308450	0.059161	5.213716	0.0000
D1995Q3	0.200395	0.057916	3.460072	0.0009
D1994Q4	0.174844	0.060951	2.868603	0.0054
D_SB2003Q1	0.107972	0.023233	4.647332	0.0000

R-squared	0.986456	Mean dependent var	6.518816
Adjusted R-squared	0.984930	S.D. dependent var	0.457195
S.E. of regression	0.056125	Akaike info criterion	-2.816803
Sum squared resid	0.223654	Schwarz criterion	-2.548825
Log likelihood	121.6721	Hannan-Quinn criter.	-2.709363
F-statistic	646.3957	Durbin-Watson stat	1.856558
Prob(F-statistic)	0.000000		

Dependent Variable: D(LRTVAT_SA)
Method: Least Squares
Date: 09/30/14 Time: 12:30
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.128318	0.048511	2.645129	0.0100
ECM_LRTVAT_SA(-1)	-0.104172	0.042362	-2.459124	0.0163
D(LRNOGDP_SA)	1.298911	0.221067	5.875653	0.0000
D(ALICUOTA)	2.439715	0.985280	2.476164	0.0156
D1995Q1	0.210616	0.071403	2.949675	0.0043
D1995Q2	-0.163112	0.065690	-2.483032	0.0153
D2004Q3	0.150235	0.065621	2.289431	0.0249

R-squared	0.527579	Mean dependent var	0.022157
Adjusted R-squared	0.488750	S.D. dependent var	0.089537
S.E. of regression	0.064021	Akaike info criterion	-2.575792
Sum squared resid	0.299200	Schwarz criterion	-2.367365
Log likelihood	110.0317	Hannan-Quinn criter.	-2.492227
F-statistic	13.58719	Durbin-Watson stat	2.071215
Prob(F-statistic)	0.000000		

DVAT – Quarterly frequency

Dependent Variable: LRDVAT_SA
Method: Least Squares
Date: 09/29/14 Time: 10:19
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.417472	1.015364	-5.335500	0.0000
LRDVAT_SA(-1)	0.575147	0.050451	11.40016	0.0000
LRNOGDP_SA	0.808313	0.129912	6.221996	0.0000
ALICUOTA	3.517559	0.656979	5.354139	0.0000
D1994Q4	0.304344	0.073038	4.166927	0.0001
D1995Q3	0.218749	0.070485	3.103501	0.0027
D_SB2003Q1	0.237662	0.032129	7.397097	0.0000

R-squared	0.986859	Mean dependent var	6.120839
Adjusted R-squared	0.985779	S.D. dependent var	0.569338
S.E. of regression	0.067895	Akaike info criterion	-2.458266
Sum squared resid	0.336514	Schwarz criterion	-2.249839
Log likelihood	105.3307	Hannan-Quinn criter.	-2.374702
F-statistic	913.6761	Durbin-Watson stat	2.083435
Prob(F-statistic)	0.000000		

Dependent Variable: D(LRDVAT_SA)
Method: Least Squares
Date: 09/30/14 Time: 13:12
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.184016	0.032128	5.727616	0.0000
ECM_LRDVAT_SA(-1)	-0.208253	0.040633	-5.125201	0.0000
D(LRNOGDP_SA)	1.157324	0.257276	4.498384	0.0000
D1994Q4	0.263871	0.080404	3.281809	0.0016
D1995Q4	-0.191600	0.077800	-2.462735	0.0161

R-squared	0.475540	Mean dependent var	0.034205
Adjusted R-squared	0.447569	S.D. dependent var	0.103723
S.E. of regression	0.077093	Akaike info criterion	-2.227153
Sum squared resid	0.445747	Schwarz criterion	-2.078276
Log likelihood	94.08610	Hannan-Quinn criter.	-2.167464
F-statistic	17.00108	Durbin-Watson stat	1.720276
Prob(F-statistic)	0.000000		

EVAT – Quarterly frequency

Dependent Variable: LREVAT_SA
Method: Least Squares
Date: 09/29/14 Time: 10:33
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LREVAT_SA(-1)	0.850232	0.039620	21.45986	0.0000
LRNOGDP_SA	2.871747	0.346725	8.282482	0.0000
LRNOGDP_SA(-1)	-2.786397	0.340552	-8.182013	0.0000
D1994Q2	-0.292783	0.091115	-3.213344	0.0020
D1995Q1	0.507612	0.094586	5.366658	0.0000
D1995Q2	-0.314989	0.090001	-3.499850	0.0008
D1996Q2	0.238743	0.090135	2.648721	0.0099
D2003Q2	-0.456844	0.108040	-4.228467	0.0001

R-squared	0.932057	Mean dependent var	5.333752
Adjusted R-squared	0.925452	S.D. dependent var	0.327269
S.E. of regression	0.089356	Akaike info criterion	-1.897738
Sum squared resid	0.574883	Schwarz criterion	-1.659535
Log likelihood	83.90952	Hannan-Quinn criter.	-1.802236
Durbin-Watson stat	1.747106		

Dependent Variable: D(LREVAT_SA)
Method: Least Squares
Date: 09/29/14 Time: 10:49
Sample (adjusted): 1994Q2 2013Q4
Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESIDUOS(-1)	-0.133510	0.040390	-3.305490	0.0015
D(LRNOGDP_SA)	1.937470	0.293477	6.601776	0.0000
D(LRNOGDP_SA(-1))	1.481491	0.323083	4.585487	0.0000
D1995Q1	0.535789	0.093372	5.738199	0.0000
D1995Q2	-0.444870	0.092420	-4.813585	0.0000
D1996Q2	0.260135	0.089929	2.892672	0.0050
D2008Q1	-0.240352	0.090623	-2.652210	0.0098

R-squared	0.679103	Mean dependent var	0.002973
Adjusted R-squared	0.652362	S.D. dependent var	0.152053
S.E. of regression	0.089652	Akaike info criterion	-1.901332
Sum squared resid	0.578697	Schwarz criterion	-1.691381
Log likelihood	82.10262	Hannan-Quinn criter.	-1.817219
Durbin-Watson stat	1.768215		

Table 3A
Cointegration Test (Engle-Granger)

NOT- Annual frequency

Cointegration Test - Engle-Granger
Date: 09/30/14 Time: 11:33
Equation: DOLS2
Specification: LRNOT_L LRNOGDP_L_V C @TREND D_SB1964 D_SB1973 D_SB1994
D_SB2004 D1987
Cointegrating equation deterministics: C @TREND D_SB1964 D_SB1973 D_SB1994
D_SB2004 D1987
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=10)

	Value	Prob.*
Engle-Granger tau-statistic	-4.702637	0.0073
Engle-Granger z-statistic	-31.57729	0.0078

*MacKinnon (1996) p-values.
Warning: p-values do not account for user-specified deterministic
regressors.

Intermediate Results:	
Rho - 1	-0.509311
Rho S.E.	0.108303
Residual variance	0.021991
Long-run residual variance	0.021991
Number of lags	0
Number of observations	62
Number of stochastic trends**	2

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/30/14 Time: 11:33
Sample (adjusted): 1951 2012
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.509311	0.108303	-4.702637	0.0000

R-squared	0.265530	Mean dependent var	-0.004680
Adjusted R-squar...	0.265530	S.D. dependent var	0.173037
S.E. of regressio...	0.148295	Akaike info criterion	-0.963230
Sum squared res...	1.341474	Schwarz criterion	-0.928921
Log likelihood	30.86013	Hannan-Quinn criter.	-0.949760
Durbin-Watson st...	1.977878		

NOT- Quarterly frequency

Cointegration Test - Engle-Granger
Date: 09/23/14 Time: 09:55
Equation: LRNOT_SA
Specification: LRNOT_SA LRNOGDP_SA C D_SB1994Q2 D_SB2003Q3
D_SB2007Q1 D_SB1993Q4
Cointegrating equation deterministics: C D_SB1994Q2 D_SB2003Q3 D_SB2007Q1
D_SB1993Q4
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion,
maxlag=11)

	Value	Prob.*
Engle-Granger tau-statistic	-5.545711	0.0001
Engle-Granger z-statistic	-46.34303	0.0000

*MacKinnon (1996) p-values.
Warning: p-values do not account for user-specified deterministic
regressors.

Intermediate Results:	
Rho - 1	-0.509264
Rho S.E.	0.091830
Residual variance	0.007488
Long-run residual variance	0.007488
Number of lags	0
Number of observations	91
Number of stochastic trends**	2

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/23/14 Time: 09:55
Sample (adjusted): 1991Q2 2013Q4
Included observations: 91 after adjustments

Variable	Coefficie...	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.509264	0.091830	-5.545711	0.0000

R-squared	0.254685	Mean dependent var	0.000224
Adjusted R-squared	0.254685	S.D. dependent var	0.100231
S.E. of regression	0.086531	Akaike info criterion	-2.045699
Sum squared resid	0.673886	Schwarz criterion	-2.018107
Log likelihood	94.07930	Hannan-Quinn criter.	-2.034567
Durbin-Watson stat	2.118158		

IT- Annual frequency

Cointegration Test - Engle-Granger
Date: 09/19/14 Time: 14:59
Equation: DOLS_QE2
Specification: LRIT_L LRNOGDP_L C D_SB1989 D1989 D1991 D1993 D2006
Cointegrating equation deterministics: C D_SB1989 D1989 D1991 D1993 D2006
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion, maxlag=10)

	Value	Prob.*
Engle-Granger tau-statistic	-5.403351	0.0002
Engle-Granger z-statistic	-41.43155	0.0001

*MacKinnon (1996) p-values.
Warning: p-values do not account for user-specified deterministic regressors.

Intermediate Results:	
Rho - 1	-0.668251
Rho S.E.	0.123673
Residual variance	0.011528
Long-run residual variance	0.011528
Number of lags	0
Number of observations	62
Number of stochastic trends**	2

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/19/14 Time: 14:59
Sample (adjusted): 1951 2012
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.668251	0.123673	-5.403351	0.0000

R-squared	0.323130	Mean dependent var	-0.003748
Adjusted R-squared	0.323130	S.D. dependent var	0.130505
S.E. of regression	0.107369	Akaike info criterion	-1.609084
Sum squared resid	0.703220	Schwarz criterion	-1.574776
Log likelihood	50.88162	Hannan-Quinn criter.	-1.595614
Durbin-Watson stat	2.048817		

IT – Quarterly frequency

Cointegration Test - Engle-Granger
Date: 09/19/14 Time: 15:11
Equation: DOLS_QE_LP
Specification: LRIT_SA LRNOGDP_SA C @TREND @TREND^2 D_SB1989Q1 D_SB2003Q2
Cointegrating equation deterministics: C @TREND @TREND^2 D_SB1989Q1 D_SB2003Q2
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion, maxlag=12)

	Value	Prob.*
Engle-Granger tau-statistic	-7.873665	0.0000
Engle-Granger z-statistic	-81.90767	0.0000

*MacKinnon (1996) p-values.
Warning: p-values do not account for user-specified deterministic regressors.

Intermediate Results:	
Rho - 1	-0.688300
Rho S.E.	0.087418
Residual variance	0.039636
Long-run residual variance	0.039636
Number of lags	0
Number of observations	119
Number of stochastic trends**	2

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/19/14 Time: 15:11
Sample (adjusted): 1984Q2 2013Q4
Included observations: 119 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.688300	0.087418	-7.873665	0.0000

R-squared	0.344424	Mean dependent var	0.000256
Adjusted R-squared	0.344424	S.D. dependent var	0.245887
S.E. of regression	0.199089	Akaike info criterion	-0.381765
Sum squared resid	4.677084	Schwarz criterion	-0.358411
Log likelihood	23.71501	Hannan-Quinn criter.	-0.372282
Durbin-Watson stat	2.061021		

TVAT – Quarterly frequency

Cointegration Test - Engle-Granger
Date: 09/19/14 Time: 14:34
Equation: DOLS_DEF
Specification: LRTVAT_SA LRNOGDP_SA VAT RATE C D_SB2003Q1 D_SB2007Q2
Cointegrating equation deterministics: C D_SB2003Q1 D_SB2007Q2
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion, maxlag=11)

	Value	Prob.*
Engle-Granger tau-statistic	-4.700308	0.0053
Engle-Granger z-statistic	-29.49786	0.0147

*MacKinnon (1996) p-values.
Warning: p-values do not account for user-specified deterministic regressors.

Intermediate Results:	
Rho - 1	-0.368723
Rho S.E.	0.078447
Residual variance	0.005365
Long-run residual variance	0.005365
Number of lags	0
Number of observations	80
Number of stochastic trends**	3

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/19/14 Time: 14:34
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.368723	0.078447	-4.700308	0.0000

R-squared	0.216717	Mean dependent var	0.003972
Adjusted R-squared	0.216717	S.D. dependent var	0.082765
S.E. of regression	0.073249	Akaike info criterion	-2.377474
Sum squared resid	0.423872	Schwarz criterion	-2.347698
Log likelihood	96.09895	Hannan-Quinn criter.	-2.365536
Durbin-Watson stat	1.982039		

DVAT – Quarterly frequency

Cointegration Test - Engle-Granger
Date: 09/19/14 Time: 14:45
Equation: DOLS
Specification: LRDVAT_SA LRNOGDP_SA VAT RATE C D1995Q3 D_SB2003Q1
Cointegrating equation deterministics: C D1995Q3 D_SB2003Q1
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=0 based on Schwarz Info Criterion, maxlag=11)

	Value	Prob.*
Engle-Granger tau-statistic	-7.385510	0.0000
Engle-Granger z-statistic	-44.67297	0.0002

*MacKinnon (1996) p-values.
Warning: p-values do not account for user-specified deterministic regressors.

Intermediate Results:	
Rho - 1	-0.558412
Rho S.E.	0.075609
Residual variance	0.009080
Long-run residual variance	0.009080
Number of lags	0
Number of observations	80
Number of stochastic trends**	3

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/19/14 Time: 14:45
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.558412	0.075609	-7.385510	0.0000

R-squared	0.404104	Mean dependent var	0.010505
Adjusted R-squared	0.404104	S.D. dependent var	0.123443
S.E. of regression	0.095291	Akaike info criterion	-1.851341
Sum squared resid	0.717350	Schwarz criterion	-1.821566
Log likelihood	75.05364	Hannan-Quinn criter.	-1.839403
Durbin-Watson stat	2.033467		

EVAT – Quarterly frequency

Cointegration Test - Engle-Granger
Date: 09/19/14 Time: 14:55
Equation: EQ01
Specification: LREVAT_SA LRNOGDP_SA
Null hypothesis: Series are not cointegrated
Automatic lag specification (lag=1 based on Schwarz Info Criterion, maxlag=11)

	Value	Prob.*
Engle-Granger tau-statistic	-2.209652	0.1675
Engle-Granger z-statistic	-10.41883	0.1443

*MacKinnon (1996) p-values.

Intermediate Results:	
Rho - 1	-0.127762
Rho S.E.	0.057820
Residual variance	0.019778
Long-run residual variance	0.021075
Number of lags	1
Number of observations	79
Number of stochastic trends**	2

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 09/19/14 Time: 14:55
Sample (adjusted): 1994Q2 2013Q4
Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.127762	0.057820	-2.209652	0.0301
D(RESID(-1))	0.031256	0.114740	0.272408	0.7860

R-squared	0.060579	Mean dependent var	-0.001221
Adjusted R-squared	0.048379	S.D. dependent var	0.144166
S.E. of regression	0.140635	Akaike info criterion	-1.060307
Sum squared resid	1.522922	Schwarz criterion	-1.000321
Log likelihood	43.88213	Hannan-Quinn criter.	-1.036275
Durbin-Watson stat	1.990107		

Table 4A
DOLS Output

NOT- Annual frequency

Dependent Variable: LRNOT_L
Method: Dynamic Least Squares (DOLS)
Date: 09/30/14 Time: 11:21
Sample (adjusted): 1955 2009
Included observations: 55 after adjustments
Cointegrating equation deterministics: C @TREND D_SB1964 D_SB1973 ... D_SB2004 D1987
Fixed leads and lags specification (lead=3, lag=4)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRNOGDP_L	1.685358	0.317560	5.307215	0.0000
C	-7.522858	2.724570	-2.761117	0.0087
@TREND	-0.050774	0.015142	-3.353180	0.0018
D_SB1964	-0.473507	0.095879	-4.938563	0.0000
D_SB1973	-0.300331	0.124344	-2.415328	0.0205
D_SB1994	0.713458	0.148435	4.806537	0.0000
D_SB2004	1.637389	0.235877	6.941693	0.0000
D1987	0.557480	0.213416	2.612176	0.0127

R-squared	0.968152	Mean dependent var	7.586723
Adjusted R-squared	0.955903	S.D. dependent var	0.790808
S.E. of regression	0.166064	Sum squared resid	1.075511
Long-run variance	0.031031		

Dependent Variable: D(LRNOT_L)
Method: Least Squares
Date: 09/30/14 Time: 11:21
Sample (adjusted): 1956 2010
Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRNOGDP_L)	1.195084	0.371995	3.212634	0.0022
ECM_LRNOT_L(-1)	-0.476629	0.185590	-2.568184	0.0131

R-squared	0.197843	Mean dependent var	0.050888
Adjusted R-squared	0.182708	S.D. dependent var	0.212899
S.E. of regression	0.192469	Akaike info criterion	-0.422074
Sum squared resid	1.963356	Schwarz criterion	-0.349080
Log likelihood	13.60702	Hannan-Quinn criter.	-0.393846
Durbin-Watson stat	1.769509		

NOT – Quarterly frequency

Dependent Variable: LRNOT_SA
Method: Dynamic Least Squares (DOLS)
Date: 09/30/14 Time: 11:50
Sample (adjusted): 1992Q1 2013Q1
Included observations: 85 after adjustments
Cointegrating equation deterministics: C D_SB1993Q4 D_SB1994Q2 D_SB2003Q... D_SB2007Q1
Fixed leads and lags specification (lead=3, lag=3)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRNOGDP_SA	1.629129	0.285411	5.708007	0.0000
C	-8.349492	2.567036	-3.252581	0.0017
D_SB1993Q4	0.487780	0.161111	3.027597	0.0034
D_SB1994Q2	0.541532	0.057972	9.341309	0.0000
D_SB2003Q3	0.912703	0.090152	10.12405	0.0000
D_SB2007Q1	0.536296	0.142408	3.765902	0.0003

R-squared	0.951809	Mean dependent var	7.119590
Adjusted R-squared	0.943777	S.D. dependent var	0.435539
S.E. of regression	0.103272	Sum squared resid	0.767895
Long-run variance	0.020998		

Dependent Variable: D(LRNOT_SA)
Method: Least Squares
Date: 09/30/14 Time: 11:50
Sample (adjusted): 1992Q2 2013Q2
Included observations: 85 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRNOGDP_SA)	1.254607	0.287276	4.367249	0.0000
ECM_LRNOT_SA(-1)	-0.383227	0.104681	-3.660888	0.0004
D1993Q4	0.450343	0.092603	4.863135	0.0000

R-squared	0.356498	Mean dependent var	0.018821
Adjusted R-squared	0.340803	S.D. dependent var	0.112784
S.E. of regression	0.091570	Akaike info criterion	-1.908765
Sum squared resid	0.687579	Schwarz criterion	-1.822554
Log likelihood	84.12252	Hannan-Quinn criter.	-1.874089
Durbin-Watson stat	2.548589		

IT- Annual frequency

Dependent Variable: LRIT_L
Method: Dynamic Least Squares (DOLS)
Date: 06/09/14 Time: 14:03
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Cointegrating equation deterministics: D_SB1989 D1989 D1991 D1993 D2006
Automatic leads and lags specification (lead=3 and lag=0 based on SIC criterion, max=5)
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRNOGDP_L	1.657492	0.042566	38.93907	0.0000
C	-9.92628	0.426958	-23.24887	0.0000
D_SB1989	1.088873	0.144502	7.535335	0.0000
D1989	-11.98101	1.513074	-7.918324	0.0000
D1991	-0.272412	0.062705	-4.344319	0.0001
D1993	0.364479	0.041977	8.682798	0.0000
D2006	0.181559	0.058959	3.079413	0.0034
R-squared	0.992024	Mean dependent var		6.286721
Adjusted R-squared	0.990362	S.D. dependent var		0.99305
S.E. of regression	0.097491	Sum squared resid		0.456215
Durbin-Watson stat	1.285594			

Dependent Variable: DLRIT_L
Method: Least Squares
Date: 06/09/14 Time: 14:22
Sample (adjusted): 1952 2009
Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLRNOGDP_L	0.935847	0.253066	3.698037	0.0005
ECM_LRIT(-1)	-0.726197	0.149523	-4.856765	0.0000
D1989	-0.404001	0.089553	-4.511299	0.0000
D1993	0.408047	0.091923	4.438984	0.0000
D2006	0.304020	0.092073	3.301932	0.0018
D_AC_SE	1.197973	0.364831	3.283637	0.0019
D1991	-0.178226	0.088421	-2.015660	0.0491
R-squared	0.790473	Mean dependent var		0.067092
Adjusted R-squared	0.765823	S.D. dependent var		0.176934
S.E. of regression	0.085622	Akaike info criterion		-1.964992
Sum squared resid	0.373885	Schwarz criterion		-1.716318
Log likelihood	63.98478	Hannan-Quinn criter.		-1.868129
Durbin-Watson stat	2.280459			

IT – Quarterly frequency

Dependent Variable: LRIT_SA
Method: Dynamic Least Squares (DOLS)
Date: 06/06/14 Time: 10:58
Sample (adjusted): 1984Q4 2013Q4
Included observations: 117 after adjustments
Cointegrating equation deterministics: C @TREND @TREND^2 D_SB1989Q1 D_SB2003Q2
Automatic leads and lags specification (lead=0 and lag=2 based on SIC criterion, max=5)
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRNOGDP_SA	2.338893	0.253741	9.217640	0.0000
C	-15.06128	2.234342	-6.740814	0.0000
@TREND	0.008683	0.004243	2.046389	0.0431
@TREND^2	-0.000123	3.67E-05	-3.359689	0.0011
D_SB1989Q1	-0.093570	0.015665	-5.973387	0.0000
D_SB2003Q2	0.068558	0.010350	6.623879	0.0000
R-squared	0.865545	Mean dependent var		5.608369
Adjusted R-squared	0.855586	S.D. dependent var		0.515335
S.E. of regression	0.195837	Sum squared resid		4.142033
Durbin-Watson stat	1.699043			

Dependent Variable: DLRIT_SA
Method: Least Squares
Date: 06/06/14 Time: 14:35
Sample (adjusted): 1985Q1 2013Q4
Included observations: 116 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLRNOGDP_SA	1.383519	0.483496	2.861492	0.0050
ECM_LRIT_SA(-1)	-0.852446	0.089051	-9.572606	0.0000
D1989Q1	-0.719830	0.173498	-4.148928	0.0001
D1992Q1	-0.526355	0.174183	-3.021849	0.0031
D1993Q4	0.496141	0.170832	2.904272	0.0044
D1987Q2	-0.533404	0.170823	-3.122553	0.0023
R-squared	0.562094	Mean dependent var		0.006564
Adjusted R-squared	0.542189	S.D. dependent var		0.248383
S.E. of regression	0.168060	Akaike info criterion		-0.678647
Sum squared resid	3.106876	Schwarz criterion		-0.536220
Log likelihood	45.36154	Hannan-Quinn criter.		-0.620830
Durbin-Watson stat	1.867054			

TVAT – Quarterly frequency

Dependent Variable: LRTVAT_SA
Method: Dynamic Least Squares (DOLS)
Date: 09/19/14 Time: 14:37
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments
Cointegrating equation deterministics: C D_SB2003Q1 D_SB2007Q2
Automatic leads and lags specification (lead=0 and lag=0 based on SIC criterion, max=5)
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRNOGDP_SA	2.348368	0.197228	11.90685	0.0000
VAT RATE	6.555754	1.330016	4.929079	0.0000
C	-16.00740	1.850113	-8.652118	0.0000
D_SB2003Q1	0.033768	0.005139	6.570442	0.0000
D_SB2007Q2	-0.033291	0.008490	-3.921103	0.0002

R-squared	0.954333	Mean dependent var	6.518816
Adjusted R-squared	0.950580	S.D. dependent var	0.457195
S.E. of regression	0.101638	Sum squared resid	0.754107
Durbin-Watson stat	0.633807		

Dependent Variable: DLRTVAT_SA
Method: Least Squares
Date: 06/10/14 Time: 09:23
Sample (adjusted): 1994Q2 2013Q4
Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLRNOGDP_SA	1.322267	0.194907	6.784092	0.0000
D VAT RATE	3.020046	0.895047	3.374176	0.0012
ECM_LRTVAT_SA(-1)	-0.285489	0.068718	-4.154526	0.0001
D1995Q1	0.270096	0.063473	4.255304	0.0001
D1995Q3	0.188321	0.058942	3.195033	0.0021
D2007Q2	-0.131171	0.058897	-2.227112	0.0290

R-squared	0.598979	Mean dependent var	0.021507
Adjusted R-squared	0.571511	S.D. dependent var	0.089919
S.E. of regression	0.058860	Akaike info criterion	-2.754396
Sum squared resid	0.252909	Schwarz criterion	-2.574438
Log likelihood	114.7987	Hannan-Quinn criter.	-2.682300
Durbin-Watson stat	1.767796		

DVAT – Quarterly frequency

Dependent Variable: LRDVAT_SA
Method: Dynamic Least Squares (DOLS)
Date: 09/19/14 Time: 14:45
Sample (adjusted): 1994Q1 2013Q4
Included observations: 80 after adjustments
Cointegrating equation deterministics: C D1995Q3 D_SB2003Q1
Automatic leads and lags specification (lead=0 and lag=0 based on SIC criterion, max=5)
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRNOGDP_SA	2.033183	0.171233	11.87375	0.0000
VAR RATE	8.713339	1.598477	5.451026	0.0000
C	-14.01323	1.759780	-7.963057	0.0000
D1995Q3	0.336393	0.062129	5.414429	0.0000
D_SB2003Q1	0.054050	0.005166	10.46300	0.0000

R-squared	0.964195	Mean dependent var	6.120839
Adjusted R-squared	0.961253	S.D. dependent var	0.569338
S.E. of regression	0.112071	Sum squared resid	0.916869
Durbin-Watson stat	0.761614		

Dependent Variable: DLRDVAT_SA
Method: Least Squares
Date: 06/10/14 Time: 09:51
Sample (adjusted): 1994Q2 2013Q4
Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLRNOGDP_SA	0.955039	0.252620	3.780536	0.0003
ECM_LRDVAT_SA(-1)	-0.228000	0.083005	-2.746826	0.0076
C	0.020294	0.008817	2.301852	0.0242
D VAT RATE	2.956578	1.095584	2.698632	0.0086
D1994Q4	0.328501	0.077461	4.240840	0.0001
D1995Q4	-0.177758	0.076175	-2.333552	0.0224

R-squared	0.440439	Mean dependent var	0.030146
Adjusted R-squared	0.402113	S.D. dependent var	0.097784
S.E. of regression	0.075610	Akaike info criterion	-2.253550
Sum squared resid	0.417330	Schwarz criterion	-2.073592
Log likelihood	95.01523	Hannan-Quinn criter.	-2.181453
F-statistic	11.49188	Durbin-Watson stat	1.986678
Prob(F-statistic)	0.000000		