Political Instability and Economic Growth: the case of Venezuela (1983 - 2000)

Rafael Muñoz

Andrés Bello Catholic University
Caracas, Venezuela
March, 2009

Political Instability and Economic Growth: the case of Venezuela (1983 - 2000)

Abstract: Using political instability indices built by Muñoz (2006, 2009) through the principal components method, in this work we empirically investigate the relationship between political instability and growth in Venezuela for the period 1983-2000. Our main empirical findings are summarised as follows: a) Our results support the theoretical hypothesis that political instability (PI) affects negatively growth. Moreover, our findings are consistent with the evolution of the Venezuelan politics and economy during the period of study (documented by Muñoz 2006), in the sense that the decreasing trend in growth (measured by Non-oil GDP growth) after the seventies became more pronounced since 1989, a year after which political instability became a particularly important feature of the Venezuelan politics. Furthermore, the estimated coefficient for political instability obtained by the estimation of the single —reduced form— equation of the determinants of growth (where growth is modelled as an ARDL (4,4) process controlling for seasonal effects) clearly indicates that the quantitative negative effect of political instability on growth during our period of study is quite relevant. In fact, we estimated that annual average per capita —non-oil— output for the period 1989-2000 would have been between 29.8% and 42.8% higher than the observed average for this period if political instability had remained at its 1980-1988 lower level (mean); b) After extending our basic model by including investment through its growth rate, the estimated coefficients associated to the political instability indices remained statistically significant and their values did not change notably, which suggests that investment is not a decisive channel through which PI and growth are connected in the case of Venezuela for our period of study. However, it remains open the possibility of the investment channel to be operating through the level of investment; c) Our results are robust to the use of five different political instability indices and to the inclusion as explanatory variables, of the first four principal components associated with the set of the —original— political variables used in our analysis (this way capturing at least 56.4% of the total variation of this set of variables), instead of including only the first principal component (which we use as our PI indices).

Resumen: Utilizando índices de inestabilidad política construidos por Muñoz (2006, 2009) a través del método de los componentes principales, en este trabajo investigamos empíricamente la relación entre inestabilidad política (IP) y el crecimiento económico en Venezuela en el periodo 1983-2000. Nuestros principales hallazgos empíricos son los siguientes: a) Nuestros resultados respaldan la hipótesis de que la inestabilidad política afecta negativamente el crecimiento económico. Más aún, nuestros resultados son consistentes con la evolución de la económica y política de Venezuela en nuestro período de estudio (lo cual ha sido documentado en Muñoz 2006), en el sentido de que la tendencia decreciente en el crecimiento económico (medido mediante el crecimiento del PIB no petrolero) después de los años setenta se hizo más pronunciada desde 1989, un año después del cual la inestabilidad política se convirtió en una característica particularmente importante de la realidad política venezolana. Más aún, el coeficiente estimado asociado a la inestabilidad política obtenido a través de la estimación de un modelo de ecuación única de forma reducida de los determinantes del crecimiento económico (donde el crecimiento económico es modelado como un proceso ARDL (4,4) controlando por efectos estacionales) claramente indica que el efecto cuantitativo negativo de la inestabilidad política en el crecimiento económico en nuestro período de estudio es bastante relevante. De hecho, de acuerdo a nuestras estimaciones, el producto –no petrolero- per capita promedio anual del período 1989-2000 hubiese sido entre 29,8% y 42,8% más elevado que el promedio efectivamente observado si la inestabilidad política se hubiese mantenido en el nivel (promedio) más bajo del período 1980-1988; b) Al extender nuestro modelo base incluyendo como variable independiente la inversión, a través su tasa de crecimiento, los coeficientes estimados asociados a los índices de inestabilidad política usados permanecieron siendo estadísticamente significativos y sus valores no cambiaron apreciablemente, lo cual sugiere que la inversión no es un canal decisivo a través del cual la IP y el crecimiento económico están conectados en el caso de Venezuela para nuestro período de estudio. Sin embargo, aún permanece abierta la posibilidad de que el canal de conexión entre estas variables por la vía de la inversión opere a través del nivel de esta última variable; c) Nuestros resultados son robustos al uso de cinco índices de inestabilidad política diferentes y a la inclusión, como variables explicativas, de los primeros cuatro componentes principales asociados al conjunto de variables políticas -originales- empleado en nuestro análisis (de esta manera capturando al menos el 56,4% de la variación conjunta de este grupo de variables), en vez de incluir sólo el primer componente principal (el cual usamos, en cada una de las cinco variantes, como nuestro índice de inestabilidad política).

JEL Classification: P16, P26

Key Words: Political Instability, Economic Growth, Venezuela.

Rafael Muñoz: Economic Consultant. Professor of Macroeconomic at the Graduate Program on Applied Economics at the Andrés Bello Catholic University (Venezuela). Ph.D. in Economics (University of Essex, UK). MA in Economics (State University of New York at Albany, USA). Economist (Central University of Venezuela, Venezuela).

Correspondence address: rmunozj@gmail.com

Contents

1 Introduction[1]

Political instability (PI)[2] affects growth through many channels. The three more relevant channels discussed in the literature are: a) the investment channel (higher PI normally reduces, physical and human, capital accumulation, as well as induces changes in its composition favouring short run investment and in less sophisticated capital); b) the socio-political unrest channel (as PI increases socio-political unrest tends to intensify, which reduces productivity since normal economic activities are more frequently disrupted; and c) the sub-optimal economic policies channel (the higher PI, the more likely it is that political rulers engage in politically driven sub-optimal policies, because they perceive a higher probability of not continuing in power). Although most theoretical approaches conclude that the effect of PI on growth is negative, some contributions show that there are possible positive effects. Therefore, empirical research on the relationship between political instability and growth seems to be particularly pertinent because we have no a priori unambiguous theoretical prediction about the sign of the effect. Furthermore, some —although a minority— empirical studies have found no effect (e.g., Hibbs 1973) or even a positive relationship (e.g., Fosu 1992, 2001; Campos, Nugent and Robinson 1999; Campos and Nugent 2002).[3]

Venezuela has experienced a very important increase of socio-political unrest (SPU) and political instability (PI) since 1989. In particular, SPU and PI were much higher in the period 1989-2000 than in the period 1980-1988[4], which coincides with a drop of the average growth rate of real non-oil GDP between these two periods. This suggests a negative relationship between political instability and growth in Venezuela, at least over the period 1980-2000[5].

Using political instability indices built by Muñoz (2006, 2009), in this work we empirically investigate the relationship between political instability and growth in Venezuela for the period 1983-2000. Examining the relationship between political instability and growth in a single country using time series data rather than cross-

---

[1] This working paper is based on part of my research done for and published in my PhD thesis "Political Uncertainty and Macroeconomic Outcomes: Theoretical and Empirical Essays" (particularly, chapter 7), presented at the Department of Economics of the University of Essex, U.K., in 2006.

[2] There is no a consensual definition of political instability in the literature. In this work we define political instability as *the propensity to a change in the political system of a country, where the latter includes the prevailing political institutions and legal system, the present political group in power, and the set of policies in place*. For a discussion about the definition of political instability and an analysis of the characteristics of the definition we adopted here see Muñoz (2003, 2006).

[3] For a survey of the theoretical and empirical literature on the relationship between political instability and growth see Muñoz (2003, 2006).

[4] For evidence supporting the increase of SPU and PI between the periods 1980-1988 and 1989-2000 see Muñoz (2006, 2009).

[5] Although it clearly seems to be the case that SPU and PI has been even much higher since 2001 until present than in the period 1989-2000, unfortunately no reliable quantitative socio-political data for building sound measures of SPU and PI for Venezuela is available since 2001.

sectional data or panel data has the following main advantages: a) we are able to make a more careful and detailed examination of the institutional and historical characteristics of a particular country; b) we have at our disposal a data set that normally includes a wider rage of indicators of the different dimensions of political instability than the more common cross-section and panel studies; and c) we are able to take into account a more detailed exposition of the dynamic evolution of the economy (Asteriou and Price 2001).[6]

The rest of this paper is organised as follows. In section 2 we specify the model to be used and describe and analyse the data to be employed. In section 3 we present our empirical results. Finally, in section 4 we summarise the main conclusions of our research.

2 Model specification and data analysis

Following the most common approach in the empirical literature relating PI and growth, we estimated a reduced form equation of the determinants of growth in which political instability proxies are included among the explanatory variables.[7] In particular, we start with the basic equation:

$$g_t = a_0 + \sum_{i=1}^{p} b_i g_{t-i} + \sum_{i=0}^{s} c_i X_{t-i} + \sum_{i=0}^{s} h_i PI_{t-i} + u_t, \qquad (1)$$

where g_t denotes the growth rate of output per capita, X_t denotes a set of exogenous control variables, PI_t denotes a measure of political instability, and u_t is an error term. Thus, the growth rate of output per capita is modelled as an autoregressive distributed lag process, $ARDL(p,s)$. Note that although it is clear that factor inputs are direct determinants of growth via the production function, in our case it would be wrong to control for them. If we did, the estimates of political instability's impact on growth would leave out any effects operating through its influence on these variables.

Since we use time series data, we allow for some dynamic structure in our model specification by including

---

[6] In addition, although it is beyond the scope of this paper, the use of time series data makes it possible to test the effects of political instability on the conditional variance of output growth (through GARCH and GARCH-M models), as Asteriou and Price (2001) did for the case of U.K.

[7] See for example Venieris and Grupta (1986), Barro (1991), Aizenman and Marion (1991), Easterly and Robelo (1993), Barro and Sala-I-Martin (1995), Knack and Keefer (1995), Levine and Zerbos (1996), Chen and Feng (1996), Przeworsky et al. (2000), Asteriou and Siriopoulos (2000), Asteriou and Price (2001), and Fosu (2001), among others.

lagged values of growth on the right hand side (rhs) of (1), which account for possible persistence effects.[8]

2.1 Basic empirical specification

We defined the dependent variable g_t as the growth rate of non-oil GDP per capita ($XGDPNOC_t$) because Venezuela is a major oil producer country and therefore, an important part of what is measured by total GDP represents the sale of existing resources instead of authentic value added.

PI is proxied by the political instability indices calculated in Muñoz (2006, 2009) ($PII_{k,t}$). These indices were calculated quarterly for the period 1980-2000. However, quarterly data on GDP in Venezuela are available only from 1983. Therefore, our analysis is based on quarterly data and covers the period 1983-2000.

We use a political instability index instead of individual socio-political variables to proxy political instability because of three main reasons. First, with the use of a political instability index we avoid the problem of multicollinearity arising from the high correlation among the socio-political variables to be included as political explanatory variables. Second, the number of socio-political variables available to us which —in principle— we should include in our analysis for the period 1983-2000 is large enough to significantly reduce our degrees of freedom (particularly if lags of these variable are to be included) which would considerably reduce the quality of our estimations. Three, employing explanatory factor analysis, recent empirical research (Jong-A-Ping 2006) suggests that the use of individual socio-political variables (together or separately) to proxy the underlying determinants of political instability does not seem to be appropriate.[9]

In order to calculate the PI indices, Muñoz (2006, 2009) used twelve socio-political variables expressing different dimensions of PI. Table 1 contains the list of variables included as well as their definitions and sources.

---

[8]A similar approach, applied to time series data in the United Kingdom, is found in Asteriou and Price (2001), who modelled the rate of growth of output per capita as an ARDL(4,4) process. In their case, uncertainty is directly included in the model. In particular, they look at the conditional variance of output, which is modelled by alternative GARCH processes, in order to examine how political factors affect uncertainty, thereby exploring in more detail the possible transmission mechanism from political instability to growth that operates through this variable.

[9] Fosu (2001) also shows that in studying the effect of political instability on growth, specifying political instability employing separate political variables may result in a misspecified relationship, reduced model fit, and underestimation of the effect of political instability on growth. In particular, he compares the use of coup attempts, coup plots, and successful coups individually with an aggregate index including these variables (his case of study is Sub-Saharan Africa).

Table 1: Variables Included in the Construction of the Political Instability Indices

Variable Name	**Definition**	**Source**
Strike	Number of political strikes	PPED [a]
Dem	Number of political demonstrations	PPED [a]
NCF	Number of political Non-conventional forms of protests	PPED [a]
Riot	Number of political Riots	PPED [a]
Regime	Dummy variable that takes the number 1 on those quarters when a change in the office national executive from one ruling group to another that is accomplished through conventional legal or customary procedures took place, and zero otherwise.	
Election	Dummy variable that takes the number 1 on those quarters when general elections took place, and zero otherwise. It includes all types of national elections: presidential, parliamentary and regional.	CNE [b]
Provisional	Dummy variable that takes the number 1 on those quarters when a provisional —not elected— government was in power, and zero otherwise.	
Coup	Dummy variable that takes the number 1 on those quarters when a coup d'etat attempt took place, and zero otherwise.	
Referendum	Dummy variable that takes the number 1 on the quarters when a political referendum took place, and zero otherwise.	
Caracazo	Dummy variable that takes the number 1 on the quarter when the so-called "Caracazo" (two consecutive days of generalised, nationally widespread, and highly violent riots) took place, and zero otherwise.	
Impeachment	Dummy variable that takes the number 1 on the quarter when the impeachment process to the president Carlos Andrés Pérez took	

	place, and zero otherwise.	
CEA	Change of Economic Authorities: number of changes of heads of key public economic institutions. Simple redistribution of authorities among the same individuals does not constitute a CEA. Someone must be moved into or out of the group of key economic institutions. (This variable is similarly defined with the name of "executive adjustments" by Jodice and Taylor 1983:p.95). The list of Venezuelan economic institutions included is presented in Appendix.	Institutions included in the list of key public economic institutions (See Appendix)
(a) Political Protest Event Database (b) National Electoral Council (CNE Spanish acronym)		

Muñoz used the Principal Components Method to calculate the PI indices[10]. He obtained the political protest variables (namely: political strikes, political demonstrations, political non-conventional forms of protests, and political riots) from the Political Protest Event Database (PPED), which was built by himself and its main characteristics are described in Muñoz (2006, 2009)[11]. Muñoz constructed five different PI indices by using five different samples of political protests taken from the PPED in the calculation of them.[12]

Two criteria were used for building these samples: the extent of the constituencies (constituencies for short) and the type of the main grievance. The extent of the constituency (constituency for short) of a protest event is defined as the segment of the population "whose interest would have been served if the protest were successful" (Tarrow 1989: 117). These constituencies range from the people directly involved in the protest event (e.g., teachers at a particular elementary school), to the categorical interest group they belong to (e.g., all elementary school teachers), to a general interest group they identify with (e.g., all teachers), to people other than the protesters or their associates (e.g., the oppressed people of Haiti), to universal beneficiaries (e.g., all

[10] The loadings for each variable of the first principal component are taking as the weights of the variables included in the indices. For good and detailed textbook expositions of the principal components method see Koutsoyiannis (1977) and Theil (1979).

[11] We use the definition of political protest proposed by Muñoz (2006, 2009), which in turn is based on the general definition of protest proposed by Tarrow (1989). Thus, we define political protest as direct, overt, and disruptive collective action aimed at political institutions and/or political authorities with the purpose of modifying their policies and actions.

[12] Notice that the rest of the variables included in the PI indices, that is, those different from the political protest variables, are the same for each of the five PI indices.

Venezuelans). Additionally, these constituencies can be delimited by geopolitical-administrative boundaries (e.g., all school teachers of the Metropolitan District; all inhabitants of a particular city, state, or region, etc.).

The larger the constituency of a protest event, the higher its intensity and its power. The former is the capacity of a protest event to raise public interest and generate concerns to authorities, and the latter is the capacity of a protest event to provoke responses from those who are targeted. Obviously, the higher the intensity of a protest event the higher its power.[13]

The type of the main grievance of a protest event refers to the type of the main issue that motivate the protest. Muñoz (2006, 2009) distinguishes two main categories: economic and political.

The five samples of political protests are the following: Sample 1 includes all political protest events in the PPED (therefore, no constraints regarding constituencies and main grievance are imposed). Sample 2 includes only political protest events whose constituency is *larger* than state, interest group state, regional or interest group regional (i.e., only political protest events whose constituencies are widespread, interest group widespread, national or interest group national). Sample 3 includes only political protest events whose type of main grievance is political. Sample 4 includes only political protest events whose constituency is *larger* than state, interest group estate, regional or interest group regional and whose type of main grievance is political. Finally, sample 5 includes only political protest events whose constituency is national or interest group national and whose type of main grievance is political.

We summarise the results of the calculations of the five versions of the PI indices in two tables. Table 2 presents the percentage of the total variation accounted for by each principal component for each set of the variables (differentiated by the five samples of political protest) used to build the PI indices. For the first principal components these percentages range from 21.9% (sample 1) to 24.5% (sample 5). Although these percentages of the total variation are not relatively high, they are in line with the results with regard to this matter reported by

[13] In the PPED constituency is classified as follows. *State*: constituencies composed by all —or most of— the inhabitants of a single state. *Regional*: constituencies composed by all —or most of— the inhabitants of two or more states of a single administrative region. *Widespread*: constituencies composed by all —or most of— the inhabitants of two or more states and at least two of them are part of different regions. *National*: constituencies composed by all —or most of— the inhabitants of the whole nation. *Interest group – state*: constituencies composed by all —or most of — the members of an interest group whose activities are delimited to a single state (e.g., all physicians of public hospitals of the state of Zulia). *Interest group – regional*: constituencies composed by all —or most of — the members of an interest group whose activities are delimited to a single region (e.g., all physicians of public hospitals of the North-West region). *Interest group – widespread*: constituencies composed by all —or most of— the members of an interest group whose activities are delimited to two or more states and at least two of them are part of different regions (all physicians of public hospitals of the states of Mérida, Táchira, and Trujillo —region of Los Andes— as well as the state of Zulia —North-West region. *Interest group – national*: constituencies composed by all —or most of — the members of an interest group whose activities are delimited to the whole nation (e.g., all physicians of public hospitals of the whole nation).

many studies in the empirical literature on PI and growth (e.g., Alesina and Perotti (1996) report 27.1% and Asteriou and Siriopoulos (2000) report 26.0%). Table 3 shows the loadings of the first principal component for each of the samples utilized, which were used as the weights of the variables included in the PI indices. We denoted the corresponding indices as PII_k, where k = 1, 2, 3, 4, 5. In constructing these indices Muñoz (2006, 2009) first standardised all variables included in them, so as to obtain comparable magnitudes of the effect of each variable.

Table 2: Proportion of the Total Variation Accounted for by each Principal Component for each set of the variables (differentiated by the five samples of political protest) used to build the PII_k

	SAMPLE 1		SAMPLE 2		SAMPLE 3		SAMPLE 4		SAMPLE 5	
Principal Component	**Proportion**	**Cumulative**	**Proportion**	**Cumulative**	**Proportion**	**Cumulative**	**Proportion**	**Cumulative**	**Proportion**	**Cumulative**
PC 1	0.2193	0.2193	0.2303	0.2303	0.2265	0.2265	0.2423	0.2423	0.2447	0.2447
PC 2	0.1291	0.3484	0.1341	0.3644	0.1268	0.3533	0.1309	0.3732	0.13	0.3747
PC 3	0.1134	0.4618	0.1133	0.4777	0.1133	0.4665	0.1132	0.4864	0.1133	0.488
PC 4	0.1024	0.5642	0.1000	0.5778	0.0985	0.5651	0.0981	0.5845	0.0991	0.5871
PC 5	0.0953	0.6595	0.0909	0.6687	0.0909	0.6559	0.0891	0.6736	0.0901	0.6772
PC 6	0.0819	0.7414	0.0831	0.7517	0.0822	0.7381	0.0821	0.7558	0.0825	0.7597
PC 7	0.0717	0.8131	0.0695	0.8212	0.0753	0.8134	0.0674	0.8232	0.0675	0.8272
PC 8	0.0592	0.8723	0.0557	0.8769	0.0578	0.8712	0.0553	0.8785	0.0541	0.8813
PC 9	0.0511	0.9234	0.0468	0.9238	0.0469	0.9182	0.0492	0.9277	0.047	0.9283
PC 10	0.0367	0.9601	0.0345	0.9583	0.0382	0.9564	0.0308	0.9585	0.0303	0.9586
PC 11	0.0216	0.9816	0.0234	0.9816	0.0244	0.9807	0.024	0.9825	0.0241	0.9828
PC 12	0.0184	1.0000	0.0184	1.0000	0.0193	1.0000	0.0175	1.0000	0.0172	1.0000

Source: Own Calculations

Table 3: Loadings of the First Principal Component for each set of the variables (differentiated by the five samples of political protest) used to build the PII_k

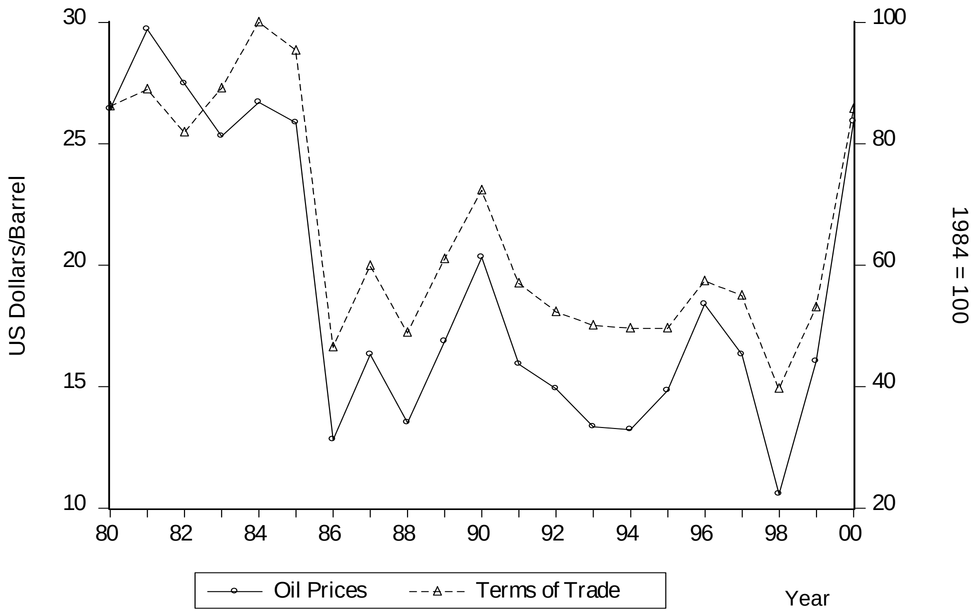
Variables	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
STRIKE	0.15453	0.26091 *	0.31259 **	0.36662 **	0.37881 **
DEM	0.50371 **	0.48515 **	0.47503 **	0.45773 **	0.44555 **
NCF	0.47866 **	0.47194 **	0.44277 **	0.42969 **	0.43154 **
RIOT	0.34064 **	0.33661 **	0.34300 **	0.35191 **	0.35404
REGIME	0.13762	0.09783	0.15772	0.10684	0.10413
ELECTION	0.12098	0.15824	0.11327	0.14971	0.15307
PROVISIONAL	0.11097	0.15457	0.1519	0.18519	0.18833
COUP	0.17694	0.21529	0.17668	0.21032	0.21348
REFERENDUM	0.22980 *	0.11397	0.16273	0.06425	0.03466
CARACAZO	0.29775 *	0.32712 **	0.33371 **	0.35176 **	0.35282 **
IMPEACHMENT	0.15086	0.16323	0.10098	0.09561	0.09532
CEA	0.36854 **	0.3302 **	0.35058 **	0.31342 **	0.31038 **

Note: * and ** denote statistical significance at 5% level and 1% level respectively. Critical values from Koutsouyiannis (1977: 432)
Source: PPED, Own Calculations

As a small open economy whose exports are mainly primary commodities, changes in the terms of trade is a key factor affecting growth in Venezuela. Moreover, oil prices are the driven force of the behaviour of this variable. Figure 1 illustrates this point. There is a strong correlation (0.96 at the 5% level of statistical significance) between terms of trade and oil prices for annual data. Because quarterly data on terms of trade are not available for Venezuela for the whole period of study[14], based on this strong correlation, we proxy terms of trade by the Venezuelan oil prices ($OILP$).

[14] Quarterly data are only available for the unit value of imports, and only from 1989.

Figure 1: Terms of Trade and Oil prices
(Tia Juana light) in Venezuela



Source: IMF, PDVSA

Because we use quarterly data, seasonal effects are important to control for. Consequently, we included seasonal dummy variables in rhs of (1). In fact, graphic inspection of the behaviour of the rate of growth of non-oil GDP per capita strongly suggests the presence of this type of effect.[15] Thus, the use of quarterly data led us to reformulate equation (1) as follows:

$$g_t = a_0 + \sum_{i=1}^{3} a_i S_i + \sum_{i=1}^{4} b_i g_{t-i} + \sum_{i=0}^{4} c_i X_{t-i} + \sum_{i=0}^{4} h_i PI_{t-i} + u_t, \quad (2)$$

where S_i $(i = 1,2,3)$ are seasonal dummy variables, corresponding to the respective quarters. Therefore, we specifically model g_t as an *ARDL (4,4)* process controlling for seasonal effects.

A detailed definition and sources of all variables used in this study is presented in table 4.[16]

[15]Graphs of the main variables involved in this study, for the period 1983-2000, can be found in the Appendix.
[16] The main statistical properties of these variables are shown in the Appendix.

Table 4: Variable Definitions and Sources

Variable name	Definition	Source
GDPNOC	Real Non-oil Gross Domestic Product per capita	BCV - OC
OILP	Venezuelan (Tia Juana Light) Oil Prices	MEM
GFCFTC	Real Total Gross Fixed Capital Formation per capita	BCV - OC
GFCFPC	Real Private Gross Fixed Capital Formation per capita	BCV - OC
GFCFGC	Real Government Gross Fixed Capital Formation per capita	BCV - OC
INVR	Total Investment to GDP Ratio = Total Gross Fixed Capital Formation / GDP	BCV - OC
INVRNO	Total Investment to Non-Oil GDP Ratio = Total Gross Fixed Capital Formation / Non-Oil GDP	BCV - OC
INVRP	Private Investment to GDP Ratio = Private Gross Fixed Capital Formation / GDP	BCV - OC
INVRPNO	Private Investment to Non-Oil GDP Ratio = Private Gross Fixed Capital Formation / Non-Oil GDP	BCV - OC
INVRG	Government Investment to GDP Ratio = Government Gross Fixed Capital Formation / GDP	BCV - OC
INVRGNO	Government Investment to Non-Oil GDP Ratio = Government Gross Fixed Capital Formation / Non-Oil GDP	BCV - OC
GEXPRC	Real Government Expenditures per capita	BCV - OC
INF	Inflation Rate (growth rate of CPI)	BCV - OC
RATE	Real Borrowing Interest Rate	BCV - OC
PII_k *(k = 1,…,5)*	Political Instability Indices as defined in Muñoz (2006, 2009)	OC
XGDPNOC	Growth rate of GDPNOC	BCV - OC
XOILP	Growth rate of OILP	BCV - OC
XGFCFTC	Growth rate of GFCFTC	BCV - OC
XGFCFPC	Growth rate of GFCFPC	BCV - OC
XGFCFGC	Growth rate of GFCFGC	BCV - OC
XGEXPRC	Growth rate of GEXPRC	BCV - OC

Notes: BCV = Banco Central de Venezuela (Venezuelan Central Bank). MEM = Ministerio de Energía y Minas (Venezuelan Ministry of Energy and Mines). OC = Own Calculations. All real variables are expressed in Bolívares of 1984. The quarterly population series used in the computation of per capita variables was estimated by interpolation from population annual data provided by OCEI, Oficina Central de Estadísticas e Informática (Venezuelan Central Office of Statistics).

2.2 Unit roots and structural changes

2.2.1 Unit roots

Before we give a precise empirical specification to (2), to avoid running spurious regressions, we test for the presence of unit roots. For this purpose, we applied the augmented Dickey-Fuller and Phillips-Perron tests to each variable. However, for most of the variables it was unclear what deterministic variables should be included in the tests. In those cases we followed the general procedure suggested by Enders (1995), which in turn, is a modification of the procedure proposed by Doldado, Jenkinson and Sosvilla-Rivero (1990). This procedure offers some guidelines to avoid misspecification concerning the deterministic part of the regressions run to perform the tests when the data generating process is unknown, which would lead to wrongly failing to reject the null hypothesis of a unit root. Avoiding this type of misspecification is important because unit root tests have low power to reject the null hypothesis. In particular, the procedure we adopted is as follows:

a) First, we run the least restrictive specification of the test, which includes a constant term and a trend term. If the test rejects the presence of a unit root there is no need to proceed any further and we conclude that the series is stationary. If the presence of a unit root is not rejected, we test for the significance of the trend term under the null hypothesis of a unit root. If the trend is significant we conclude that the variable contains a unit root.

b) If the trend is not significant we run the test without the trend term but only with a constant term. If the test rejects the presence of a unit root we stop here and conclude that the variable follows a stationary process. If the presence of a unit root is not rejected, we test for the significance of the constant term under the null hypothesis of a unit root. If the constant term is significant we conclude that the variable contains a unit root.

c) If the constant term is not significant we run the test without the trend term nor the constant term. If the null hypothesis of a unit root is rejected we conclude that the variable follows a stationary process. Otherwise, we conclude that it contains a unit root. Table 5 shows the results of the unit root tests performed.

Table 5: Unit Root Tests

Sample: 1983 - 2000 (Quarterly Data).

Variable	Deterministic variables included[a]	Augmented Dickey-Fuller[b]	Phillips-Perron[b]	Critical value at 5%	Conclusion
GDPNOC	1	-2.5783	-3.0269	-2.9048	Non-stationary[c]
OILP	2	-2.7914	-2.6014	-2.9048	Non-stationary
PII1	1	-5.0433	-5.9352	-3.4769	Stationary
PII2	1	-5.1075	-6.2722	-3.4769	Stationary
PII3	1	-4.6446	-5.5691	-3.4769	Stationary
PII4	1	-4.3874	-5.5759	-3.4769	Stationary
PII5	1	-4.3124	-5.7646	-3.4769	Stationary
GFCFTC	2	-1.5383	-5.6920	-2.9048	Non-stationary[c]
GFCFPC	1	-2.7517	-3.9971	-3.4769	Non-stationary[c]
GFCFGC	2	-2.4332	-6.7664	-2.9048	Non-stationary[c]
INVR	2	-2.8585	-5.9646	-2.9023	Non-stationary[c]
INVRNO	1	-3.4339	-6.5881	-3.4769	Non-stationary[c]
INVRP	1	-3.1791	-3.9719	-3.4769	Non-stationary[c]
INVRPNO	2	-2.5596	-3.7472	-2.9023	Non-stationary[c]
INVRG	2	-2.2501	-7.1570	-2.9023	Non-stationary[c]
INVRGNO	2	-2.1248	-7.0933	-2.9023	Non-stationary[c]
GEXPRC	1	-3.3972	-7.9862	-3.4769	Non-stationary[c]
RATE	2	-3.5056	-3.7095	-2.9048	Stationary
INF	2	-3.4792	-3.5557	-2.9048	Stationary
XGDPNOC	3	-3.1941	-14.0977	-1.9451	Stationary
XOILP	3	-6.8615	-7.1995	-1.9451	Stationary
XGFCFTC	3	-3.5477	-18.5901	-1.9451	Stationary
XGFCFPC	3	-7.1456	-9.7920	-1.9451	Stationary
XGFCFGC	3	-4.6584	-19.3198	-1.9451	Stationary
XGEXPRC	3	-7.2128	-20.2263	-1.9451	Stationary

Notes: (a) 1 = Drift and trend terms included in the regression's test; 2 = Drift but not trend term included in the regression's test; 3 = No drift and no trend included in the regression's test. (b) The statistics reported here correspond to either (1) the specification of the test suggested by clear evidence regarding the deterministic variables to be included, or (2) the specification of the test that yields conclusive results under the procedure followed when the data generating process is unknown, which is explained in the text. The number of lags used in the Augmented Dickey-Fuller (ADF) test was chosen using the Schwartz Bayesian criterion for model selection. The number of periods of serial correlation included in the Phillips-Perron (PP) test was chosen according to the Newey-West automatic truncation lag selection function. The PP test was performed using Eviews econometric softwere, which provides the suggested truncation lag for the test using this selection function. (c) In cases where the ADF and PP tests yielded contradictory results the more "conservative" decision of non-stationarity was taken.

Source: Own Calculations

2.2.2 Structural Changes

If it is suspected that a structural change has occurred, and not taken into account, then special care must be taken in performing unit root tests because they might be biased toward the non-rejection of the null hypothesis (i.e., the presence of a unit root). Consequently, when there were reasons to believe that the variable being tested experienced a structural break during the period of study, we performed the unit root tests taking this fact into account. For this purpose, we followed the procedure developed by Perron (1989)[17]. In particular, we proceeded as follows:

a) First, we created two dummy variables to account for different types of structural breaks, namely: $D_L = 1$ if $t > \tau$ and *zero* otherwise, where t denotes time, and τ is the time period before the structural change took place; and $D_T = t - \tau$ if $t > \tau$ and *zero* otherwise. D_L accounts for a jump in the intercept and D_T for a change in the slope of the process that characterizes the variable being tested.

b) Second, we detrended the data by estimating a regression of the form

$$y_t = \alpha_0 + \alpha_2 t + \beta_1 D_L + \hat{u}_t \tag{3}$$

and saved the residuals $\hat{u}_t$, which are the detrended variable.

c) Third, we estimated the regression:

$$\hat{u}_t = \alpha_1 \hat{u}_{t-1} + \varepsilon_t . \tag{4}$$

Under the null hypothesis of a unit root, the value of α_1 is unity. Perron (1989) shows that (when the residuals ε_t are iid) the distribution of α_1 depends on the proportion of the observations occurring before the break, which we denote by $\lambda = \tau / T$, where T is the total number of observations.

d) Fourth, if the appropriate tests revealed the presence of serial correlation in the residuals in (4), we used the augmented form of the regression:

$$\hat{u}_t = \alpha_1 \hat{u}_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta \hat{u}_{t-i} + \varepsilon_t . \tag{5}$$

[17] A detailed description of the procedure proposed by Perron (1989) to formally test for unit roots when a structural change is detected can be found in Enders (1995).

e) Fifth, we calculated the *t*-statistic corresponding to the null hypothesis $\alpha_1 = 1$. Then we compared this statistic to the critical values provided by Perron (1989) for different values of λ.

f) Finally, we repeated steps (b) to (e) but including D_T instead of D_L in (3) to take into account structural changes in the slope, and both D_T and D_L to take the two types of structural brakes into account.

Graphical inspection led to consider the presence of possible structural changes in two cases: Venezuelan oil prices ($OILP$) and non-oil GDP per capita ($GDPNOC$). In the former case the break is very clear and corresponds to the abrupt fall in oil prices in 1986. In the latter case the change is not completely obvious and is observed in 1989. Table 6 shows the results of the unit root tests performed to these two variables when structural breaks are taken into account. In both cases the null hypothesis of a unit root could not be rejected in any of the specifications of the test. Thus, the conclusions presented in table 5 were no modified.

Table 6: Unit Root Tests in the presence of Structural Change (Perron 1989)

Sample: 1983 - 2000 (Quarterly Data)

Variable	λ [f]	Test including only D_L [a]	Test including only D_T [b]	Test including D_L and D_T [c]	Conclusion
OILP [d]	0.2	-3.4928	-3.4930	-3.4517	Non-stationary
GDPNOC [e]	0.3	-3.1979	-2.8928	-2.6724	Non-stationary

Notes: Critical values for the tests are taken from Perron (1989). (a) 5% critical values: λ = 0.2 → -3.77; λ = 0.3 → -3.76. (b) 5% critical values: λ = 0.2 → -3.80; λ = 0.3 → -3.87. (c) 5% critical values: λ = 0.2 → -3.99; λ = 0.3 → -4.17. (d) Suspected structural change in 1986Q1. (e) Suspected structural change in 1989Q1. (f) λ = proportion of the observations occurring before the structural break (rounded in order to match Perron's (1989) tables of critical values).

Source: Own Calculations

Having tested for unit roots and determined the order of integration of the available variables, we can now specify the empirical model to be estimated as:

$$XGDPNOC_t = a_0 + \sum_{i=1}^{3} a_i S_i + \sum_{i=1}^{4} b_i XGDPNOC_{t-i} + \sum_{i=0}^{4} c_i XOILP_{t-i} + \sum_{i=0}^{4} h_i PII_{k,t-i} + u_t , \qquad (6)$$

where $XOILP_t$ is the rate of growth of the Venezuelan oil prices.[18]

It is worth mentioning that in the specification of our empirical model we also considered the effect of internal shocks during the period of study, specifically the macroeconomic adjustment plans of 1989 and 1996 and the financial crisis of 1994. We estimated versions of our basic model including dummy variables to account for these factors. These dummy variables where built in different ways in each case. They turned out to be not significant in all cases. It is possible that the effect of these shocks is somehow captured by the other variables included in the model.

3 Empirical results

3.1 OLS estimation of the basic model

We first estimated the basic model (6) by OLS. As suggested by Hendry (1979), we go from the general to specific. Therefore, we began with the most general specification of the basic model (i.e., where all seasonal dummy variables, four lagged terms of *XGDPNOC*, and contemporaneous and four lagged terms of *XOILP* and *PII* are included), and then, the model was gradually simplified until a parsimonious specification was obtained[19]. In order to check whether the results are robust to the use of the different political instability indices, we estimated five different versions of the model, one for each index. The results of these regressions (in particular, the parsimonious specifications), which we denote by regressions 1A, are summarized in table 7.

[18]Although Non-oil output per capita (GDPNOC) and Venezuelan oil prices (OILP) turned out to be non-stationary variables, we tested for cointegration in order to see the possibility of exploring the long run empirical relationship between output and political instability in Venezuela for the period of study. In particular, we performed different specifications of the Johansen's ML procedure for testing for cointegration (using microfit 4.0), but we were not able to reject the null hypothesis of *no* cointegration. The results of these tests are presented in the Appendix.

[19]We followed this approach to model specification in all models estimated in this paper.

Table 7: Economic Growth and Political Instability - Regressions 1A (model (6) estimated with OLS)

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC*)
Sample: 1983 - 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoitnts
Regressions 1A. Method: OLS [a]

	1A.1	1A.2	1A.3	1A.4	1A.5
Constant	0.04284 (7.673)***	0.04337 (7.806)***	0.04215 (7.563)***	0.04272 (7.766)***	0.04269 (7.799)***
S1	-0.13036 (-12.297)***	-0.13065 (-12.447)***	-0.12968 (-12.161)***	-0.12989 (-12.399)***	-0.12949 (-12.403)***
S3	-0.04360 (-4.654)***	-.04383 (-4.725)***	-.04215 (-4.531)***	-0.04240 (-4.632)***	-0.04218 (-4.633)***
XGDPNOC (-3)	0.28932 (3.602)***	0.29154 (3.661)***	0.28616 (3.554)***	0.29082 (3.666)***	0.29302 (3.709)***
XOILP (-3)	0.05483 (2.699)***	0.05505 (2.736)***	0.05316 (2.618)***	0.05256 (2.634)***	0.05227 (2.632)***
PII1	-0.00490 (-2.064)**				
PII2		-0.00595 (-2.323)**			
PII3			-0.00491 (-1.976)**		
PII4				-0.00648 (-2.433)***	
PII5					-0.00688 (-2.550)***
R^2-bar	0.7366	0.7411	0.7351	0.7431	0.7453
S.E. of Regression	0.0280	0.0278	0.0281	0.0277	0.0275
Serial Correlation [b, f]	1.9287	2.4324	1.9581	2.3707	2.5720
RESET [c, g]	0.5775	0.8676	0.5377	1.1512	1.2240
Normality [d, h]	3.5041	3.1450	3.4309	2.7929	2.5842
Heteroscedasticity [e, g]	0.3197	0.1305	0.3107	0.2466	0.2638

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103

Source: Own Calculations

In all cases the goodness-of-fit is high (over 73%), showing that an important proportion of the total variation in growth is explained by the regressions. Also, in all cases, the tests performed to check the assumptions regarding the behaviour of the residuals and the functional form yield statistics well below their critical values at standard levels of significance. Seasonal effects are statistically (highly) significant. The negative effect of the first quarter on growth (measured by the estimated coefficient of S_1) is pronounced, which is consistent with what a graphical inspection of $XGDPNOC$ suggests (see Appendix). The third lag of $XGDPNOC$ enters the estimated equations with positive sign and is statistically significant, suggesting the presence of positive persistence effects. With respect to $XOILP$, its third lag is statistically significant and it enters the estimated equations with the expected positive sign.

In all regressions the contemporaneous value of the respective political instability index enters with negative sign and is statistically significant, at least at the conventional 5% level. These results are consistent with the theoretical hypothesis that political instability affects economic growth negatively. They concord with the findings of most of the empirical literature on the relationship between political instability and growth (surveyed in Muñoz (2003, 2006). In particular, they are in line with other individual country time series studies by Asteriou and Siriopoulos (2000) and Asteriou and Price (2001), which, based on quarterly data for Greece and U.K., respectively, show a contemporaneous and negative relationship between political instability and growth.

The estimated coefficients on the political instability indices imply that, in average, an increase of one unit in the political instability indices is associated with a decrease between 0.49 and 0.69 percentage points in economic growth.

Note that only the contemporaneous effect of political instability on growth was found to be statistically significant in all regressions. This might be considered a somewhat unexpected result. As it is noticed by Muñoz (2003, 2006), the theoretical literature highlights the investment channel as the main route through which political instability affects growth, but this process could take some time as there may be many lags involved.[20] Thus, in the context of quarterly data, one might expect to find lagged effects of political instability on growth (particularly if the investment channel is believed to be relevant and to operate relatively slowly).

There are at least three possible explanations for these results, which are not mutually exclusive. First, the investment channel may be acting faster than expected. One possibility for this to happen in the case of Venezuela during the period of our analysis, is that the presence of high political and economic uncertainty that characterised to a relevant extent this period (see Muñoz 2006, 2009), might have biased the composition of private investment toward —very— short-maturity projects, which makes this variable to react relatively fast to

[20] For example, there may be a lag between the change in political conditions and the detection of the new situation by investors, or between the moment investors identify the new political environment and the time when they actually adjust their investment decisions, as well as between the moment these adjustments materialise and the time output is actually affected.

changes in economic and political circumstances[21]. Second, the investment channel may not be as important as it is normally believed to be, and there are other important channels through which political instability affects growth. The third possible explanation behind our results has to do with the way we conducted our empirical analysis; in particular, the way we measured political instability. The components of the political instability indices that express socio-political unrest and political violence (namely, political strikes, political demonstrations, political riots, political non-conventional protests, general social uprising —the Caracazo—, and violent coup attempts) might be driving in a relevant way the behaviour of these indices[22], and socio-political unrest and political violence not only generate political uncertainty but also have relevant negative short run effects on productivity (e.g, disrupting marked activities and labour relations) and therefore on growth. Thus, the contemporaneous negative effect of political instability on growth we found might be reflecting the short-run effects on productivity coming from the socio-political unrest and political violence dimensions of political instability captured by these indices[23].

Another element worth noticing about the results in table 7 is that the absolute value and t-statistics of the estimated coefficients associated to the political instability indices increase as we move from *PII1* to *PII2* (from regression 1A.1 to 1A.2) and from *PII3* to *PII5* (from regressions 1A.3 to 1A.5). Because within these two groups of indices the samples of political protest events used in their construction are differentiated only by the inclusion of different sets of political protest events with increasing —extents of their— constituencies[24], and therefore increasing intensity (and power), this finding suggests that: a) the socio-political factors contained in our political instability indices may be playing an important role in driving their behaviour, and b) the strength of the socio-political conflict, expressed by the intensity (and power) of political protest events in our case, is an important determining factor of the magnitude of the negative effect of political instability on growth that the results in table 7 suggest to be present in Venezuela within the period of study.

Finally, the fact that in all regressions in table 7 the political instability indices enter with negative sign and are statistically significant indicates that the results reported in that table are robust to the type of political instability

[21] Unfortunately, there is no data on the composition of private investment regarding short-run and long-run investment in Venezuela.

[22] In fact, the loading of these variables in the PI indices are, in general, higher than the loadings of most of the other variables included in these indices (see table 3).

[23] This argument can also explain the results found by Asteriou and Siriopoulos (2000) and Asteriou and Price (2001) regarding the contemporaneous and negative effects of political instability on growth, since their proxies for political instability include variables that reflect socio-political unrest and political violence.

[24] Recall that *PII1* and *PII2* include political protest events with all types of main grievance (i.e., both economic and political), but the constituency of the former can be state/interest-group-state or larger while the constituency of the latter is restricted to be widespread/interest-group-widespread of larger. On the other hand, *PII3*, *PII4, PII5* are restricted to include only political protest events whose main grievance is political, but *PII3* includes political protest events with state/interest-group-state or larger constituencies, *PII4* contains political protests with widespread/interest-group-widespread or larger constituencies, and *PII5* takes account of only political protests with national constituencies.

indices employed with regard to whether or not political protest events whose main grievance is economic are included in the samples of political protest events used for the construction of these indices. This follows from the fact that although *PII1* and *PII3* as well as *PII2* and *PII4* are differentiated only by the inclusion (or not) of political protest events whose main grievance is economic (*PII1* and *PII2* include political protest events with all types of main grievance, i.e. economic and political, whereas *PII3* and *PII4* only include political protest events whose main grievance is political), in both cases their estimated coefficients have negative sign and are statistically significant. Furthermore, in the case of *PII1* and *PII3* the values of the estimated coefficients are quite similar.

3.2 Instrumental variable estimation of the basic model

The OLS estimation of (6) may be inappropriate because of two reasons. First, as it is noticed by Muñoz (2003, 2006), political instability is thought to affect economic growth, but it is also plausible to think that economic growth may affect political instability. If this is the case, political instability should be considered as an endogenous variable in the model and not as exogenous. Second, the indices used to proxy political instability may be subject to measurement errors. In fact, as it is also noticed by Muñoz (2003, 2006), political instability is a variable difficult to measure, even difficult to define empirically[25]. These two issues lead to the same problem, namely, the presence of correlation between $PII_{k,t}$ and u_t, in which case OLS produces inconsistent estimates.

In order to overcome these potential problems we estimated the basic model (6) using the instrumental variable method (IV). In particular, we instrumented $PII_{k,t}$. We denoted these estimations as regressions 1B. As instruments we used all the predetermined and the exogenous variables in (6) as well as lagged values of inflation (INF) and the rate of growth of real government expenditures per capita ($XGEXPRC$). The results of these regressions are shown in table 8.

[25] In our case political instability may be subject to measurement errors at least in two important ways. Firstly, our political instability indices are just proxy variables for the phenomenon of political instability. Secondly, some components of the indices, as the number of the different forms of political protest events (strikes, demonstrations, riots and non-conventional forms), are measured using newspaper data as a source, which, as it is pointed out by Muñoz (2006, 2009), have limitations as sources of information on protest events (like the validity and reliability problems mentioned in those works). However, they are usually the best alternative available.

Table 8: Economic Growth and Political Instability – Regressions 1B (model (6) estimated with $PII_{k,t}$ instrumented)

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC*)
Sample: 1983 - 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoitnts
Regressions 1B. Method: Instrumental Variable ($PII_{k,\,t}$ instrumented [a, i]).

	1B.1	1B.2	1B.3	1B.4	1B.5
Constant	0.04327 (7.694)***	0.04390 (7.835)***	0.04229 (7.567)***	0.04311 (7.776)***	0.04304 (7.809)***
S1	-0.12981 (-12.179)***	-0.13025 (-12.351)***	-0.12907 (-12.032)***	-0.12916 (-12.236)***	-0.12873 (-12.239)***
S3	-.04473 (-4.717)***	-0.04491 (-4.790)***	-0.04265 (-4.559)***	-.043157 (-4.674)***	-0.04276 (-4.665)***
XGDPNOC (-3)	0.29017 (3.598)***	0.29297 (3.663)***	0.28599 (3.543)***	0.29222 (3.662)***	0.29291 (3.714)***
XOILP (-3)	0.05648 (2.759)***	0.05657 (2.793)***	0.05401 (2.650)***	0.05346 (2.662)***	0.05297 (2.653)***
PII1	-0.00655 (-2.213)**				
PII2		-0.00775 (-2.472)**			
PII3			-0.00621 (-1.952)*		
PII4				-0.00873 (-2.585)***	
PII5					-0.00897 (-2.646)***
GR^2-bar [j]	0.7395	0.7443	0.7348	0.7401	0.7428
S.E. of Regression	0.0281	0.0279	0.0282	0.0278	0.0277
Serial Correlation [b, f]	2.0396	2.7425	2.0971	2.6332	2.9534
RESET [c, g]	0.2078	0.2854	0.1189	0.1837	0.1538
Normality [d, h]	3.1479	2.8490	3.1367	2.3043	2.1089
Heteroscedasticity [e, g]	0.8596	0.3836	0.7797	0.5934	0.5974
Sargan's test [k, l]	15.497	15.068	17.116	15.084	14.983

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103. (i) Instruments used: constant, seasonal dummies, contemporaneous and lagged values of XOILP, lagged values of XGDPNOC, XGEXPRC, INF, and PII*k*; *k* = 1, 2, 3, 4, 5. (j) Generalized R^2-bar, proposed by Pasaran and Smith (1994). (k) Sargan's (1964) test for testing misspecification of the regression and the validity of the set of instruments. (l) Critical values [CHSQ(19)]: 10% = 27.2036, 5% = 30.1435, 1% = 36.1908.

Source: Own Calculations

In terms of the sign and statistical significance of the variables included, the results remain the same. Only $PII3_t$ is now statistically significant only at 10% level (compared to 5% in the OLS estimations, table 7). The values of the estimated coefficients are very similar. The goodness-of-fit is high[26] and all other diagnostic tests give satisfactory results at conventional significance levels. The Sargan's test validates the selection of the set of instruments. Thus, the conclusions derived from the OLS estimation of the basic model (6) remain the same.

The clear similarity of the statistical results obtained when model (6) is estimated using OLS with those obtained when it is estimated using IV (instrumenting $PII_{k,t}$) leads us to infer that the problems of endogeneity and measurement error associated to political instability that we suspect to be present in the OLS estimations (regressions 1A) are not relevant. However, to verify this we performed the Hausman's specification error test, which we report next.

3.3 Hausman's specification error tests

Hausman's (1978) test is a general procedure for testing the hypothesis of no misspecification in a model[27]. We use the test to check whether $PII_{k,t}$ is independent of u_t. If independence is not rejected, both, endogeneity and measurement errors associated to political instability, should not be considered as problems actually affecting the OLS estimation.

In our case the null hypothesis (H_0) is that $PII_{k,t}$ and u_t are independent, and the alternative hypothesis (H_1) is that $PII_{k,t}$ and u_t are *not* independent. To implement the test, we construct two estimators of h_0 in (6), $\hat{h}_0$ and $\tilde{h}_0$, which have the following properties:

$\hat{h}_0$ is consistent and efficient under H_0 but not consistent under H_1.

$\tilde{h}_0$ is consistent under both H_0 and H_1 but is not efficient under H_0.

For $\hat{h}_0$ we use the OLS estimations for h_0 provided by regressions 1A. For $\tilde{h}_0$ we use the IV estimations for h_0 given by regressions 1B. Then we applied the following formula to obtain the test statistics, m:

---

[26] Because the use of R^2 and $\bar{R}^2$ as measures of goodness of fit in the case of IV regressions is no valid, we report the generalized $\bar{R}^2$, denoted by $\overline{GR}^2$, proposed by Pasaran and Smith (1994) (provided by the econometric software Microfit) in all IV estimations. Thus, we cannot strictly compare the goodness of fit measures reported for the OLS estimations of model (6) (regressions 1A) with those for the IV regressions of the same model (regressions 1B).

[27] A detailed explanation of the Hausman's (1978) test can be found in Maddala (1992).

$$m = \frac{\hat{q} r^2}{(1 - r^2)\hat{V}_0} \quad (7)$$

where $\hat{q} = \hat{h}_0 - \tilde{h}_0$, r^2 is the squared correlation between $PII_{k,t}$ and the instrumental variable used for $PII_{k,t}$ in the IV estimation (which in this case is the fitted value given by the regression of $PII_{k,t}$ on the instruments used in the IV estimations in regressions 1B), and $\hat{V}_0$ is the OLS estimate of $V_0 = \text{var}(\hat{h}_0)$. We use the test statistics as χ^2 with 1 d.f. The essential idea of this procedure is to check whether $\hat{h}_0$ and $\tilde{h}_0$ are statistically different. The results of the Hausman's test are shown in table 9[28] (rows referred to regressions 1A).

Table 9: Hausman's Specification Error Tests

Parsimonious specifications					
Regressions 1A	1A.1	1A.2	1A.3	1A.4	1A.5
Statistic *m*	0.9978	1.1101	0.4716	1.2842	1.1332
Regressions 2A	2A.1	2A.2	2A.3	2A.4	2A.5
Statistic *m*	0.8339	1.0959	0.2665	0.6064	0.3186
Regressions 3A	3A.1	3A.2	3A.3	3A.4	3A.5
Statistic *m*	0.6218	0.5311	0.12032	0.2695	0.1081
General specifications					
Regressions 1A	1A.1	1A.2	1A.3	1A.4	1A.5
Statistic *m*	2.4924	2.3286	2.4400	1.7576	2.0334
Regressions 2A	2A.1	2A.2	2A.3	2A.4	2A.5
Statistic *m*	1.6189	2.5778	0.8222	1.0680	0.7553
Regressions 3A	3A.1	3A.2	3A.3	3A.4	3A.5
Statistic *m*	3.5813	2.9309	3.1681	1.7502	0.7567
Critical values for *m* [CHS(1)]: 10% = 2.70554 5% = 3.84146 1% = 6.63490					

Source: Own Calculations

In all cases, the statistic m is below its critical values, thus, we *cannot* reject the null hypothesis of *no* correlation between $PII_{k,t}$ and the residuals, u_t. This confirms our inference that the endogeneity and measurement error problems associated to political instability do not seem to be affecting the OLS estimations. Under these circumstances, regressions 1A should be preferred to regressions 1B, because the OLS estimation is consistent

[28] Although we performed the Hausman's test on each of the specifications of the basic model (6), from the most general to the most parsimonious form, we present here only the results corresponding to the most general and parsimonious specifications. In all "intermediate" specifications the results of the test are the same as in these two cases, namely, the null hypothesis of *no* misspecification cannot be rejected.

and efficient but the IV estimation, although consistent, is not efficient.

Summarising our main results so far, the regressions outcomes obtained indicate that political instability (captured by the political instability indices) affected Venezuelan growth negatively during the period of study. This result is robust to the use of different versions of the political instability index as well as to the method of estimation, OLS or IV. However, since misspecification tests show that endogeneity and/or measurement error problems associated to political instability seem not to be present in the model, the OLS estimation of the basic model (6) (regressions 1A) should be preferred.

3.4 Two further econometric evaluations of the basic model

Two other econometric evaluations were performed in order to check the robustness of the results summarised above. First, Granger causality tests between growth ($XGDPNOC_t$) and the political instability indices ($PII_{k,t}$) were performed in order to check the statistical precedence between these two variables. These tests, reported in the Appendix (Section A.4), cannot reject the null hypothesis of non Granger causality in both directions for all cases. Thus, since growth is not found to be Granger causing political instability, these results support the estimation of (6) treating $PII_{k,t}$ as exogenous, as we did in the OLS regressions 1A. Additionally, these findings are consistent with the fact that only contemporaneous effects from political instability to growth were found to be statistically significant.

Second, although, as we mentioned above, the proportion of the total variation of the set of —original— political variables used in our analysis captured by our political instability indices is in line with the results reported by many studies in the empirical literature relating political instability and growth (e.g., Alesina and Perotti 1996, Asteriou and Price 2001), the percentage of this total variation accounted by our political instability indices may be considered as relatively low. Thus, since our political instability indices are based on the first principal component of our set of —original— political variables, we extended and estimated our basic model (6) incorporating the second, third and fourth principal component as explanatory variables. The purpose is to check whether our results are sensitive to the use of a broader set of compound political instability variables (in this case the first four principal components) which accounts for a higher percentage of the total variation of the group of the —original— political variables used in our analysis. Also, by incorporating the second, third, and fourth principal component we reduce the chances of leaving out relevant underlying determinants of the different dimensions of political instability.

The cumulative percentage of the total variation of the group of —original— political variables used in our study captured by the first four principal components (i.e., our political instability indices plus the second, third, and fourth principal components) ranges from 56.4% (sample 1) to 58.7% (sample 5) (see Table 2), a much higher percentage than the one found when we used the political instability indices alone (furthermore, close to 60%). The results of the estimation of the parsimonious specification of this extended version of our basic model (6), which we denoted model (6a), are shown in the Appendix (Section A.5). Tables A.5.1 and A.5.2 show the OLS and IV estimations respectively[29], which contain regressions denoted by 1AP (1AP.1,…,1AP.5) in the former case and by 1BP (1BP.1,…,1BP.5) in the latter case.[30]

The results indicate that the estimations of our basic model (6) are robust to the inclusion of three additional principal components which, together with our political instability index (i.e., the first principal component), capture at least 56.4% of the total variation of the set of the —original— political variables used in our analysis. When we compare the estimations of model (6a) using both OLS and IV (Tables A.5.1 and A.5.2 in the Appendix, respectively) with the corresponding estimations of model (6) (Tables 7 and 8, respectively) we find that the results are quite similar[31]. In all estimations of model (6a) the sign of the contemporaneous value of the political instability indices remains negative and statistically significant, at least at the conventional 5% level. The values of the estimated coefficients associate with this variable are quite similar (slightly higher in the case of the estimations of model (6a)). Also, it remains being the case that only the contemporaneous effect of the political instability indices was found to be statistically significant. In terms of the sign and statistical significance as well as the value of the estimated coefficients associated with the non-political variables included in the regressions, the results remain the same. Moreover, the goodness-of-fit are very similar (slightly higher in the case of the estimations of model (6a)) and all other diagnostic tests gave satisfactory results at conventional significant levels. Regarding the additional principal components included in the extended model (6a), only the contemporaneous value of the fourth principal component turned out to be statistically significant, in most of the cases at least at the conventional 5% level (with four cases where it is statistically significant at 10% level: regressions 1AP.4, 1AP.5, 1BP.2, and 1BP.5) and its coefficient entered with negative sign in all regressions,

---

[29] Because we included the contemporaneous value of the principal components in our regressions we not only estimated the extended model (6a) using OLS but also using IV, the latter making possible to avoid possible endogeneity problems.

[30] Five different regressions are reported in each instance (OLS estimations and IV estimations), corresponding to the five different samples of the —original— political variables used to calculate the five different sets of principal components. In the Appendix (Section A.5: tables A.5.3, A.5.4, and A.5.5) we also show the loadings of the second, third, and fourth principal component for each of the five sets of the —original— political variables used (which are differentiated by the use of the five samples of political protests as specified above) and the specific empirical form of model (6a) we estimated.

[31] Likewise, the results of the estimation of model (6a) using OLS and using IV are very similar (see Tables A.5.1 and A.5.2 in the Appendix), which suggests that the possible endogeneity and measurement error problems associated with the compound political variables (i.e. the principal components) are not relevant. The only point worth mentioning is that the absolute value of the coefficients associated with the contemporaneous value of the political instability index (first principal component) and the fourth principal component are somewhat higher in the case of the IV estimations than in the case of the OLS estimations.

which is consistent with the hypothesis that predicts a negative relationship between political instability and growth.

3.5 The investment channel: growth rate of total investment

The results presented so far do not tell us much about the transmission mechanisms acting from political instability to growth. In order to shed some light on what possible channels could be operating between these two variables, we extended the basic model (6) by including the rate of growth of investment per capita as an explanatory variable (as it is done in Asteriou and Price 2001). We could not consider for this purpose the level of investment (per capita) nor the investment to GDP ratio in our research because unit root tests performed to these variables (expressed in many different empirical definitions in each case) did not reject the hypothesis of non-stationarity (see table 5 for the results of these tests). This limits to some extent our analysis since the economic interpretation of the rate of growth of investment (per capita) as a determinant of growth is less straightforward than the level of investment (per capita) or the investment to GDP ratio.

Thus, with the rate of growth of investment per capita included among the explanatory variables, now the model we estimate is:

$$\begin{aligned} XGDPNOC_t = a_0 + \sum_{i=1}^{3} a_i S_i + \sum_{i=1}^{4} b_i XGDPNOC_{t-i} + \sum_{i=0}^{4} c_i XOILP_{t-i} \\ + \sum_{i=0}^{4} d_i XGFCFTC_{t-i} + \sum_{i=0}^{4} h_i PII_{k,t-i} + u_t , \end{aligned} \tag{8}$$

where $XGFCFTC$ denotes the rate of growth of total (real) gross fixed capital formation per capita. If the coefficient on $PII_{k,t}$ is notoriously affected after including the $XGFCFTC$ terms, we should conclude that the investment channel, operating through the investment growth rate, may be an important route by which political instability affects growth in Venezuela. In the estimation of model (8) we face the problem of endogeneity of the contemporaneous growth rate of investment, so we use the IV method. As instruments we used all predetermined and exogenous variables in (8) as well as lagged values of the real interest rates ($RATE$)[32], inflation (INF), and the rate of growth of real government expenditures per capita ($XGEXPRC$).

[32]Because quarterly data on nominal lending rates is only available in Venezuela from 1984, we used borrowing rates to calculate real interest rates. The estimated correlation coefficient between lending and borrowing nominal rates, using quarterly data from 1984 to 2000, is very high, 0.947 (for the period 1984Q1-2006Q1 it is 0.951).

3.5.1 Estimation without PIIk,t instrumented

We first estimated model (8) without instrumenting $PII_{k,t}$ (only instrumenting *XGFCFTC*), denoting this case as regressions 2A. As we did with the basic model (6), five different versions of the regressions were estimated, depending on the different political instability indices included. The results (for the parsimonious specification) of these regressions are summarized in table 10.

Table 10: Economic Growth and Political Instability – Regressions 2A (model (8) estimated without $PII_{k,t}$ instrumented)

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC)*
Sample: 1983 – 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoints

Constant	0.05861	0.059157	0.05793	0.05834	0.05848
	(6.685)***	(6.998)***	(6.706)***	(6.898)***	(6.959)***
S1	-0.16036	-0.16078	0.15965	-0.15964	-0.15954
	(-9.686)***	(-9.869)***	(-9.522)***	(-9.776)***	(-9.841)***
S3	-0.75992	-0.07634	-0.07460	0.07461	-0.07470
	(-4.763)***	(-4.831)***	(-4.634)***	(-4.716)***	(-4.751)
XGDPNOC (-3)	0.18468	0.19196	0.18044	0.19143	0.19501
	(1.820)*	(1.909)*	(1.770)*	(1.909)*	(1.955)*
XOILP (-3)	0.05176	0.05196	0.05036	0.04990	0.04966
	(2.649)***	(2.686)***	(2.579)**	(2.599)**	(2.602)**
XGFCFTC (-1)	0.05353	0.05427	0.05303	0.05326	0.05393
	(2.027)**	(2.091)**	(1.989)**	(2.053)**	(2.099)**
XGFCFTC (-3)	0.07902	0.07759	0.07925	0.07679	0.07670
	(2.675)***	(2.645)***	(2.674)***	(2.623)**	(2.635)**
PII1	-0.00406				
	(-1.739)*				
PII2		-0.00503			
		(-2.017)**			
PII3			-0.00399		
			(-1.623)		
PII4				-0.00547	
				(-2.099)**	
PII5					-0.00591
					(-2.255)**
GR^2-bar	0.7585	0.7625	0.7569	0.7638	0.7662
S.E. of Regression	0.0268	0.02659	0.0269	0.0265	0.0264
Serial Correlation [b, f]	7.2656	7.7917	8.0168	8.6631	9.1025
RESET [c, g]	0.0288	0.0063	0.0551	0.0035	-0.0087
Normality [d, h]	2.8824	2.8331	2.8051	2.8140	2.8059
Heteroscedasticity [e, g]	0.3580	0.0461	0.3735	0.3865	0.3529
Sargan's test [k, l]	24.638	24.999	25.166	25.195	24.837

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103. (i) Instruments used: constant, seasonal dummies, contemporaneous and lagged values of XOILP and PII*k* (*k* = 1, 2, 3, 4, 5), lagged values of XGDPNOC, XGFCFTC, XGEXPRC, RATE and INF. (j) Because in this parsimonious specification the model XGFCFTC(t) is not included, the results are the same as those obtained by OLS. (k) Sargan's (1964) test for testing misspecification of the regression and the validity of the set of instruments. (l) Critical values [CHSQ(26)]: 10% = 35.5631, 5% = 38.8852, 1% = 45.6417.

Source: Own Calculations

The results from the tests performed to check the assumptions about the residuals and the functional form are all satisfactory at standard significance levels. Also, the Sargan's test does not indicate problems with the selection of the set of instruments. The goodness-of-fit of the regressions is high in all cases (over 75%). Compared to regressions 1A (model (6) estimated with OLS) the sign and the statistical significance of the variables included are quite similar. Moreover, the growth rate of investment has a lagged positive effect on growth, since the coefficients of the first and third lag of $XGFCFT$ are positive and statistically significant in all cases.

The negative direct and contemporaneous impact of political instability on growth remains. However, the t-statistics associated to the coefficients on $PII_{k,t}$ are in all cases lower than in regressions 1A. In fact, $PII1_t$ is only significant at 10% level and $PII3_t$ is not even significant at 10% level (although the corresponding t-statistic is only marginally below its critical value for 10% level of significance). On the other hand, in all cases, the estimated coefficients on $PII_{k,t}$ are only slightly lower than in regressions 1A. These results suggest that the investment channel, operating through the growth rate of investment, does not seem to be a decisive channel by which political instability affects growth in the Venezuelan case (for our period of study). Although part of the effect of political instability on growth might be working through the growth rate of investment, most of it seems to be operating via other channels; for instance, via productivity[33]. Nevertheless, it remains open the possibility of the investment channel to be operating through the level of investment.[34]

3.5.2 Estimation with PIIk,t instrumented

To account for possible problems of endogeneity and measurement errors associated to $PII_{k,t}$, we also estimated model (8) instrumenting both, $XGFCFT_t$ and $PII_{k,t}$. We denoted this case as regressions 2B. The set of instruments were the same as that used in regressions 2A. The results (for the parsimonious specification) of these regressions are summarized in table 11.

[33]This is also consistent with the result obtained that only contemporaneous values of PII_k are statistically significant in all regressions.

[34]Asteriou and Price (2001) obtain similar results for the case of U.K. When controlling for the growth rate of investment all political instability proxies they use remain highly (statistically) significant and the estimated coefficients on these proxies remain very close or the same. They also leave open the possibility of political instability affecting the level of investment but not its rate of growth.

Table 11: Economic Growth and Political Instability – Regressions 2B (model (8) estimated with $PII_{k,t}$ instrumented)

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC)*
Sample: 1983 – 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoints

Constant	0.05816 (6.769)***	0.05889 (6.944)***	0.05707 (6.616)***	0.05796 (6.827)***	0.05825 (6.916)***
S1	-0.15844 (-9.454)***	-0.15911 (-9.686)***	-0.15828 (-9.296)***	-0.1581 (-9.586)***	-0.15849 (-9.699)***
S3	-0.07537 (-4.705)***	-0.07586 (-4.784)***	-0.07393 (-4.569)***	-0.07385 (-4.649)***	-0.07420 (-4.707)***
XGDPNOC (-3)	0.18244 (1.793)*	0.19201 (1.904)*	0.17818 (1.744)*	0.19135 (1.905)*	0.19550 (1.958)*
XOILP (-3)	0.05320 (2.705)***	0.05336 (2.742)***	0.05099 (2.604)**	0.0502 (2.624)**	0.05003 (2.618)**
XGFCFTC (-1)	0.05029 (1.879)*	0.05148 (1.966)*	0.05088 (1.880)*	0.05089 (1.943)**	0.05244 (2.027)**
XGFCFTC (-3)	0.07764 (2.617)**	0.07590 (2.576)**	0.07843 (2.639)**	0.07532 (2.561)**	0.07569 (2.593)**
PII1	-0.00534 (-1.907)*				
PII2		-0.00651 (-2.228)**			
PII3			-0.00479 (-1.606)		
PII4				-0.00669 (-2.163)**	
PII5					-0.00680 (-2.198)**
GR^2-bar [j]	0.7611	0.7662	0.7565	0.7649	0.7653
S.E. of Regression	0.02688	0.0267	0.0269	0.0266	0.0264
Serial Correlation [b, f]	6.9931	7.6515	8.0253	8.7417	9.2275
RESET [c, g]	0.1886	0.0686	0.3477	0.1394	0.1392
Normality [d, h]	2.8334	2.8771	2.7557	2.8422	2.8240
Heteroscedasticity [e, g]	0.0399	0.1289	0.0967	0.0603	0.0567
Sargan's test [k, l]	23.821	23.897	24.897	24.556	24.495

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation ($\rho = 4$). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103. (i) Instruments used: constant, seasonal dummies, contemporaneous and lagged values of XOILP , lagged values of XGDPNOC, XGFCFTC, XGEXPRC, RATE, INF and PII*k* (*k* = 1, 2, 3, 4, 5). (j) Generalized R^2-bar, proposed by Pasaran and Smith (1994). (k) Sargan's (1964) test for testing misspecification of the regression and the validity of the set of instruments. (l) Critical values [CHSQ(25)]: 10% = 34.3816, 5% = 37.6525, 1% = 44.3141.

Source: Own Calculations

In terms of the sign and statistical significance of the variables included, the results in this case remain very much the same as those of regressions 2A. However, the level of statistical significance of the estimated coefficients for the growth rate of the investment terms ($XGFCFTC_{t-1}$ and $XGFCFTC_{t-3}$) are lower in all cases. The values of the estimated coefficients are very similar. The goodness-of-fit remains high for all cases, and all diagnostic tests are satisfactory at conventional significance levels. Moreover, the Sargan's test does not reject the null hypothesis of validity of the instruments. The estimated coefficients associated to $PII_{k,t}$ are higher than those in regressions 2A but, on the other hand, the corresponding t -statistics are all very similar.

As in the case when we compared the OLS and IV estimations of model (6), the clear similarity of the statistical results obtained when model (8) is estimated instrumenting only $XGFCFTC_t$ with those obtained when it is estimated instrumenting $XGFCFTC_t$ and $PII_{k,t}$, leads us to deduce that the problems of endogeneity and measurement error associated to political instability that we presume to be present in the estimations without $PII_{k,t}$ instrumented (regressions 2A) are not significant. However, to validate this we performed the Hausman's specification error test, which we report below.

3.5.3 Hausman's specification error test

In this case, in order to perform the Hausman's (1978) specification error test applying formula (7), for $\hat{h}_0$ we used the estimations for h_0 in regressions 2A (in which $PII_{k,t}$ is not instrumented) and for $\tilde{h}_0$ we used the estimations for h_0 in regressions 2B (in which $PII_{k,t}$ is instrumented). In this instance, because regressions 2A are obtained using the instrumental variable procedure (and not OLS) we only state that $\hat{h}_0$ is consistent under H_0 but not consistent under H_1 , whereas $\tilde{h}_0$ is consistent under both H_0 and H_1. The results are shown in table 9 (rows referred to regressions 2A). In all cases the statistic m is well below its critical value at 5% significance level. Therefore, endogeneity and measurement errors associated to $PII_{k,t}$ seem not to be relevant problems in regressions 2A. Although in both regressions (2A and 2B) the estimators of h_0 are not efficient (since both use IV), we might be inclined to prefer regressions 2A because in this case we do not substitute $PII_{k,t}$ with an instrumental variable.

3.6 The investment channel: investment decomposed

In the previous section we extended the basic model (6) by including the rate of growth of total investment in order to gain some insights into the relevance of the investment channel as a transmission mechanism through which political instability affects growth. However, total investment can be decomposed into government (public) investment and private investment, and these two components may react differently to changes in political instability. In particular, private investment might be more sensitive to variations in the political environment than public investment because the latter is not exclusively driven by profit concerns. Furthermore, public investment may react positively to higher political instability as a way for the government to gain political support through, for example, the positive effect it has on employment. However, particularly in the short run, public investment may also react negatively to more unstable political conditions, since the government may change the composition of government expenditures to favour government consumption and transfers (at the expense of reducing public investment) because it may find these type of expenditures more effective to gain immediate political support (Darby, Li and Muscatelli 2004).

The above arguments suggest that it may be important to include separately the growth rate of private and government investment. Thus, we extended the basic model (6) by incorporating separately the rate of growth of private and government investment. The model to be estimated is:

$$\begin{aligned} XGDPNOC_t &= a_0 + \sum_{i=1}^{3} a_i S_i + \sum_{i=1}^{4} b_i XGDPNOC_{t-i} + \sum_{i=0}^{4} c_i XOILP_{t-i} \\ &+ \sum_{i=0}^{4} d_i XGFCFPC_{t-i} + \sum_{i=0}^{4} e_i XGFCFGC_{t-i} \\ &+ \sum_{i=0}^{4} h_i PII_{k,t-i} + u_t \end{aligned} \tag{9}$$

where $XGFCFPC$ denotes the rate of growth of (real) private gross fixed capital formation per capita and $XGFCFGXC$ is the rate of growth of (real) government gross fixed capital formation per capita. As in the case of (8), in the estimation of (9) we face the problem of endogeneity of the contemporaneous growth rate of both private and government investment, hence we applied the instrumental variable method. We used as instruments all predetermined and exogenous variables in (9), as well as lagged values of real interest rate ($RATE$), inflation (INF), and the rate of growth of real government expenditures per capita ($XGEXPRC$).

3.6.1 Estimation without PIIk,t instrumented

We first estimated model (9) without instrumenting $PII_{k,t}$, distinguishing this case as regressions 3A. As we did in the previous cases, we estimated five different versions of the model, corresponding to the use of each of the political instability indices. The results (of the parsimonious specification) of these regressions are shown in table 12.

Table 12: Economic Growth and Political Instability – Regressions 3A (model (9) estimated without $PII_{k,t}$ instrumented)

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC*)
Sample: 1983 - 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoitnts
Regressions 3A. Method: Instrumental Variable (*XGFCFPC* $_t$ and *XGFCFGC* $_t$ instrumented [a, i, j]).

	3A.1	3A.2	3A.3	3A.4	3A.5
Constant	0.05704	0.05803	0.05668	0.05792	0.05822
	(6.973)***	(7.183)***	(6.899)***	(7.213)***	(7.308)***
S1	-0.15931	-0.16058	-0.15905	-0.16061	-0.16088
	(-9.798)***	(-10.071)***	(-9.729)***	(-10.145)***	(-10.259)***
S3	-0.07059	-0.07168	-0.06998	-0.07144	-0.07172
	(-4.763)***	(-4.889)***	(-4.706)***	(-4.904)***	(-4.961)***
XGDPNOC (-3)	0.19408	0.20274	0.18755	0.19993	0.20514
	(1.941)*	(2.053)**	(1.865)*	(2.036)**	(2.106)**
XOILP (-3)	0.05667	0.05695	0.05523	0.05476	0.05455
	(2.938)***	(2.987)***	(2.866)***	(2.903)***	(2.915)***
XGFCFPC (-3)	0.03038	0.02691	0.02951	0.02888	0.02946
	(2.259)**	(2.246)**	(2.192)**	(2.188)**	(2.249)**
XGFCFGC (-1)	0.02565	0.02691	0.02585	0.02756	0.02839
	(1.958)*	(2.098)**	(1.969)*	(2.168)**	(2.257)**
XGFCFGC (-3)	0.04069	0.04041	0.04191	0.04172	0.04168
	(2.641)**	(2.651)***	(2.7165)***	(2.757)***	(2.635)***
PII1	-0.00449				
	(-1.954)*				
PII2		-0.0555			
		(-2.269)**			
PII3			-0.00451		
			(-1.875)*		
PII4				-0.00616	
				(-2.435)**	
PII5					-0.00670
					(-2.635)**
GR^2-bar	0.7629	0.7679	0.7618	0.7708	0.7743
S.E. of Regression	0.0266	0.0263	0.0266	0.0261	0.0259
Serial Correlation [b, f]	4.8588	5.9511	5.6966	7.1129	8.2626
RESET [c, g]	0.2110	0.1094	0.2884	0.0359	0.0218
Normality [d, h]	2.6315	2.6672	2.7652	2.9096	2.9752
Heteroscedasticity [e, g]	0.2625	0.3197	0.2633	0.1633	0.1069
Sargan's test [k, l]	31.237	30.637	32.086	31.154	31.493

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103. (i) Instruments used: constant, seasonal dummies, contemporaneous and lagged values of XOILP and PII*k* (*k* = 1, 2, 3, 4, 5), lagged values of XGDPNOC, XGFCFPC, XGFCFGC, XGEXPRC, RATE, and INF. (j) Because in this parsimonious specification the model XGFCFPC(t) and XGFCFGC(t) are not included, the results are the same as those obtained by OLS. (k) Sargan's (1964) test for testing misspecification of the regression and the validity of the set of instruments. (l) Critical values [CHSQ(29)]: 10% = 39.0875, 5% = 42.5569, 1% = 49.5879.

All diagnostic tests yield satisfactory results at standard significance levels. The Sargan's test validates the selection of the set of instruments used. The goodness-of-fit of the regressions is high in all cases (over 76%). Moreover, the sign and statistical significance of the variables also present in regressions 1A are very similar. Both, the rate of growth of private and public investment have positive lagged effects on growth. Thus, the coefficients of the third lag of *XGFCFPC* and the first and third lag of *XGFCFGC* are positive and statistically significant at 1% or 5% levels in all regressions, with the only exception of $XGFCFGC_{t-1}$, which is significant at 10% for regressions 3A.1 and 3A.3.

The direct and negative effect of political instability on growth persists, confirming that the investment channel, operating through the growth rate of investment, does not appear to be a crucial route by which political instability impacts growth in Venezuela (for our period of study). The magnitude of the estimated coefficients associated to $PII_{k,t}$ and their corresponding t -statistics are quite similar to those in regressions 1A (only in the cases of regressions 3A.1 and 3A.3 these coefficients become statistically significant at 10% level while they are significant at 5% in regressions 1A.1 and 1A.3).

3.6.2 Estimation with PIIk,t instrumented

In addition to instrumenting $XGFCFPC_t$ and $XGFCFGC_t$, we also proceeded to instrument $PII_{k,t}$ in order to overcome possible problems of endogeneity and measurement error connected to $PII_{k,t}$. We labelled this case as regressions 3B. The instruments used were the same as those employed in regressions 3A. The results (for the parsimonious specification) of these regressions are shown in table 13.

Table 13: Economic Growth and Political Instability – Regressions 3B (model (9) estimated with $PII_{k,t}$ instrumented)

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC*)
Sample: 1983 - 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoitnts
Regressions 3B. Method: Instrumental Variable ($XGFCFPC_t$, $XGFCFGC_t$, and $PII_{k,t}$ instrumented [a, i])

	3B.1	3B.2	3B.3	3B.4	3B.5
Constant	0.05683 (6.931)***	0.05804 (7.174)***	0.05654 (6.869)***	0.05791 (7.207)***	0.05823 (7.308)***
S1	-0.15802 (-9.646)***	-0.15981 (-9.985)***	-0.15841 (-9.617)***	-0.16008 (-10.083)***	-0.16059 (-10.221)***
S3	-0.07041 (-4.742)***	-0.07172 (-4.887)***	-0.06982 (-4.692)***	-0.07145 (-4.901)***	-0.07174 (-4.962)***
XGDPNOC (-3)	0.19146 (1.910)*	0.20221 (2.045)**	0.18560 (1.842)*	0.19924 (2.028)**	0.20510 (2.105)**
XOILP (-3)	0.57633 (2.976)***	0.05774 (3.019)***	0.05553 (2.878)***	0.05505 (2.915)***	0.05470 (2.921)***
XGFCFPC (-3)	0.03074 (2.281)**	0.03003 (2.256)**	0.02959 (2.197)**	0.02889 (2.187)**	0.02951 (2.252)**
XGFCFGC (-1)	0.02459 (1.863)*	0.02630 (2.043)**	0.02537 (1.919)*	0.02723 (2.138)**	0.02826 (2.244)**
XGFCFGC (-3)	0.04039 (2.616)**	0.04012 (2.627)**	0.04189 (2.714)***	0.04168 (2.752)***	0.04165 (2.773)***
PII1	-0.00549 (-2.048)**				
PII2		-0.00651 (-2.312)**			
PII3			-0.00499 (-1.767)*		
PII4				-0.00689 (-2.364)**	
PII5					-0.00716 (-2.452)**
GR^2-bar [j]	0.7645	0.7688	0.7602	0.7694	0.7707
S.E. of Regression	0.0266	0.0263	0.0266	0.0261	0.0259
Serial Correlation [b, f]	4.8825	6.1126	5.8016	7.3262	8.4441
RESET [c, g]	0.3034	0.1842	0.5859	0.2579	0.2713
Normality [d, h]	2.5724	2.7169	2.7265	2.8925	2.9609
Heteroscedasticity [e, g]	0.0339	0.0658	0.0858	0.0014	0.0001
Sargan's test [k, l]	30.603	30.078	31.958	30.857	31.374

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103. (i) Instruments used: constant, seasonal dummies, contemporaneous and lagged values of XOILP, lagged values of XGDPNOC, XGFCFTC, XGEXPRC, RATE, INF and PII*k* (*k* = 1, 2, 3, 4, 5). (j) Generalized R^2-bar, proposed by Pasaran

Source: Own Calculations

ı's (1964) test for testing misspecification of the regression and the validity of the set of instruments. (l) Critical values [CHSQ(28)]: 10% = 37.9159, 5% = 41.3372, 1% = 48.2782.

As in models (6) and (8), comparison of the estimations carried out with and without $PII_{k,t}$ instrumented reveals that the results in these two cases are quite similar. Thus, in terms of the sign and statistical significance of the variables included, the results remain the same as those of regressions 3A. The values of the estimated coefficients are very similar. The goodness-of-fit remains high for all cases and all diagnostic tests are adequate at conventional significance levels. Moreover, the Sargan's test supports the validity of the instruments used. The estimated coefficients associated to $PII_{k,t}$ are higher than those in regressions 3A, but the corresponding t -statistics are all rather similar.

As in the estimations of models (6) and (8), the remarkable similarity of the statistical results obtained when model (9) is estimated without instrumenting $PII_{k,t}$ (but instrumenting $XGFCFPC_t$ and $XGFCFGC_t$) with those obtained when it is estimated instrumenting $PII_{k,t}$ (and also instrumenting $XGFCFPC_t$ and $XGFCFGC_t$), inclines us to infer that the problems of endogeneity and measurement error associated to political instability that we suspect to be present in the estimations without $PII_{k,t}$ instrumented (regressions 3A) are not relevant. However, to confirm this we performed the Hausman's specification error test, which we report below.

3.6.3 Hausman's specification error test

In this case, in order apply formula (7), for $\hat{h}_0$ we used the estimations for h_0 in regressions 3A (in which $PII_{k,t}$ is not instrumented) and for $\tilde{h}_0$ we used the estimations for h_0 in regressions 3B (in which $PII_{k,t}$ is instrumented). Because regressions 3A are obtained using the instrumental variable procedure (and not OLS), in this instance we only state that $\hat{h}_0$ is consistent under H_0 but not consistent under H_1, whereas $\tilde{h}_0$ is consistent under both H_0 and H_1. The results of the test are shown in table 9 (rows referred to regressions 3A). In all cases the statistic m is well below its critical value at 5% significance level. Therefore, endogeneity and measurement errors associated to $PII_{k,t}$ seem not to be important problems in regressions 3A. As in the case of the estimation of model (8), although in both regressions (3A and 3B) the estimators of h_0 are not efficient (since both use IV), we might be inclined to prefer regressions 3A because in these regressions we do not substitute $PII_{k,t}$ with an instrumental variable.

3.7 A quantitative assessment of the effect on growth of higher political instability since 1989

The empirical investigation on the relationship between political instability and economic growth in Venezuela for the period 1983-2000 presented in the previous sections provides quite clear and robust results indicating a negative effect of political instability on growth within our period of analysis. In fact, as we mentioned earlier, the OLS estimations of our basic model (6) (which captures the total —contemporaneous— effect of political instability on economic growth) presented in table 7 (regressions 1A) imply that, on average, in the period under study, an increase of one unit in the political instability indices produced a decrease between 0.49 and 0.69 percentage points on —quarterly— economic growth. Moreover, Muñoz (2006, 2009) showed that political instability (measured by the political instability indices) notably increased between the period 1980-1988 and the period 1989-2000, which, given the revealed negative effect of the latter on economic growth, suggests that this increase was one of the determining factors of the drop of the average growth rate of output in the post-1989 period.

Now in this section we want to address the following question: how different would economic growth have been in the post-1989 period if political instability had remained at its pre-1989 level? In particular, we estimate how much higher the mean of 1989-2000 output growth would have been if the mean of political instability had reached that for the period 1980-1988 rather than that for the period 1989-2000. In order to do this we first calculate the long run multiplier of output growth associated with political instability, denoted by z, using the OLS estimations of our basic model (6) presented in table 7 (regressions 1A). Then, we proceed to multiply z by the difference between the mean of the political instability index for the period 1989-2000 (*Mean of* $PII_{1989\text{-}2000}$) and the mean of the political instability index for the period 1980-1988 (*Mean of* $PII_{1980\text{-}1988}$).[35] This will give us the effect of the increase of —average— political instability in the post-1989 period on the mean of output growth for that period. The results of this quantitative assessment for each of the five *PIIs* used in our analysis are reported —in detail— in table 14.

The estimated effect of higher political instability in the period 1989-2000 on economic growth (measured by the growth rate of real non-oil GDP per capita, $XGDPNOC$) is significant. Thus, depending on the *PII* employed, the increase of the mean of political instability between the periods 1980-1988 and 1989-2000 had a reducing impact

[35] The long run multiplier of output growth associated to political instability is given by $z = h_0 / 1 - b_3$ where h_0 is the coefficient for the contemporaneous value of *PII* and b_3 is the coefficient for the third lag of the growth rate of real non-oil GDP per capita ($XGDPNOC$), in our basic model (6), whose parsimonious specification is estimated and reported in table 7 (regressions 1A). The calculation of z assumes that in the long-run $XGDPNOC_t = XGDPNOC_{t-1}$.

on the 1989-2000 average quarterly economic growth ranging from 0.95 to 1.32 percentage points (see row (e) in table 14), which implies a negative impact on the 1989-2000 average annual economic growth ranging from 3.74 to 5.19 percentage points (see row (h) in table 14). In other words, average quarterly (annual) economic growth in the post-1989 period would have been between 0.95(3.74) and 1.32(5.19) percentage points higher if the level (mean) of political instability in that period had remained unchanged.

The calculations presented above imply that if the level (mean) of political instability had not changed between the periods 1980-1988 and 1989-2000, the quarterly average economic growth for the period 1989-2000 would have been between 0.61% and 0.98% (see row (g) in table 14) instead of the observed quarterly average of -0.34%, and annual average economic growth would have been between 2.45% and 3.98% (see row (j) in table 14) instead of the observed annual average of -1.36%. Using these “simulated” average growth rates we simulated the path of the level of output (empirically defined as the level of per capita real non-oil GDP, *GDPNOC*) for the period 1989-2000, which in turn allowed us to estimate the, quarterly and annual, mean of this variable for this period if political instability had remained at its 1980-1988 level (mean). The results of this estimation are shown in rows (l) and (o) in table 14 and they imply that —quarterly and annual— average per capita —non-oil— output for the period 1989-2000 would have been between 29.8% and 42.8% higher than the observed average for this period if political instability had remained at its 1980-1988 level (mean).

The counterfactual estimations shown in this section clearly indicate that the quantitative negative effect of political instability on economic growth in Venezuela during our period of study seems to have been quite important. In particular, these estimations indicate that the increase of the level of political instability between the periods 1980-1988 and 1989-2000 had a significant negative effect on —per capita— output growth for the period 1989-2000 and consequently on the —average— level of per capita output for this period.

Table 14: Quantitative Effect of Higher Political Instability in Period 1989-2000 on Per Capita Real Non-Oil GDP Growth (*XGDPNOC*) and Level (*GDPNOC*) for this Period (Based on estimated coefficients of the parsimonious specification of Model (6) using OLS: Regressions 1A)

Regression used		Units	1A.1	1A.2	1A.3	1A.4	1A.5
I.- Effect on Per Capita Non-Oil GDP Growth							
Quarterly Data							
Estimated Coefficient h_0			-0,0049	-0,0060	-0,0049	-0,0065	-0,0069
Estimated Coefficient b_3			0,2893	0,2915	0,2862	0,2908	0,2930
Estimated $z = h_0 / (1-b_3)$	(a)		-0,0069	-0,0084	-0,0069	-0,0091	-0,0097
Mean of $PII_{1980-1988}$	(b)		-0,85	-0,89	-0,79	-0,77	-0,78
Mean of $PII_{1989-2000}$	(c)		0,64	0,67	0,59	0,58	0,58
Difference between Mean $PII_{1989-2000}$ and Mean $PII_{1980-1988}$	(d) = (c) - (b)		1,49	1,56	1,38	1,35	1,36
Effect of Higher Political Instability on Mean of $XGDPNOC_{1989-2000}$	(e) = (a) * (d)	PP[1]	**-1,0273**	**-1,3102**	**-0,9492**	**-1,2335**	**-1,3235**
Actual Mean $XGDPNOC_{1989-2000}$	(f)		-0,342%	-0,342%	-0,342%	-0,342%	-0,342%
Mean of $XGDPNOC_{1989-2000}$ if Mean of $PII_{1989-2000}$ would have been the same as the Mean of $PII_{1980-1988}$	(g) = (f) - (e)		**0,685%**	**0,968%**	**0,607%**	**0,892%**	**0,981%**
Annual Data							
Effect of Higher Political Instability on Annual Mean of $XGDPNOC_{1989-2000}$	(h)	PP[1]	**-4,0464**	**-5,1386**	**-3,7431**	**-4,8436**	**-5,1898**
Actual Annual Mean of $XGDPNOC_{1989-2000}$	(i)		-1,361%	-1,361%	-1,361%	-1,361%	-1,361%
Annual Mean of $XGDPNOC_{1989-2000}$ if the Annual Mean of $PII_{1989-2000}$ would have been the same as the Annual Mean of $PII_{1980-1988}$	(j) = (i) - (h)		**2,770%**	**3,929%**	**2,451%**	**3,614%**	**3,984%**
II.- Effect on Per Capita Non-Oil GDP							
Quarterly Data							
Actual Mean of $GDPNOC_{1989-2000}$	(k)	Bs-84[2]	4.847	4.847	4.847	4.847	4.847
Mean of $GDPNOC_{1989-2000}$ estimated using the Mean of XGDPNOC calculated in (g)	(l)	Bs-84[2]	6.420	6.902	6.290	6.760	6.920
Percentage difference between (l) and (k)	(m)		**32,5%**	**42,4%**	**29,8%**	**39,5%**	**42,8%**
Annual Data							
Actual Annual Mean of $GDPNOC_{1989-2000}$	(n)	Bs-84[2]	19.387	19.387	19.387	19.387	19.387
Annual Mean of $GDPNOC_{1989-2000}$ estimated using the Mean of XGDPNOC calculated in (j)	(o)	Bs-84[2]	25.680	27.609	25.160	27.040	27.681
Percentage difference between (o) and (n)	(p)		**32,5%**	**42,4%**	**29,8%**	**39,5%**	**42,8%**

Notes: (1) PP = Percentage Points, (2) Bs-84 = Bolivars of 1984. Source: Own Calculations

4 Conclusions

Using the political instability indices constructed by Muñoz (2006, 2009), in this paper we investigated the relationship between political instability and growth in Venezuela for the period 1983-2000 using quarterly data and by means of the estimation of a single —reduced form— equation of the determinants of growth modelled as an ARDL (4,4) process. Our main empirical findings are summarised as follows:

In line with most of the empirical literature on political instability and growth, our results support the theoretical hypothesis that political instability affects negatively growth. Moreover, our findings are consistent with the evolution of the Venezuelan politics and economy during the period of study (documented by Muñoz 2006), in the sense that the decreasing trend in growth (measured by Non-oil GDP growth) after the seventies became more pronounced since 1989, a year after which political instability became a particularly important feature of the Venezuelan politics. Furthermore, the estimated coefficient for political instability obtained by the estimation of the single —reduced form— equation of the determinants of growth clearly suggests that the quantitative negative effect of political instability on growth during our period of study is quite relevant. In particular, we found that the increase of the level of political instability between the periods 1980-1988 and 1989-2000 seems to have had a considerable negative effect on output growth for the period 1989-2000 and consequently it had a notably contracting impact on the —average— level of per capita output for this period. In fact, we estimated that annual average per capita —non-oil— output for the period 1989-2000 would have been between 29.8% (using the PI index 3) and 42.8% (using the PI index 5) higher than the observed average for this period if political instability had remained at its 1980-1988 level (mean).

Our results are robust to the use the five different political instability indices employed. However, the estimated coefficients of those indices capturing higher intensity political protest events (which are especially relevant socio-political unrest determinants of political instability) are higher and statistically more significant. Also, our results are robust to the inclusion, as explanatory variables in the reduced form equation of the determinants of growth estimated, of the first four principal components associated with the set of the —original— political variables used in our analysis (this way capturing at least 56.4% of the total variation of this set of variables), instead of including only the first principal component (which is our political instability index).

Although endogeneity and measurement error problems may be important in our research, the Hausman's specification error tests performed suggest that they are not actually affecting our estimations. Therefore, we could treat the political instability variable (proxied by our political instability indices) as exogenous and not subject to measurement errors in the estimations of our basic empirical model and its extensions.

After extending our basic model by including investment through its growth rate (first including the growth rate of total investment and after that including the growth rate of private and public investment separately), the estimated coefficients associated to the political instability indices remained statistically significant and their values did not change notably, which suggests that the effect of political instability on growth, through the growth rate of investment, is not a decisive channel by which these variables are connected in the case of Venezuela for our period of study. However, it remains open the possibility of the investment channel to be operating through the level of investment.

As a final remark, we would like to indicate some possible directions for future research. First, although the Hausman tests performed on the model suggest that the endogeneity problem does not seem to be relevant in our estimations, it would be desirable to explore further the bi-directional relationship between political instability and growth in Venezuela using a multi-equation model, specially of the type in Londregan and Poole (1990) and Alesina et al. (1996), where both variables are endogenous and political instability is approached by some measure of the probability of government change. Doing this with time-series-data is a challenge that would truly be worth the effort.

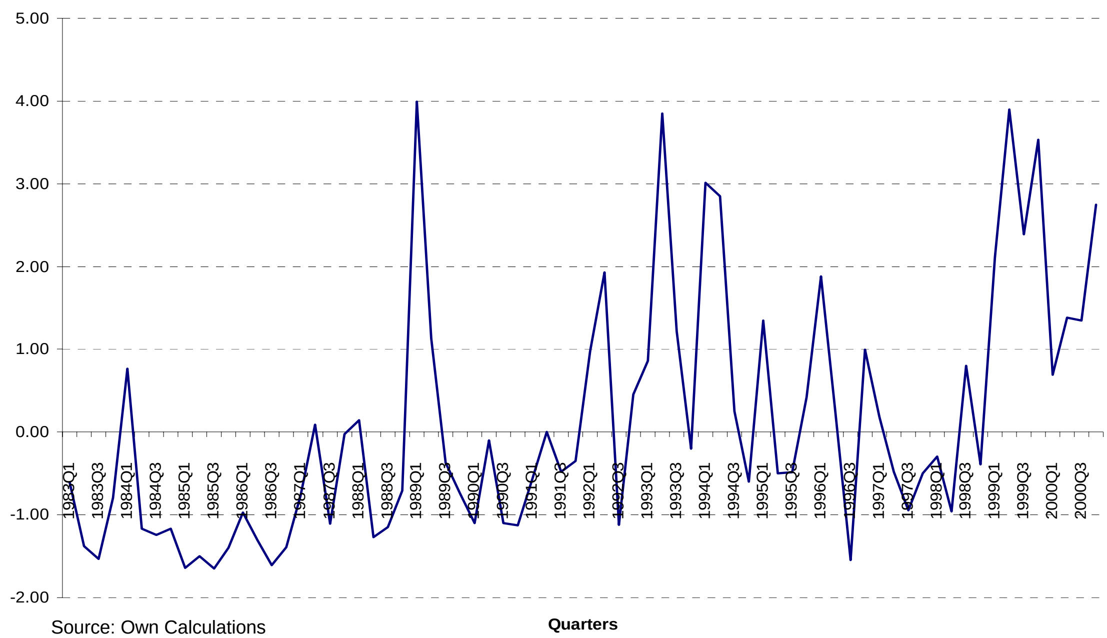
Second, following Asteriou and Price (2001) (who estimated a GARCH-M model for the U.K. including political instability proxies in the variance equation of growth), it would be interesting to use the political time-series-data made available by the PPED for Venezuela to examine the effect of political instability on growth through its effect on growth volatility (measured by the conditional variance of growth), which cannot be done with cross-sectional data.

Third, expanding the period of study forward (which requires calculating the PI indices built by Muñoz (2006, 2009) beyond year 2000) would be of great interest since after year 2000 Venezuela has experienced an almost continuous sequence events of social and political turmoil as well as profound institutional changes. How these events and institutional changes affected Venezuelan growth in the beginning of the XXI century is a question worth to be answered.

Appendix

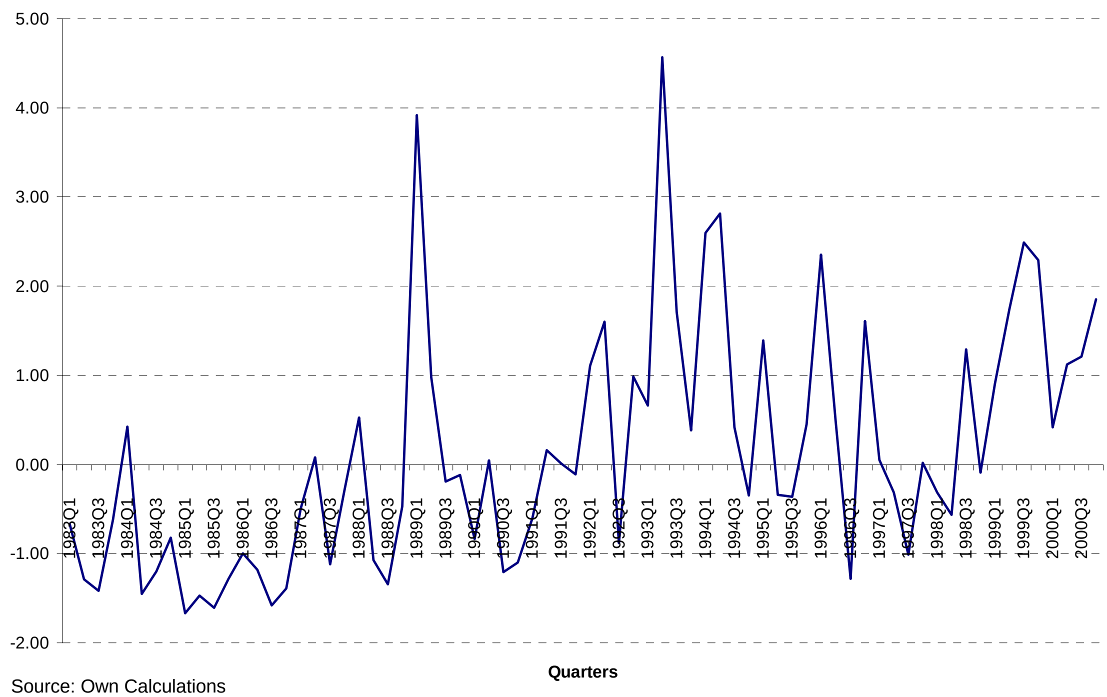
A.1 Graphs of the main Variables involved in the Econometric Study

Figure A.1: Venezuela: Political Instability Index 1 (PII 1)



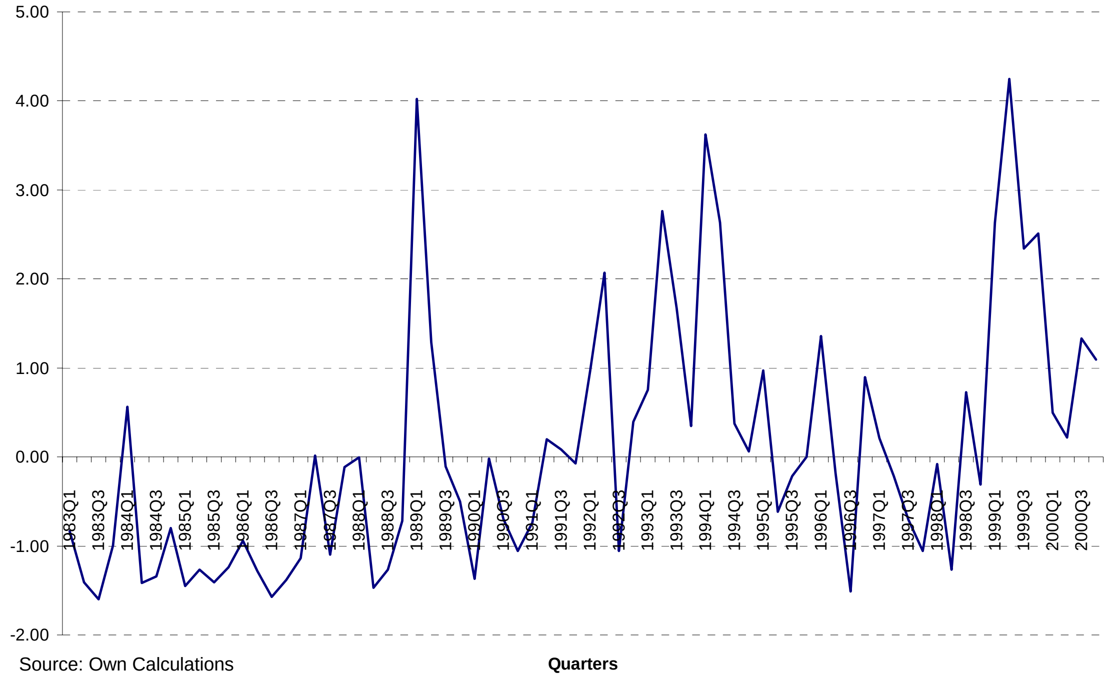
Source: Own Calculations

Figure A.2: Venezuela: Political Instability Index 2 (PII2)



Source: Own Calculations

Figure A.3: Venezuela: Political Instability Index 3 (PII 3)



Source: Own Calculations

Figure A.4: Venezuela: Political Instability Index 4 (PII 4)

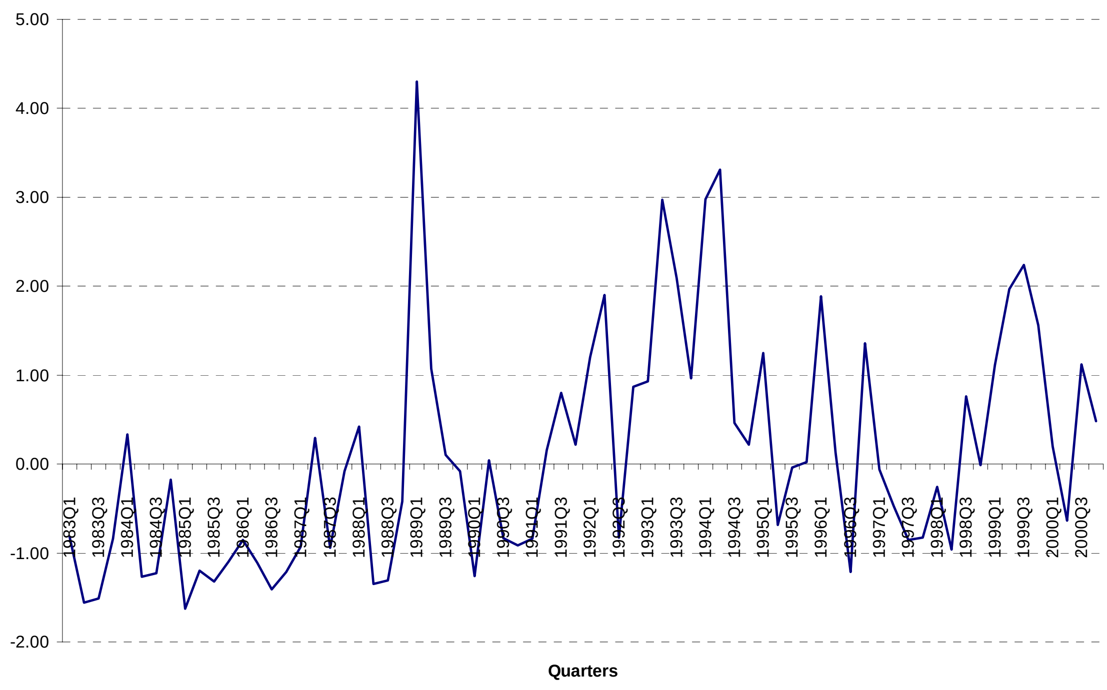
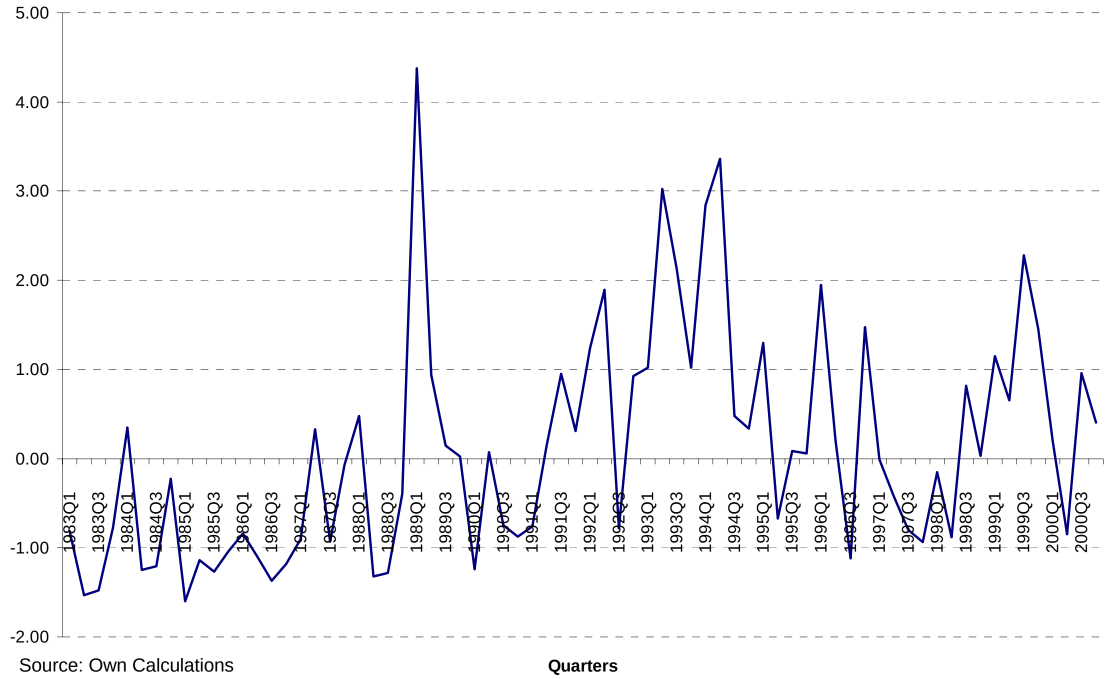
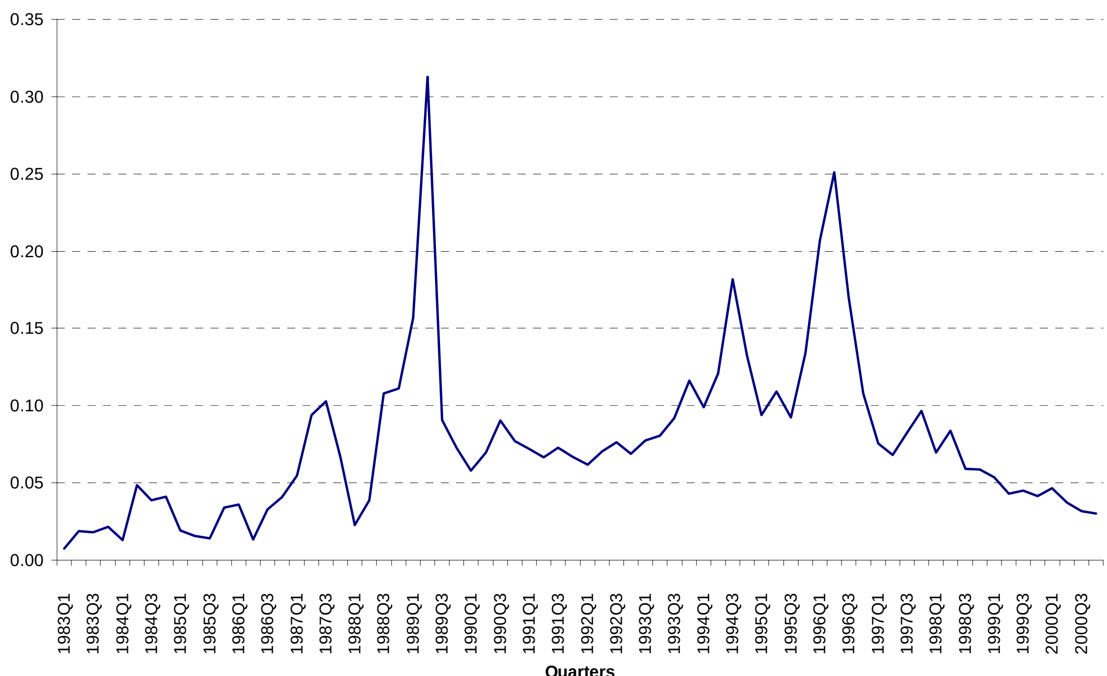


Figure A.5: Venezuela: Political Instability Index 5 (PII 5)



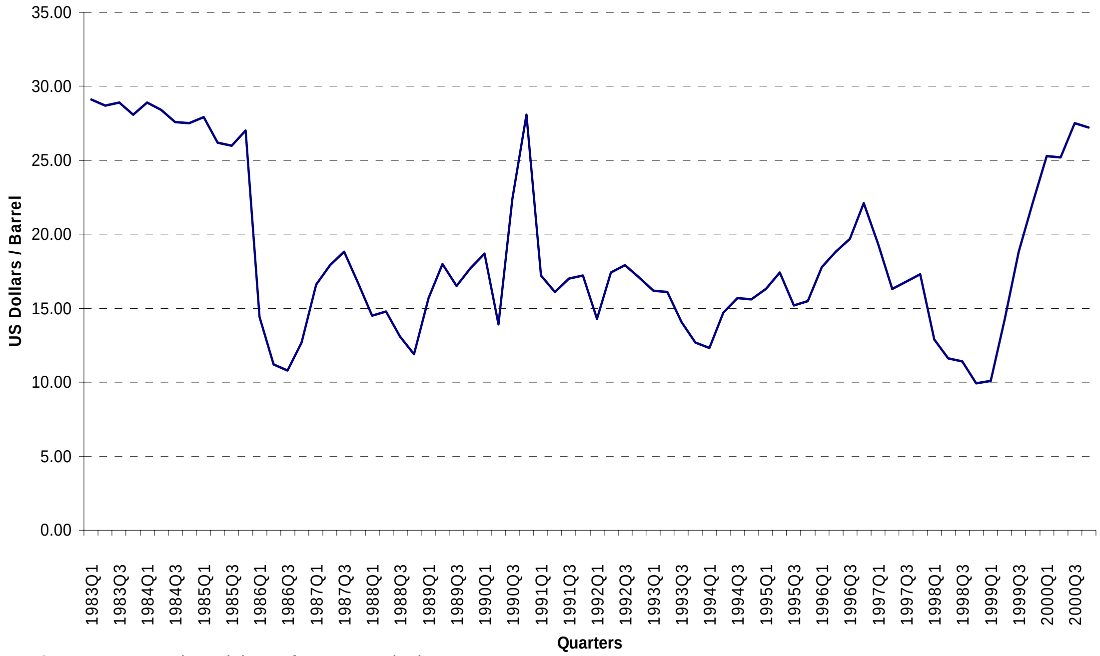
Source: Own Calculations

Figure A.6: Venezuela: Inflation Rate (INF)



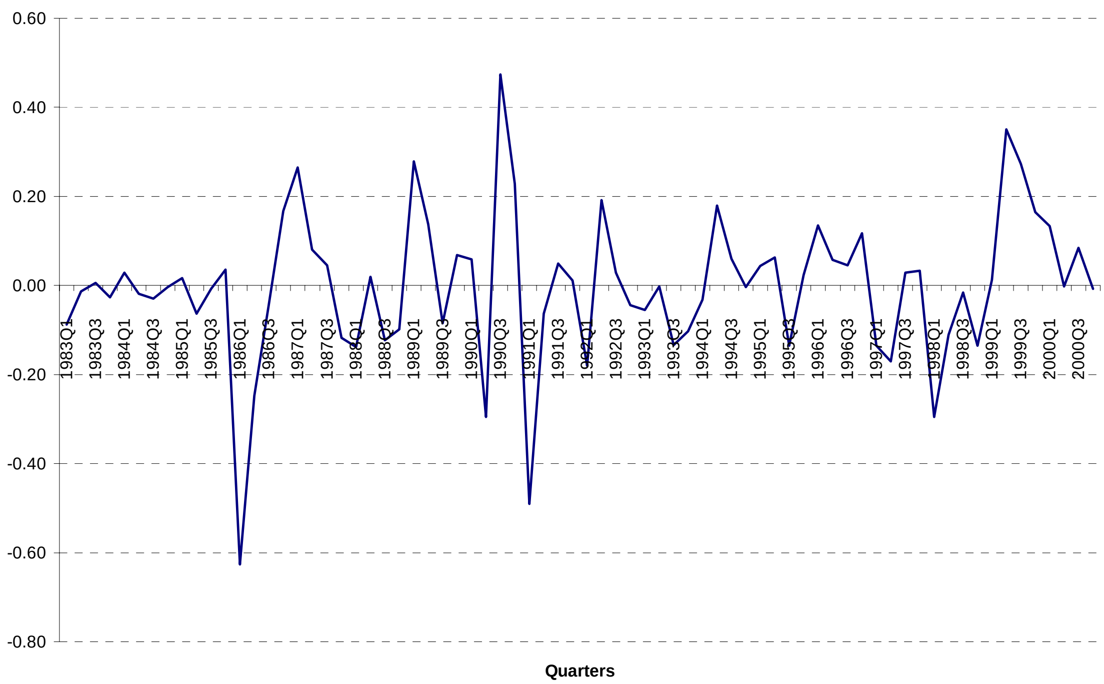
Source: Central Bank of Venezuela. Own Calculations

Figure A.7: Venezuela: Venezuelan Oil Prices – Tia Juana Light (OILP)



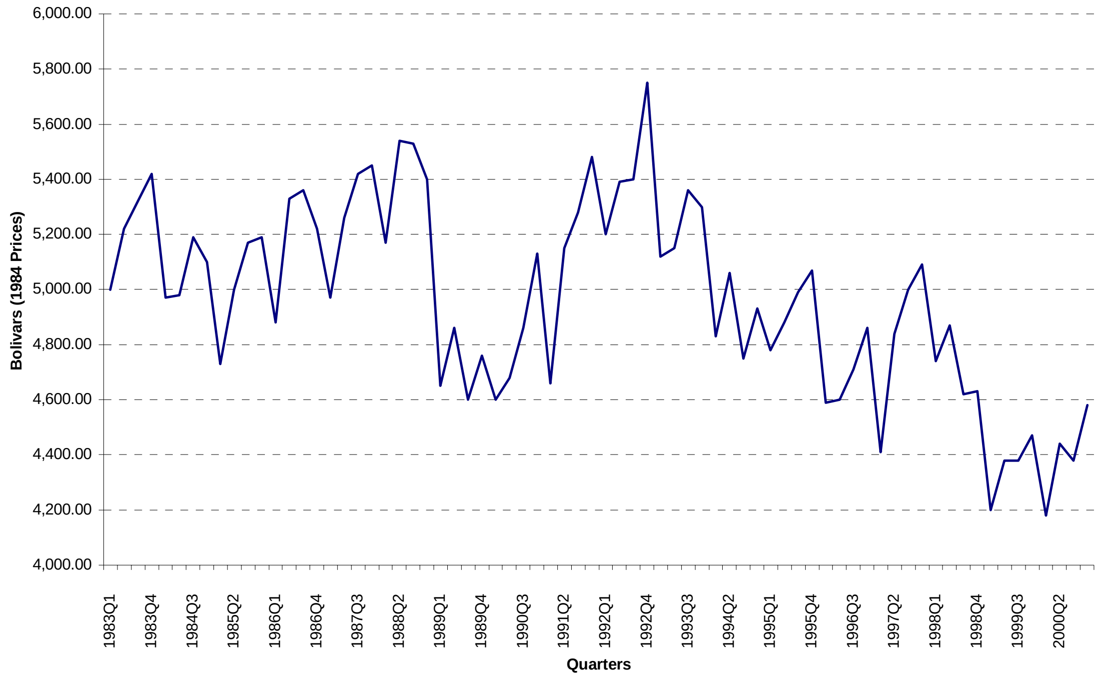
Source: Venezuelan Ministry of Energy and Mines

Figure A.8: Venezuela: Growth Rate of Venezuelan Oil Prices – Tia Juana Light (XOILP)



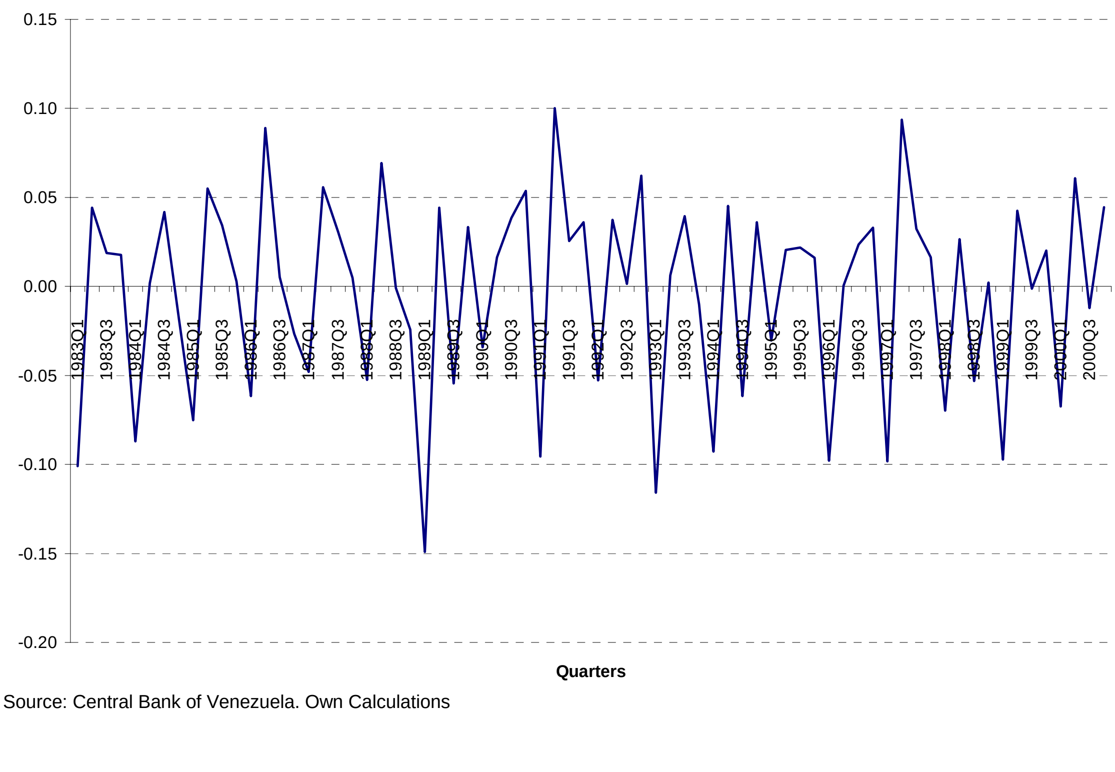
Source: Venezuelan Ministry of Energy and Mines. Own Calculations

Figure A.9: Venezuela Per Capita Real Non-Oil GDP (GDPNOC)



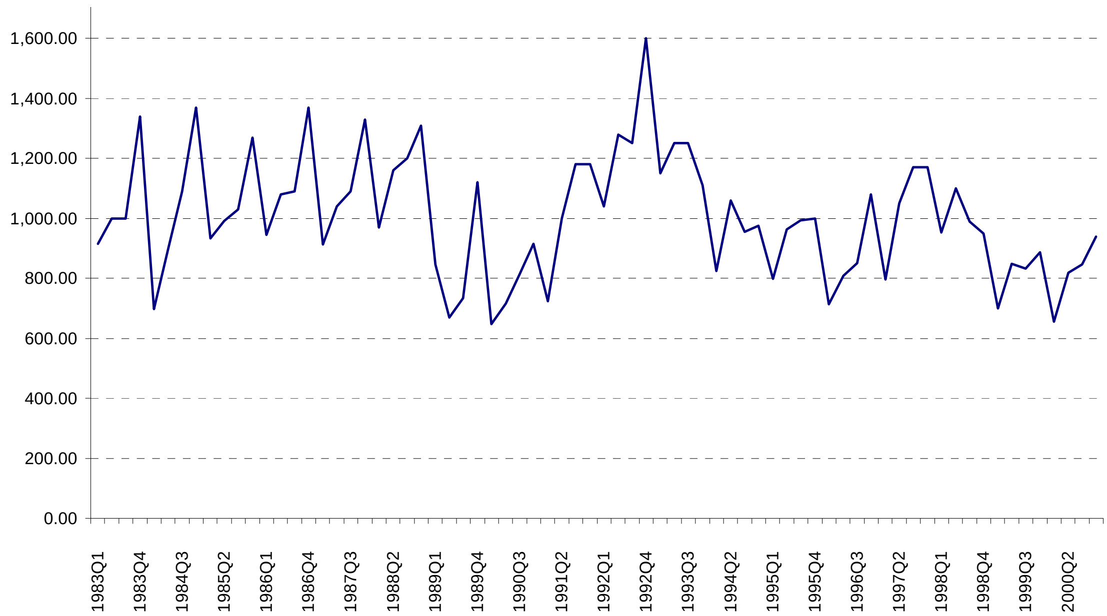
Source: Central Bank of Venezuela. Own Calculations

Figure A.10: Venezuela Growth Rate of Non-Oil GDP Per Capita (XGDPNOC)



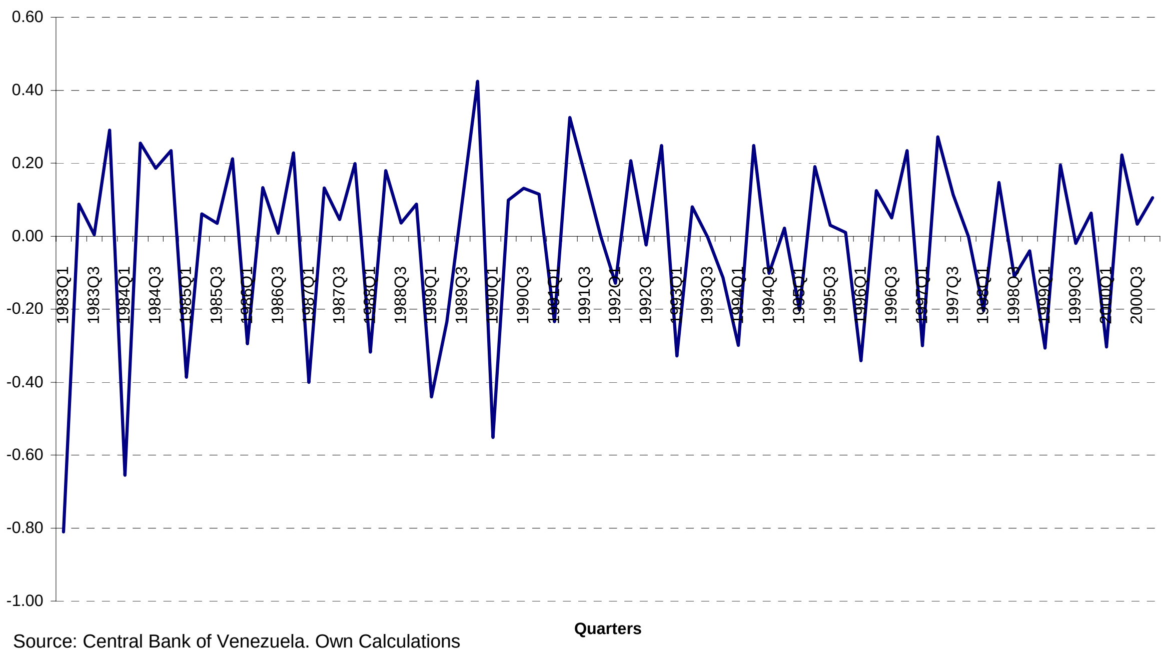
Source: Central Bank of Venezuela. Own Calculations

Figure A.11: Venezuela: Per Capita Total Gross Fixed Capital Formation (GFCFTC)



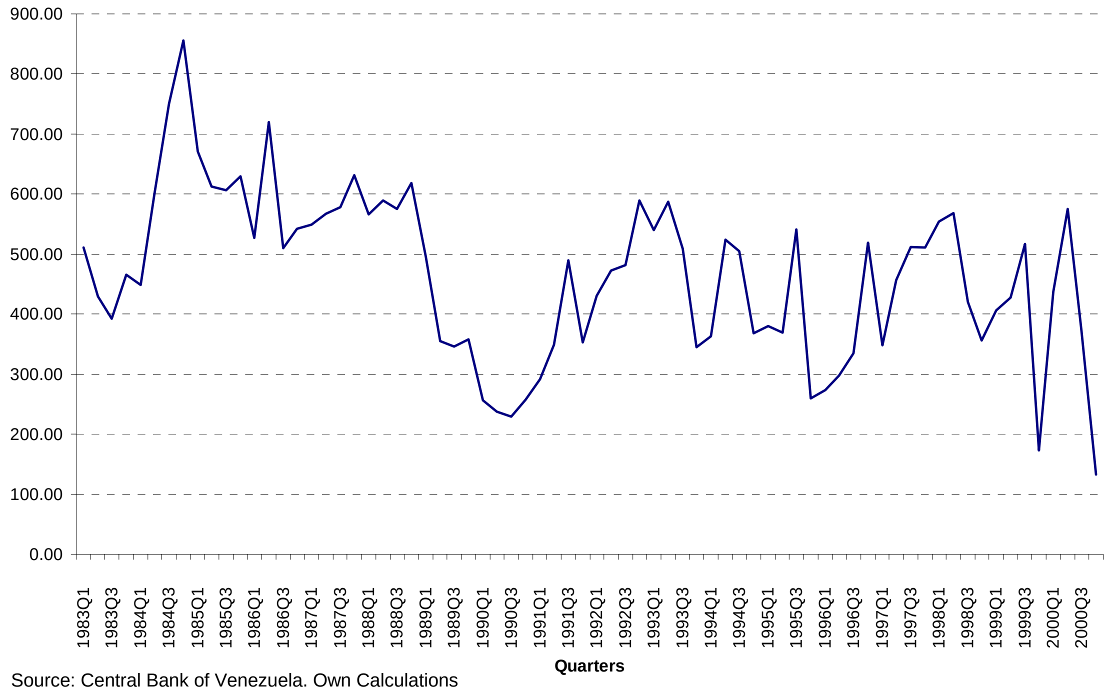
Source: Central Bank of Venezuela. Own Calculations

Figure A.12: Venezuela: Growth Rate of Total Gross Fixed Capital Formation Per Capita (XGFCFTC)



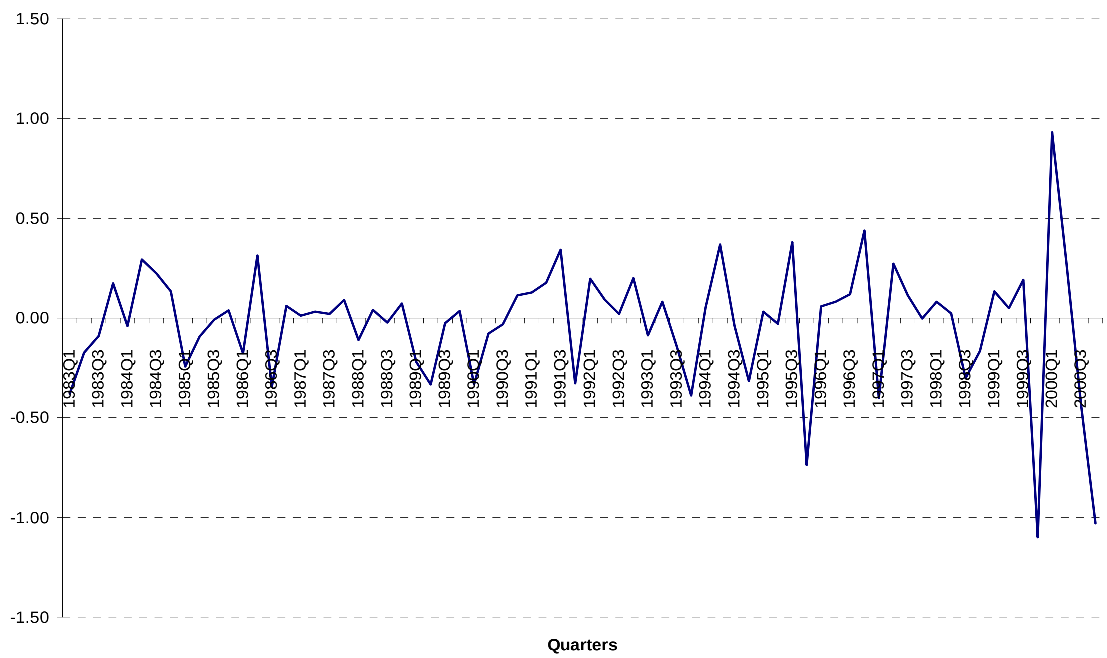
Source: Central Bank of Venezuela. Own Calculations

Figure A.13: Venezuela: Per Capita Private Gross Fixed Capital Formation (GFCFPC)



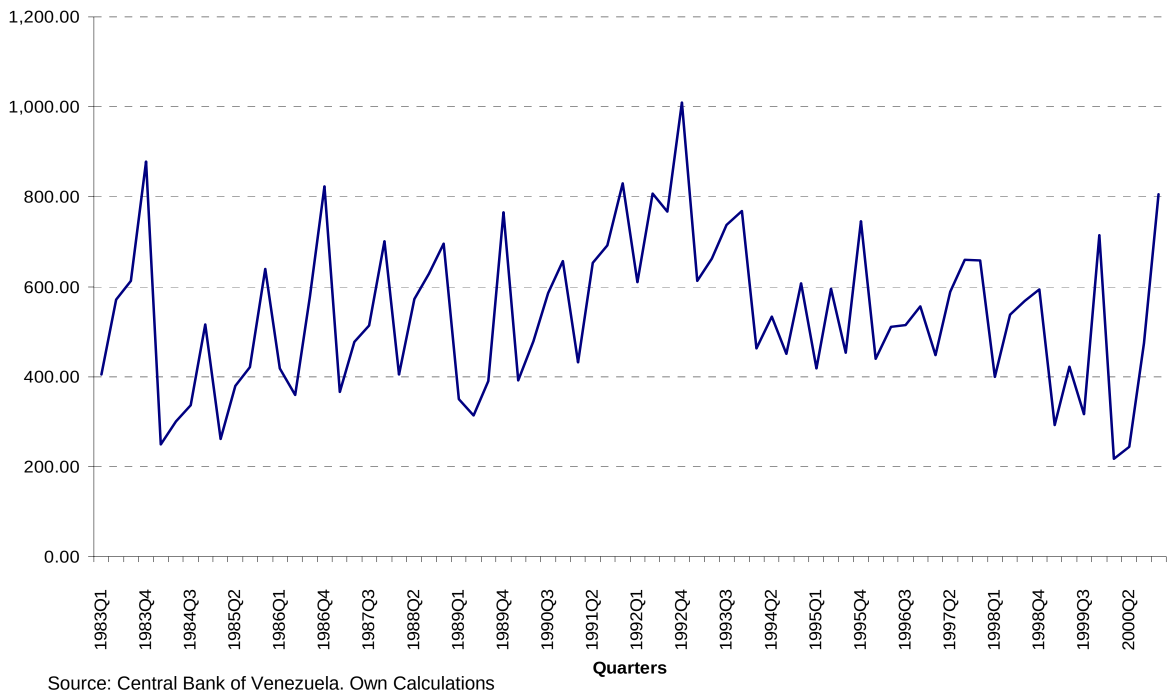
Source: Central Bank of Venezuela. Own Calculations

Figure A.14: Venezuela: Growth Rate of Private Gross Fixed Capital Formation Per Capita (XGFCFPC)



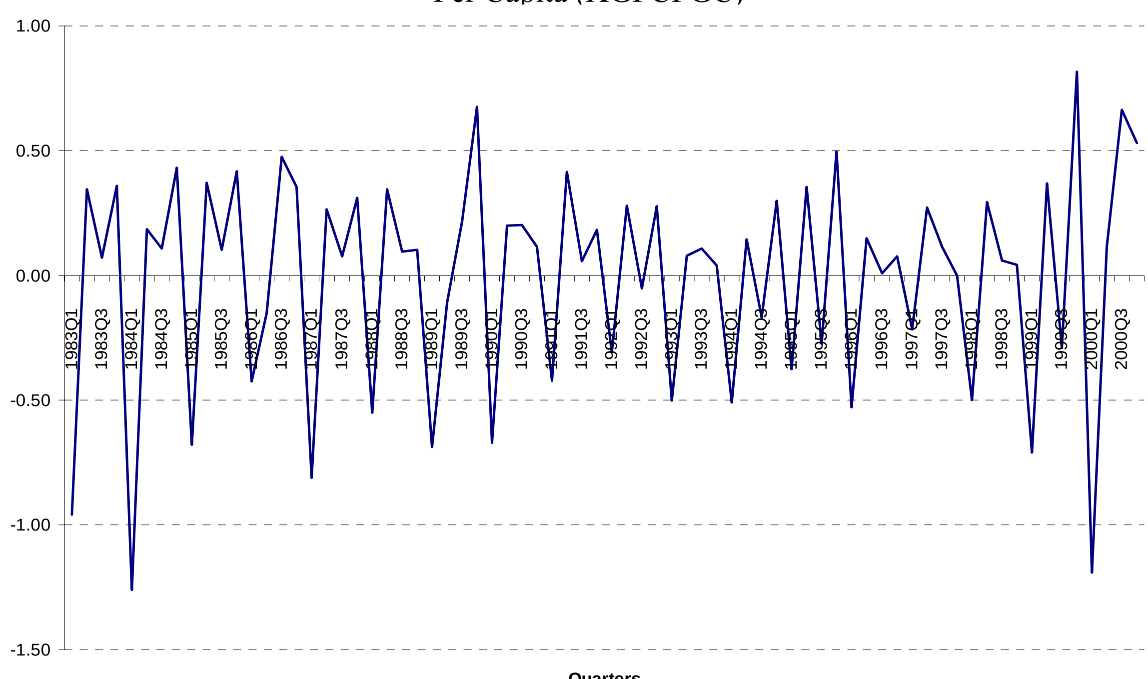
Source: Central Bank of Venezuela. Own Calculations

Figure A.15: Venezuela: Per Capita Government Gross Fixed Capital Formation (GFCFGC)



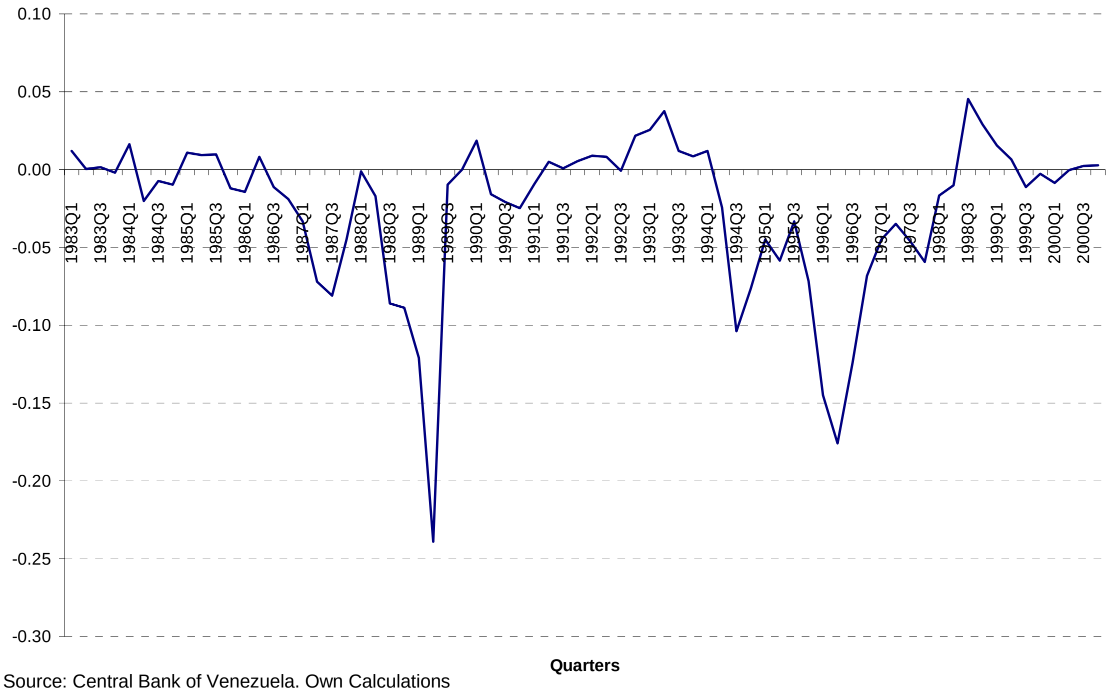
Source: Central Bank of Venezuela. Own Calculations

Figure A.16: Venezuela: Growth Rate of Government Gross Fixed Capital Formation Per Capita (XGFCFGC)



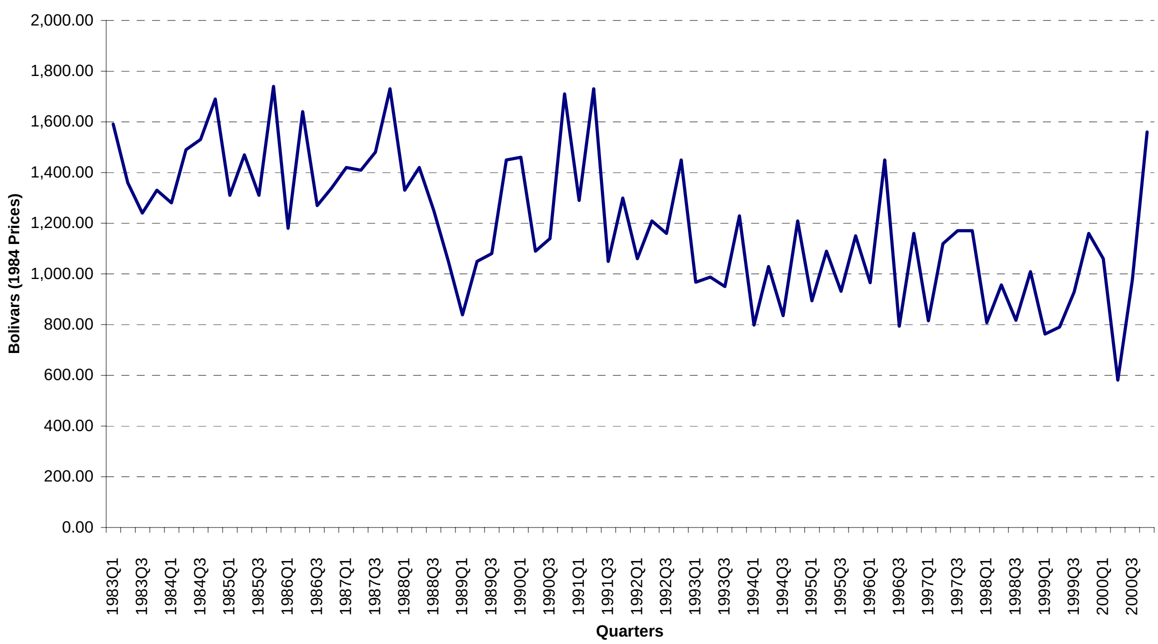
Source: Central Bank of Venezuela. Own Calculations

Figure A.17: Venezuela: Real (Borrowing) Interest Rate (RATE)



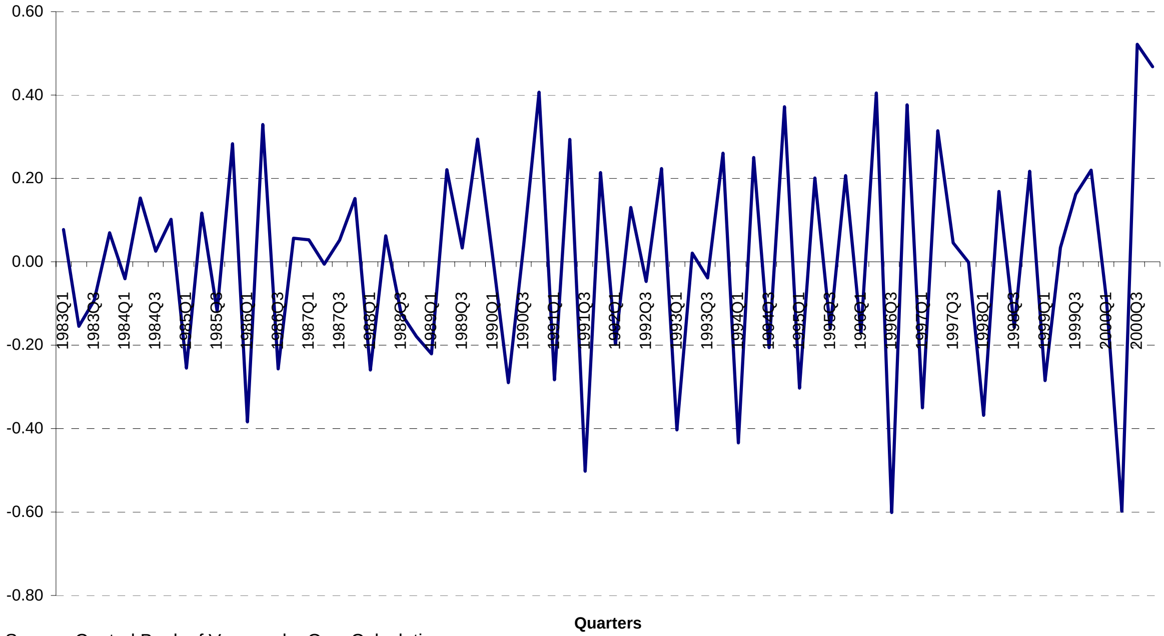
Source: Central Bank of Venezuela. Own Calculations

Figure A.18: Venezuela: Per Capita Real Government Expenditures (GEXPRC)



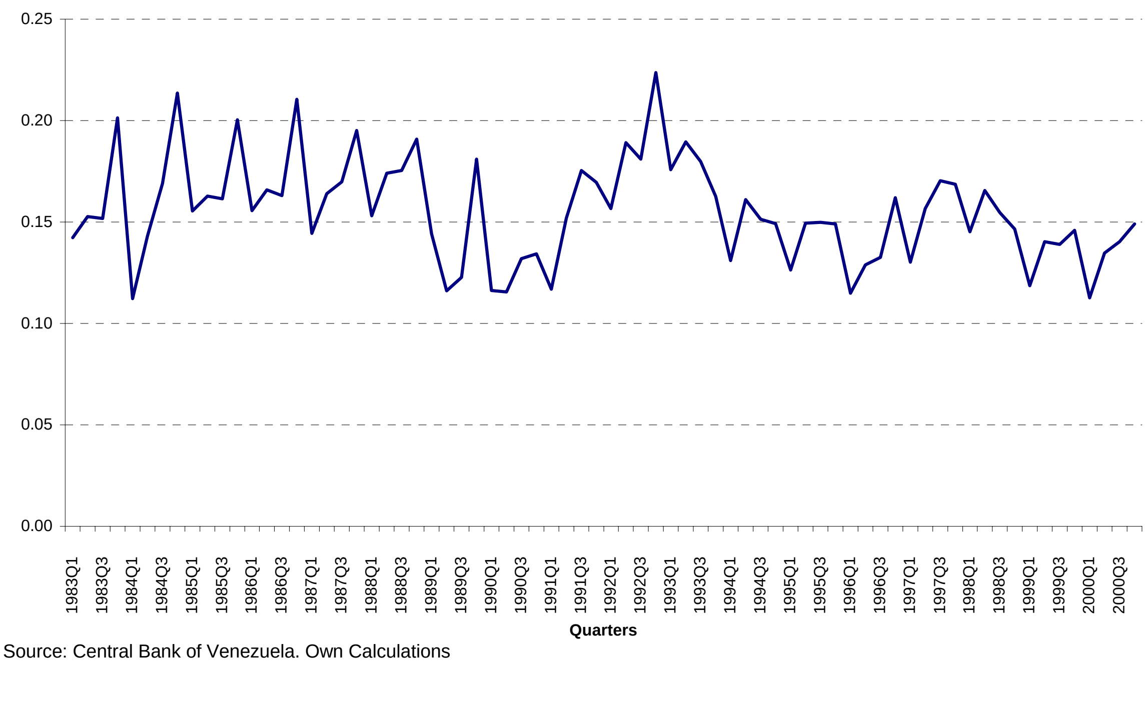
Source: Central Bank of Venezuela. Own Calculations

Figure A.19: Venezuela: Growth Rate of Per Capita Real Government Expenditures (XGEXPRC)



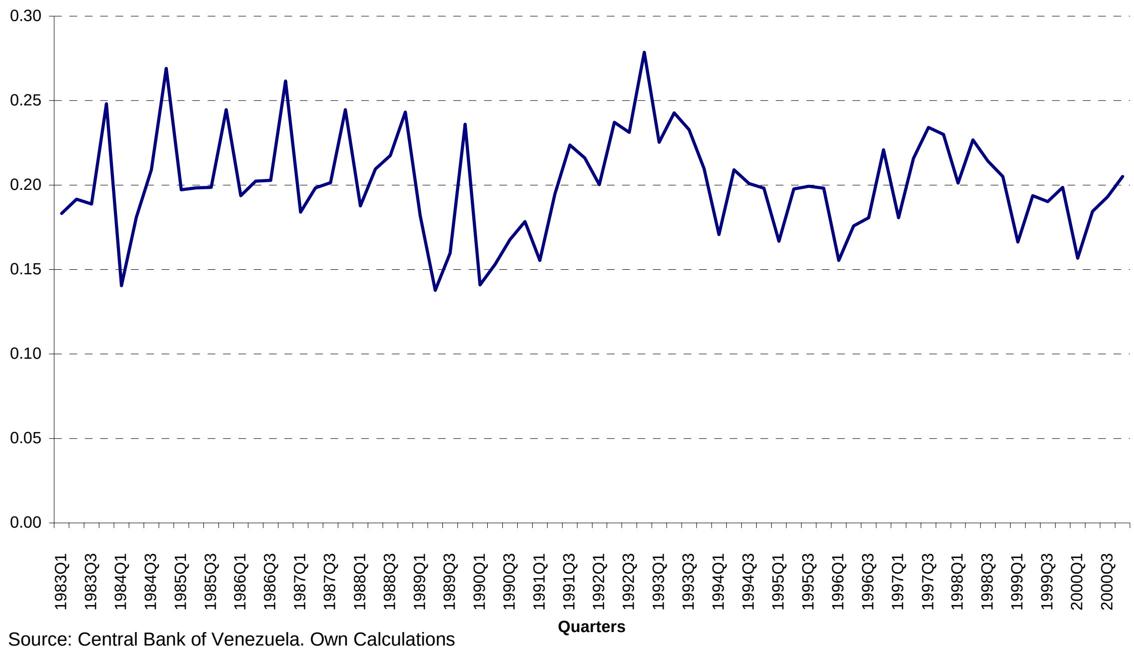
Source: Central Bank of Venezuela. Own Calculations

Figure A.20: Venezuela: INVR = Total Gross Fixed Capital Formation / GDP



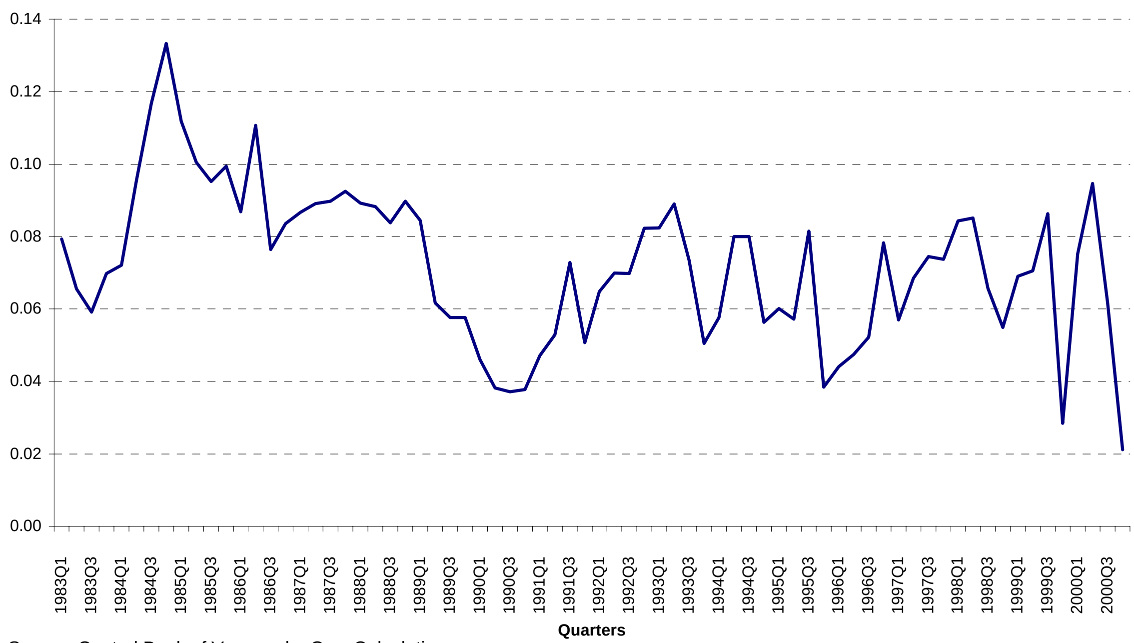
Source: Central Bank of Venezuela. Own Calculations

Figure A.21: Venezuela: INVRNO = Total Gross Fixed Capital Formation / Non-Oil GDP



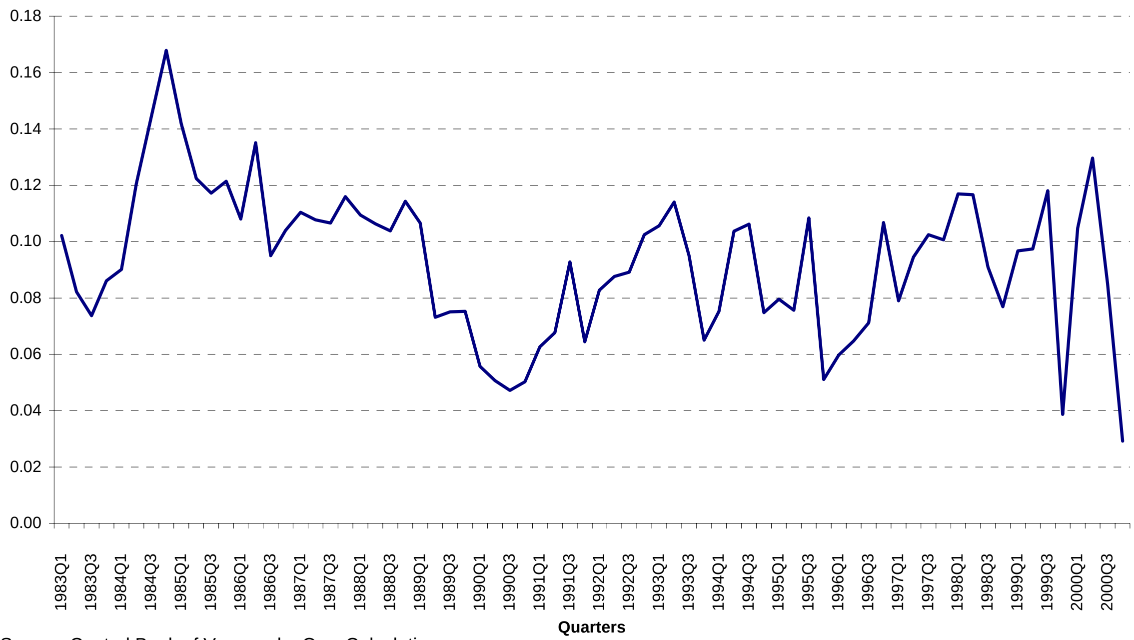
Source: Central Bank of Venezuela. Own Calculations

Figure A.22: Venezuela: INVRP = Private Gross Fixed Capital Formation / GDP



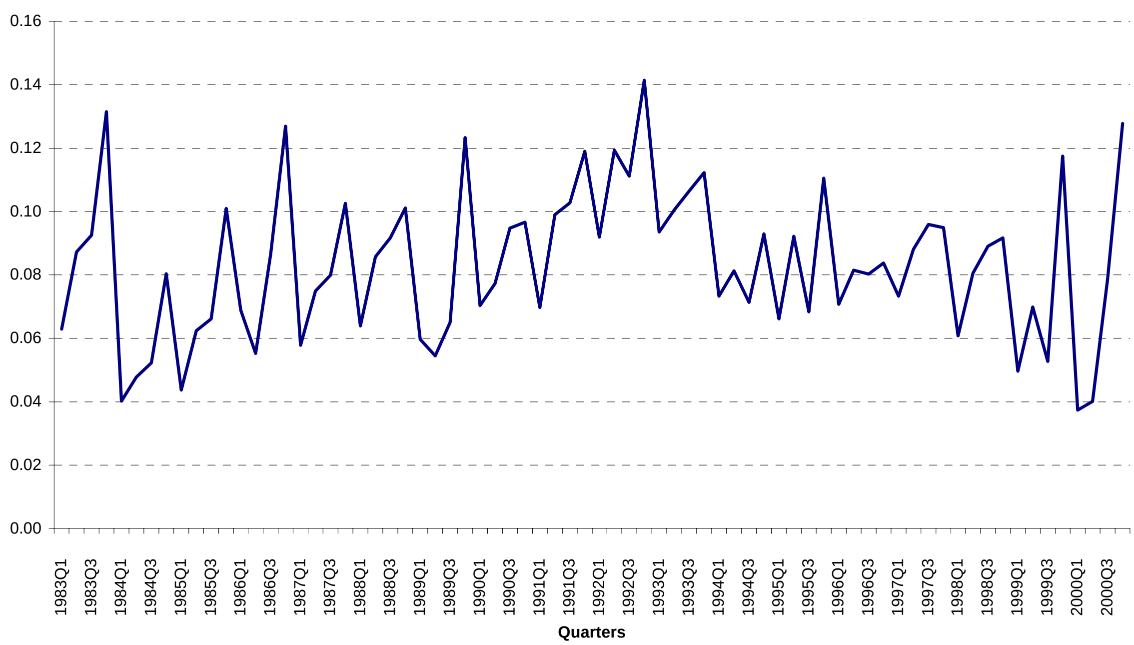
Source: Central Bank of Venezuela. Own Calculations

Figure A.23: Venezuela: INVRPNO = Private Gross Fixed Capital Formation / Non-Oil GDP



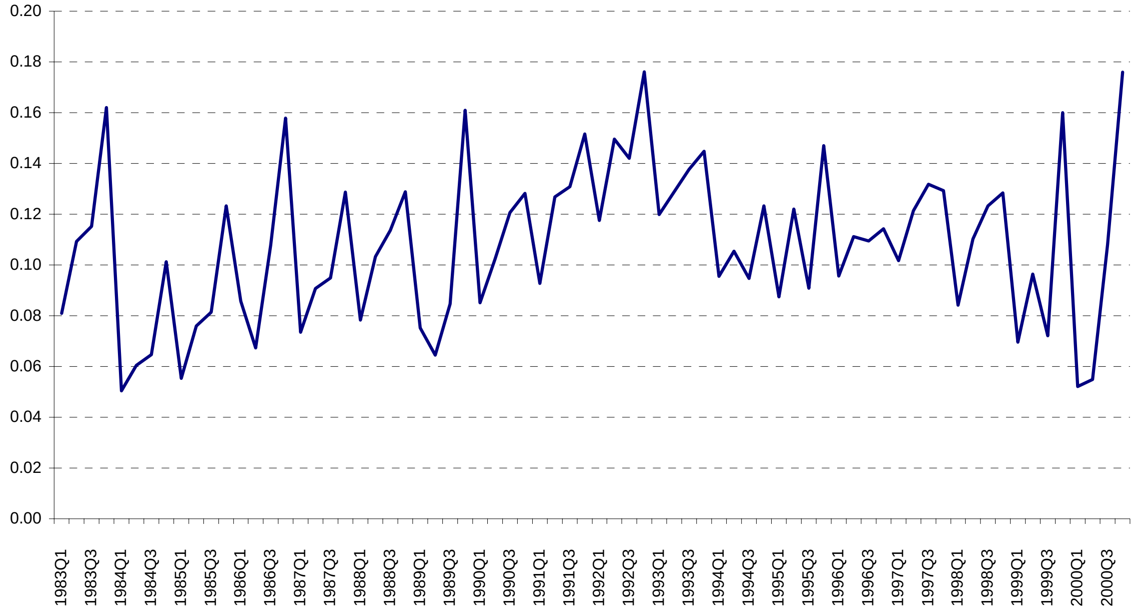
Source: Central Bank of Venezuela. Own Calculations

Figure A.24: Venezuela: INVRG = Government Gross Fixed Capital Formation / GDP



Source: Central Bank of Venezuela. Own Calculations

Figure A.25: Venezuela: INVRGNO = Government Gross Fixed Capital Formation / Non-Oil GDP



Source: Central Bank of Venezuela. Own Calculations

A.2 Main Statistics of Variables

Table A.2: Main Statistics of the Variables used in the Econometric Study

Sample period: 1983Q1 to 2000Q4

Variable(s)	GDPNOC	OILP	GFCFTC	GFCFPC	GFCFGC	GEXPRC
Maximum	5746.5	29.09	1600.6	856.282	1011.7	1735.6
Minimum	4175.4	9.93	647.8401	133.4351	217.2348	580.8676
Mean	4964.4	18.5924	1003.7	464.1161	539.5792	1195.3
Std. Deviation	351.785	5.6233	200.0371	138.3666	170.7862	272.6556
Skewness	-0.1617	0.61748	0.35424	0.002424	0.27436	0.15261
Kurtosis - 3	-0.65773	-0.82063	-0.11051	-0.0056222	-0.40644	-0.64555
Coef of Variation	0.070861	0.30245	0.1993	0.29813	0.31652	0.22811

Variable(s)	INF	RATE	PII1	PII2	PII3	PII4
Maximum	0.31292	0.045497	3.9887	4.5727	4.2454	4.303
Minimum	0.007501	-0.23945	-1.6489	-1.6695	-1.5963	-1.6339
Mean	0.07613	-0.024844	0.098891	0.132882	0.05934	0.092661
Std. Deviation	0.054083	0.050163	1.486	1.3583	1.4136	1.2959
Skewness	1.8914	-1.877	1.0582	0.98425	1.1052	0.98017
Kurtosis - 3	5.0359	4.2707	0.308	0.74618	0.71372	0.63943
Coef of Variation	0.71041	2.0191	15.0269	10.2222	23.8218	13.9853

Variable(s)	PII5	XGDPNOC	XGFCFTC	XGFCFPC	XGFCFGC	XGEXPRC
Maximum	4.3815	0.10025	0.42423	0.93004	0.81722	0.52202
Minimum	-1.6009	-0.14948	-0.80963	-1.0973	-1.2557	-0.60136
Mean	0.10269	-0.0026086	-0.010889	-0.023927	-0.0037577	0.0008332
Std. Deviation	1.2761	0.055223	0.24417	0.30194	0.43352	0.25917
Skewness	1.0258	-0.57761	-0.98482	-0.85675	-0.85757	-0.26183
Kurtosis - 3	0.89353	-0.39123	0.71389	3.4101	0.38423	-0.53927
Coef of Variation	12.4262	21.1697	22.4226	12.6195	115.3666	311.0365

Variable(s)	XOILP	INVR	INVRNO	INVRP	INVRPNO	INVRG
Maximum	0.47368	0.22363	0.27853	0.13328	0.1679	0.14134
Minimum	-0.62676	0.11223	0.1376	0.021149	0.029112	0.037344
Mean	-0.0021235	0.15534	0.20097	0.07214	0.093099	0.083202
Std. Deviation	0.16696	0.025403	0.30008	0.21204	0.025983	0.023681
Skewness	-0.59638	0.40604	0.17293	0.091207	-0.02618	0.21516
Kurtosis - 3	2.9602	-0.086758	-0.04039	0.14696	0.15403	-0.43924
Coef of Variation	78.6255	0.16353	0.14932	0.29393	0.27909	0.28462

Variable(s)	INVRGNO
Maximum	0.17605
Minimum	0.050364
Mean	0.10787
Std. Deviation	0.030656
Skewness	0.14821
Kurtosis - 3	-0.57414
Coef of Variation	0.2842

Source: Own Calculations

A.3 Cointegration Test (Johansen's ML Procedure)
A.3.1 Cointegration Tests (Johansen's ML Procedure) GDPNOC OILP, both Endogenous

A.3.1.1 Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP Intercept
List of eigenvalues in descending order:
.10059 .034203 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	8.0573	15.8700	13.8100
r<= 1	r = 2	2.6449	9.1600	7.5300

Use the above table to determine r (the number of cointegrating vectors).

A.3.1.2 Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP Intercept
List of eigenvalues in descending order:
.10059 .034203 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r>= 1	10.7021	20.1800	17.8800
r<= 1	r = 2	2.6449	9.1600	7.5300

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.1.3 Cointegration with no intercepts or trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of eigenvalues in descending order:
.085611 .027261

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.8020	11.0300	9.2800
r<= 1	r = 2	2.1006	4.1600	3.0400

Use the above table to determine r (the number of cointegrating vectors).

A.3.1.4 Cointegration with no intercepts or trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of eigenvalues in descending order:
.085611 .027261

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r>= 1	8.9026	12.3600	10.2500
r<= 1	r = 2	2.1006	4.1600	3.0400

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.1.5 Cointegration with unrestricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of eigenvalues in descending order:
.084551 .015092

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.7139	14.8800	12.9800
r <= 1	r = 2	1.1557	8.0700	6.5000

Use the above table to determine r (the number of cointegrating vectors).

A.3.1.6 Cointegration with unrestricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of eigenvalues in descending order:
.084551 .015092

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r>= 1	7.8696	17.8600	15.7500
r<= 1	r = 2	1.1557	8.0700	6.5000

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.1.7 Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP Trend
List of eigenvalues in descending order:
.094125 .063338 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	7.5129	19.2200	17.1800
r<= 1	r = 2	4.9729	12.3900	10.5500

Use the above table to determine r (the number of cointegrating vectors).

A.3.1.8 Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP Trend
List of eigenvalues in descending order:
.094125 .063338 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r>= 1	12.4858	25.7700	23.0800
r<= 1	r = 2	4.9729	12.3900	10.5500

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.1.9 Cointegration with unrestricted intercepts and unrestricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of eigenvalues in descending order:
.083400 .022208

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.6184	18.3300	16.2800
r<= 1	r = 2	1.7068	11.5400	9.7500

Use the above table to determine r (the number of cointegrating vectors).

A.3.1.10 Cointegration with unrestricted intercepts and unrestricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

64 observations from 1985Q1 to 2000Q4. Order of VAR = 8.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of eigenvalues in descending order:
.083400 .022208

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r>= 1	8.3252	23.8300	21.2300
r<= 1	r = 2	1.7068	11.5400	9.7500

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.2 Contegration Tests (Johansen's ML Procedure): GDPNOC Endogenous, OILP Exogenous

A.3.2.1 Cointegration with no intercepts or trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.031939 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	2.5968	8.1300	6.4900

Use the above table to determine r (the number of cointegrating vectors).

A.3.2.2 Cointegration with no intercepts or trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.031939 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	2.5968	8.1300	6.4900

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.2.3 Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Intercept
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.072362 .0000 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.0091	12.4500	10.5000

Use the above table to determine r (the number of cointegrating vectors).

A.3.2.4 Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Intercept
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.072362 .0000 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.0091	12.4500	10.5000

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.2.5 Cointegration with unrestricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.053560 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	4.4038	11.4700	9.5300

Use the above table to determine r (the number of cointegrating vectors).

A.3.2.6 Cointegration with unrestricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.053560 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	4.4038	11.4700	9.5300

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.2.7 Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Trend
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.065594 0.00 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	5.4276	15.4400	13.3100

Use the above table to determine r (the number of cointegrating vectors).

A.3.2.8 Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Trend
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.065594 0.00 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	5.4276	15.4400	13.3100

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.2.9 Cointegration with unrestricted intercepts and unrestricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.065533 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	5.4223	14.5300	12.4300

Use the above table to determine r (the number of cointegrating vectors).

A.3.2.10 Cointegration with unrestricted intercepts and unrestricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of eigenvalues in descending order:
.065533 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	5.4223	14.5300	12.4300

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.3 Cointegration Tests (Johansen's ML Procedure): GDPNOC I(1) END, OILP I(1) EXO, PII3I(0)

A.3.3.1 Cointegration with no intercepts or trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.033262 .0000

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	2.7063	8.1300	6.4900

Use the above table to determine r (the number of cointegrating vectors).

A.3.3.2 Cointegration with no intercepts or trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.033262 .0000

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	2.7063	8.1300	6.4900

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.3.3 Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Intercept
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.092990 .0000 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	7.8082	12.4500	10.5000

Use the above table to determine r (the number of cointegrating vectors).

A.3.3.4 Cointegration with restricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Intercept
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.092990 .0000 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	7.8082	12.4500	10.5000

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.3.5 Cointegration with unrestricted intercepts and no trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.071721 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	5.9538	11.4700	9.5300

Use the above table to determine r (the number of cointegrating vectors).

A.3.3.6 Cointegration with unrestricted intercepts and no trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.071721 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	5.9538	11.4700	9.5300

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.3.7 Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Trend
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.073772 0.00 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.1308	15.4400	13.3100

Use the above table to determine r (the number of cointegrating vectors).

A.3.3.8 Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP Trend
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.073772 0.00 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	6.1308	15.4400	13.3100

Use the above table to determine r (the number of cointegrating vectors).

***

A.3.3.9 Cointegration with unrestricted intercepts and unrestricted trends in the VAR Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.020189 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	1.6317	14.5300	12.4300

Use the above table to determine r (the number of cointegrating vectors).

A.3.3.10 Cointegration with unrestricted intercepts and unrestricted trends in the VAR Cointegration LR Test Based on Trace of the Stochastic Matrix

68 observations from 1984Q1 to 2000Q4. Order of VAR = 4.
List of variables included in the cointegrating vector:
GDPNOC OILP
List of I(1) exogenous variables included in the VAR:
OILP
List of I(0) variables included in the VAR:
PII3
List of eigenvalues in descending order:
.020189 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Valu
r = 0	r = 1	1.6317	14.5300	12.4300

Use the above table to determine r (the number of cointegrating vectors).

***

A.4 Granger Causality Tests

Table A.4: Granger Causality Tests

Sample: 1983 - 2000 (Quarterly Data). Included Observations: 67 after adjusting enpoints. Number of Lags: 4

A. Null hypothesis: political instability (PII_k) does not Granger cause growth (XGDPNOC)

Regression Including intercept and seasonal dummies		Regression Including intercept	
PII_k	Log-likelihood ratio	PII_k	Log-likelihood ratio
PII1	4.7171	*PII1*	2.5129
PII2	3.8074	*PII2*	3.4707
PII3	4.3200	*PII3*	2.3225
PII4	4.6118	*PII4*	5.0451
PII5	4.2891	*PII5*	5.6848

B. Null hypothesis: growth (*XGDPNOC*) does not Granger cause political instability (PII_k)

Regression Including intercept and seasonal dummies		Regression Including intercept	
PII_k	Log-likelihood ratio	PII_k	Log-likelihood ratio
PII1	2.3669	*PII1*	4.9835
PII2	6.2341	*PII2*	5.2461
PII3	1.1687	*PII3*	4.7278
PII4	2.8992	*PII4*	2.8340
PII5	4.2856	*PII5*	3.0234

Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767

Source: Own Calculations

A.5 Estimations of model (6a) [Extension of the basic model (6) adding the second, third, and fourth principal component associated with the set of —original— political variables used in the analysis]

The empirical model to be estimated is:

$$XGDPNOC_t = a_0 + \sum_{i=1}^{3} a_i S_i + \sum_{i=1}^{4} b_i XGDPNOC_{t-i} + \sum_{i=0}^{4} c_i XOILP_{t-i} + \sum_{i=0}^{4} h_i PII_{k,t-i} + \sum_{i=0}^{4} p_{2i} PC2S_{k,t-i} + \sum_{i=0}^{4} p_{3i} PC3S_{k,t-i} + \sum_{i=0}^{4} p_{4i} PC4S_{k,t-i} + u_t, \qquad (6a)$$

where $PC2$, $PC3$, and $PC4$ stand for the second, third, and fourth principal component of the set of —original— political variables included respectively, S_k (k = 1, 2, 3, 4, 5) denotes the sample of political variables used (each one corresponding to one of the five different samples of political protests considered in our analysis, as specified in the text), and the rest of variables and notations are the same as those employed in the basic empirical model estimated (i.e., model (6)). (Recall that our political instability index, PII, is the first principal component.)

The results of the estimations of the parsimonious specification of model (6a) for each of the samples of political variables used are reported in the following tables (Table A.5.1 reports the OLS estimations and Table A.5.2 reports the IV estimations):

Table A.5.1: Economic Growth and Political Instability – Regressions 1AP
[Model (6a) estimated with OLS]

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC*)
Sample: 1983 - 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoitnts
Regressions 1AP. Method: OLS [a]

	1AP.1	1AP.2	1AP.3	1AP.4	1AP.5
Constant	0.04349 (8.110)***	0.04360 (8.107)***	0.04253 (7.907)***	0.04234 (7.8485)***	0.04206 (7.787)***
S1	-0.12902 (-12.671)***	-0.12892 (-12.652)***	-0.12869 (-12.499)***	-0.12869 (-12.513)***	-0.12810 (-12.429)***
S3	-0.04596 (-5.087)***	-0.04524 (-5.026)***	-0.04356 (-4.844)***	-0.04197 (-4.677)***	-0.04123 (-4.593)***
XGDPNOC (-3)	0.30606 (3.958)***	0.30796 (3.9769)***	0.29996 (3.850)***	0.30491 (3.904)***	0.30814 (3.938)***
XOILP (-3)	0.05793 (2.967)***	0.05645 (2.897)***	0.05605 (2.8573)***	0.05279 (2.699)***	0.05163 (2.641)**
PII1	-0.00666 (-2.794)***				
PC4S1	-0.00699 (-2.509)**				
PII2		-0.00726 (-2.850)***			
PC4S2		-0.06200 (-2.259)**			
PII3			-0.00615 (-2.506)**		
PC4S3			-0.00654 (-2.354)**		
PII4				-0.00713 (-2.707)***	
PC4S4				-0.00518 (-1.876)*	
PII5					-0.00736 (-2.757)***
PC4S5					-0.00474 (-1.724)*
R^2-bar	0.7576	0.7574	0.7535	0.7533	0.7533
S.E. of Regression	0.0269	0.0269	0.0271	0.0271	0.0271
Serial Correlation [b, f]	2.4846	3.1762	1.9271	2.1144	2.3768
RESET [c, g]	1.8320	1.6108	2.1920	1.700	1.5686
Normality [d, h]	2.0832	1.6035	2.0867	1.8345	1.5904
Heteroscedasticity [e, g]	1.8713	1.5432	1.4982	1.3237	1.3348

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103

Source: Own Calculations

Table A.5.2: Economic Growth and Political Instability – Regressions 1BP [Model (6a) estimated with PII_k, $PC2S_k$, $PC3S_k$ and $PC4S_k$ instrumented; k = 1, 2, 3, 4, 5]

Dependent Variable: growth rate of real per capita non-oil GDP (*XGDPNOC*)
Sample: 1983 – 2000 (Quarterly Data). Included Observations: 67 after adjusting endpoints
Regressions 1BP. Method: Instrumental Variable ($PII_{k,t}$, $PC2S_{k,t}$, $PC3S_{k,t}$, $PC4S_{k,t}$ instrumented [a,i] ; *k* = 1,2,3,4,5).

Constant	0.04403 (8.103)***	0.04406 (8.083)***	0..04283 (7.851)***	0.04235 (7.653)***	0.04199 (7.563)***
S1	-0.12815 (-12.442)***	-0.12810 (-12.443)***	-0.12775 (-12.189)***	-0.12719 (-12.055)***	-0.12621 (-11.916)***
S3	-0.04762 (-5.1423)***	-0.04645 (-5.070)***	-0.04464 (-4.869)***	-0.04223 (-4.586)***	-0.04228 (-4.471)***
XGDPNOC (-3)	0.31194 (3.981)***	0.31403 (4.007)***	0.30674 (3.872)***	0.31690 (3.947)***	0.32140 (3.987)***
XOILP (-3)	0.06023 (3.039)***	0.05796 (2.943)***	0.05812 (2.911)***	0.05368 (2.685)***	0.05197 (2.603)**
PII1	-0.00855 (-2.698)***				
PC4S1	-0.00916 (-2.076)**				
PII2		-0.00893 (-2.667)***			
PC4S2		-0.00811 (-1.893)*			
PII3			-0.00773 (-2.386)**		
PC4S3			-0.00981 (-2.237)**		
PII4				-0.00941 (-2.624)**	
PC4S4				-0.00919 (-2.051)**	
PII5					-0.01014 (-2.734)***
PC4S5					-0.00822 (-1.805)*
GR^2-bar [j]	0.7507	0.7544	0.7495	0.7585	0.7578
S.E. of Regression	0.0270	0.0270	0.0274	0.0277	0.0276
Serial Correlation [b, f]	3.0773	4.1016	2.4288	2.5232	3.0175
RESET [c, g]	0.1012	0.0382	0.0907	0.0192	0.0017
Normality [d, h]	1.8765	1.2698	1.6956	1.0035	0.6662
Heteroscedasticity [e, g]	3.7377	2.7018	3.8480	3.5327	3.4409
Sargan's test [k, l]	13.8457	13.7431	14.3469	14.9600	16.0595

Notes: (a) Values in parenthesis are t-statistics. (***), (**) and (*) denote statistical significance at 1%, 5% and 10% levels respectively. (b) LM test of residual serial correlation (ρ = 4). (c) Ramsey's RESET test using the square of the fitted values (LM version). (d) LM test based on skewness and kurtosis of residuals. (e) LM test based on the regression of squared residuals on squared fitted values. (f) Critical values [CHSQ(4)]: 10% = 7.7055, 5% = 9.4877, 1% = 13.2767. (g) Critical values [CHSQ(1)]: 10% = 2.7055, 5% = 3.8146, 1% = 6.6349. (h) Critical values [CHSQ(2)]: 10% = 4.6052, 5% = 5.99146, 1% = 9.2103. (i) Instruments used: constant, seasonal dummies, contemporaneous and lagged values of XOILP, lagged values of XGDPNOC, XGEXPRC, INF, PII*k*, PC2S*k*, PC3S*k*, *and* PC4S*k* ; *k* = 1, 2, 3, 4, 5. (j) Generalized R^2-bar, proposed by Pasaran and Smith (1994). (k) Sargan's (1964) test for testing misspecification of the regression and the validity of the set of instruments. (l) Critical values [CHSQ(30)]: 10% = 40.3 , 5% = 43.8 , 1% = 50.9.

Source: Own Calculations

The loadings of the second, third, and fourth principal component for each of the five samples of the —original— political variables used (which are differentiated by the use of the five samples of political protests as specified in the text) are shown in the following tables:

Table A.5.3: Loadings of the Second Principal Component (PC2) for each of the Samples of Political Variables (Protests)

Variables	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
STRIKE	0.20174	0.36892 **	0.21643	0.30981 **	-0.30217 **
DEM	0.10954	0.06132	0.05695	0.0092	0.00841
NCF	0.25456 *	0.10446	0.22274 *	0.06504	-0.04695
RIOT	-0.17433	-0.12489	-0.12176	-0.07499	0.03241
REGIME	-0.51308 **	-0.46149 **	-0.47687 **	-0.44292 **	0.43401 **
ELECTION	0.39496 **	0.48312 **	0.49389 **	0.5187 **	-0.52774 **
PROVISIONAL	-0.06371	0.11535	0.06825	0.18333	-0.20518
COUP	0.07275	0.10056	0.15049	0.1558	-0.15897
REFERENDUM	0.43223 **	0.26703 *	0.34873 **	0.18839	-0.12175
CARACAZO	-0.19247	-0.14235	-0.13502	-0.12532	0.12296
IMPEACHMENT	-0.07684	-0.12794	-0.16791	-0.21667	0.23147 *
CEA	-0.44016 **	-0.50586 **	-0.46776 **	-0.52234 **	0.53628 **

Note: * and ** denote statistical significance at 5% level and 1% level respectively.

Critical values from Koutsouyiannis (1977: 432)

Source: PPED, Own Calculations

Table A.5.4: Loadings of the Third Principal Component (PC3) for each of the Samples of Political Variables (Protests)

Variables	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
STRIKE	-0.06172	0.06791	0.03531	0.03192	0.03013
DEM	0.05961	-0.00108	0.04901	0.03736	0.04438
NCF	-0.12028	-0.16194	-0.17558	-0.18621	-0.17939
RIOT	0.11109	0.05993	0.03934	-0.0272	-0.06459
REGIME	0.37274 **	0.55933 **	0.49228 **	0.60362 **	0.61832 **
ELECTION	0.41702 **	0.22008 *	0.27222 *	0.16216	0.15728
PROVISIONAL	0.70196 **	0.69891 **	0.71131 **	0.67223 **	0.65969 **
COUP	0.06404	-0.09017	-0.054	-0.12685	-0.1241
REFERENDUM	-0.06273	-0.07065	-0.11605	-0.00874	0.02179
CARACAZO	-0.2213 *	-0.20568	-0.26822 *	-0.29215 **	-0.30075 **
IMPEACHMENT	-0.25214 *	-0.23303 *	-0.18038	-0.13072	-0.11038
CEA	-0.19914	-0.07794	-0.14391	-0.03159	-0.00399

Note: * and ** denote statistical significance at 5% level and 1% level respectively.

Critical values from Koutsouyiannis (1977: 432)

Source: PPED, Own Calculations

Table A.5.5: Loadings of the Fourth Principal Component (PC4)
for each of the Samples of Political Variables (Protests)

Variables	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
STRIKE	0.06258 **	0.06042	0.06258	0.08797	0.12497
DEM	0.00654	-0.06475	0.00654	-0.08858	-0.15048
NCF	-0.17595	-0.11626	-0.17595	-0.06850	-0.05302
RIOT	0.51725 **	0.50299 **	0.51725 **	0.40412 **	0.35532 **
REGIME	-0.28274 **	-0.22237 *	-0.28274 *	-0.10035	-0.03109
ELECTION	-0.04077	-0.06867	-0.04077	-0.20703	-0.24443 *
PROVISIONAL	0.06898	0.03203	0.06898	0.14950	0.17109
COUP	-0.12508 **	-0.10307	-0.12508	-0.30836 **	-0.30169 **
REFERENDUM	-0.44959 **	-0.44387 **	-0.44959 **	-0.50958 **	-0.58545 **
CARACAZO	0.45984 **	0.46676 **	0.45984 **	0.38447 **	0.34521 **
IMPEACHMENT	-0.38393 *	-0.43015 **	-0.38393 **	-0.39410 **	-0.35592 **
CEA	-0.29233	-0.24475 *	-0.29330 **	-0.28850 *	-0.25114 *

Note: * and ** denote statistical significance at 5% level and 1% level respectively.

Critical values from Koutsouyiannis (1977: 432)

Source: PPED, Own Calculations

Bibliographic References

Aizenman, J. and Marion, N. (1991) Policy uncertainty, persistence and growth. *NBER Working Paper No. 3848*

Alesina, A., Ozler, S., Roubini, N. and Swagel, P. (1996) Political Instability and Economic Growth. *Journal of Economic Growth* **1**, 1989-211.

Alesina, A. and Perotti, R. (1996) Income distribution, political instability, and investment. *European Economic Review* **40**, 1203-1228.

Asteriou, D. and Price, S. (2001) Political instability and economic growth: UK time series evidence. *Scottish Journal of Political Economy* **48**, 383-399.

Asteriou, D. and Siriopoulos, C. (2000) The role of political instability in stock market development and economic growth: The case of Greece. *Economic Notes* **29**, 355-374.

Barro, R.J. (1991) Economic growth in a cross section of countries. *Quarterly Journal of Economics* **106**, 407-44.

Barro, R.J. and Sala-I-Martin, X. (1995) *Economic Growth*, edn. New York: McGraw-Hill, Inc.

Campos, N. and Nugent, J. (2002) Who is afraid of political instability? *Journal of Development Economics* **67**, 157-72.

Campos, N., Nugent, J. and Robinson, J. (1999) Can political instability be good for growth? The case of the Middle East and North Africa. *University Southern California.* Mimeo

Chen, B. and Feng, Y. (1996) Some political determinants of economic growth: Theory and empirical implications. *European Journal of Political Economy* **12**, 609-627.

Darby, J., Li, C.-W. and Muscatelli, V.A. (2004) Political uncertainty, public expenditures and growth. *European Journal of Political Economy* **20**, 153-79.

Doldado, J., Jenkinson, T. and Sosvilla-Rivero, S. (1990) Cointegration and unit roots. *Journal of Economic Surveys* **4**, 249-73.

Easterly, W. and Robelo, S. (1993) Fiscal policy and economic growth. *Journal of Monetary Economics* **32**, 417-458.

Enders, W. (1995) *Applied econometric time series*, New York: Wiley.

Fosu, A.K. (1992) Political instability and economic growth: evidence from Sub-Saharan Africa. *Economic Development and Cultural Change* **40**, 829-41.

Fosu, A.K. (2001) Political instability and economic growth in developing economies: some specification empirics. *Economic Letters* **70**, 289-294.

Hausman, J.A. (1978) Specification tests in econometrics. *Econométrica* **46**, 1251-1271.

Hendry, D. (1979) Predictive failure and econometric modelling in macroeconomics: the transactions demand for money. In: Ormerod, P., (Ed.) *Economic Modelling*, pp. 217-42. Heinemann]

Hibbs, D.A.Jr. (1973) Mass political violence: A cross-national causal analysis. ., (Ed.) New York: Wiley.

Jong-A-Ping, R. (2006) On the measurement of political instability and its impact on economic growth. *University of Groningen. The Netherlands. Mimeo*

Knack, S. and Keefer Phillip (1995) Institutions and economic performance: cross-country tests using alternative institutional measures. *Economics and Politics* **7**, 207-227 .

Koutsoyiannis, A. (1977) Theory of econometrics: an introductory exposition of econometric methods. London: The Macmillan Press LTD.

Levine, R. and Zervos, S. (1996) Stock market development and long-run growth. *World Bank Economic Review* **10**, 323-339.

Londregan, J. and Poole, K.T. (1990) Poverty, the coup trap, and the seizure of executive power. *World Politics* 151-183.

Maddala, G.S. (1992) *Introduction to econometrics*, edn. New York: Prentice Hall International.

Muñoz, R (2009) *Measuring and Analysing Socio-Political Unrest and Political Instability in Venezuela: 1980-2000*. Mercantil Bank. Economic Research Unit. Working Papers Series: Year 9, Number 1, March.

Muñoz, R (2006) *Political Uncertainty and Macroeconomic Outcomes: Theoretical and Empirical Essays.* University of Essex. Department of Economics. PhD Thesis.

Muñoz (2003) *Inestabilidad Política y Crecimiento Económico.* Mercantil Banco, Gerencia de Investigación Económica. Boletín Económico Mensual, Junio, pp 7-15.

Perron, P. (1989) The great crash, the oil price shock, and the unit root hypothesis . *Económetrica* **57**, 1361-1401.

Pesaran, M.H. and Smith, R.J. (1994) A generalized R-Bar-Squared criterion for regression models estimated by instrumental variables method. *Económetrica* **62**, 705-10.

Przeworski, A., Alvarez, M.E., Cheibub, J.A. and Limongi, F. (2000) Democracy and development: Political institutions and well-being in the world, 1950-1990. Cambridge: Cambridge University Press.

Tarrow, S. (1989) Struggle, politics, and reform: social movements and policy change during cycles of protest. Ithaca, New York: Cornell University, Westerns Societies Program, Occasional Paper 21.

Theil, H. (1979) Principles of Econometrics. New York: John Wiley and Sons.

Venieris, Y. and Gupta, D. (1986) Income distribution and sociopolitical instability as determinants of savings: A cross-section model. *Journal of Political Economy* **94**, 873-883.