

# Growth in an oil abundant economy: The case of Venezuela

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## Abstract

*Venezuela's growth experience over the past fifty years is characterised by a high economic growth rate from 1950 to 1977 and a low economic growth rate over the 1977-2003 period. In particular, we show that the country has been in a 'great depression' since the late seventies. We also show that although Venezuela has an oil abundant economy, this growth experience is largely due to the evolution of its real non-oil GDP. We perform a growth accounting exercise to quantify the extent to which the growth experience in the non-oil sector is a result of physical capital accumulation, finding that non-oil sector behavior can largely be explained by the evolution of TFP. Finally, we also make some correlations to determine whether the oil sector has affected the non-oil sector, either through its capital accumulation or through its TFP. We find that the correlation between oil revenues and capital per worker or non-oil TFP is always negative.*

JEL codes: O47, Q32

Key Words: non-renewable resources, growth accounting, TFP, oil rents.

## 1 Introduction

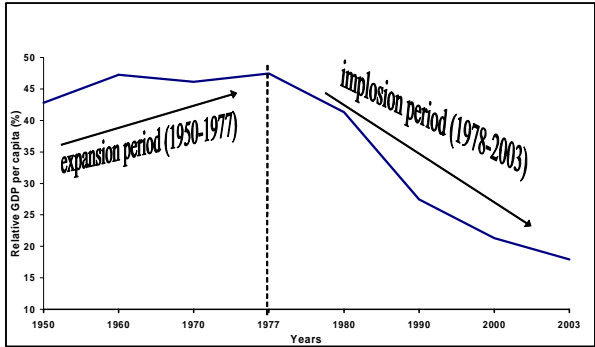
This paper focuses on the growth experience in Venezuela over the past fifty years, which is characterised by an expansion period from 1950-1977 with a high average growth rate and by an implosion period from 1977-2003 with a low average growth rate, as already noted by other authors such as Arreaza and Dorta (2004), Bello and Restuccia (2002), Del Bufalo and Ríos (2002), Hausmann (2002), Hausmann and Rigobón (2002), Rubio (2002) and Schliesser and Silva (2000), amongst others. Following the definition of depression by Kehoe and Prescott (2002, 2007), our first finding is that Venezuela has been in a 'great depression' since the late seventies (as also pointed out by Bello and Restuccia, 2002) as the three conditions stated by these authors are satisfied.

As many of the above authors mention, the collapse suffered by Venezuela is so spectacular that its per capita Real Gross Domestic Product in 2003 (RGDP per capita 2003 = 6253) fell practically to 1960 levels (RGDP per capita 1960 = 6092). If we measure the country's wealth

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through GDP and compare it at the international level, the Venezuelan economy has also suffered a relative loss of wealth, as pointed out by Saez and Pineda (2004), amongst others.



**Figure 1. Venezuelan / USA GDP (per capita)**

Venezuela has been an oil abundant economy since the late 1920s and a mayor oil exporter since the early fifties. There is extensive theoretical and empirical literature regarding the curse of natural resources: see Gylfason (2001a, 2001b) Gylfason et al. (1999), Hausmann (2002), amongst others. These papers study the factors that could lead an oil abundant economy to sluggish economic growth, focusing on several phenomena such as the Dutch disease, lack of human capital accumulation, corruption and rent seeking as well as deficiencies in institutions. All these hypotheses assume that oil rents have a negative effect on non-oil sector behavior. In this paper, we will use simple correlations to analyze whether oil rents might have affected the non-oil sector, either through its capital accumulation or through its total factor productivity (TFP).

Several papers have analyzed the Venezuelan growth experience over the last fifty years. For example, Bello and Restuccia (2002)<sup>1</sup> point to rent seeking and public economic policy failures as the factors behind the paradoxical behavior of the Venezuelan economy in the last fifty years, which is characterised by a high recorded economic growth rate over the 1950-1976 period and a low economic growth rate over the 1976-1995 period. Moreover, these authors claim that the growth experience has nothing to do with the fact that Venezuela is an oil abundant economy.

However, other authors attribute the origin of Venezuela’s poor policy-making to its abundance of oil. Among those descriptive papers, Karl (1997) states that it is a representative oil producing country whose political system is based on the redistribution of petroleum rents,

leaving the political system with no tradition of justifying the state's use of general taxation, with string-pulling (*'amiguismo'*) and rent seeking taking place outside standardised parameters. Hausmann (2002) mentions the presence of oil-created mechanisms for conflict resolution based on the redistribution of oil rents. Nevertheless, whatever the origin of these bad government policies, the quality of the institutions in Venezuela, as measured through procedures required to become an entrepreneur in a given economy, is somewhat low according to some estimates, as indicated in Djankov et al. (2002).

Through theoretical studies that provide a model for studying changes over time in GDP in an oil abundant economy like Venezuela's, authors such as Chalk (1998), Rodriguez and Sachs (1999), among others, find that the good and bad growth experience is not surprising, taking into account that exhaustible resource industries cannot expand at the same rate as other industries. In the steady state, production of the natural resource will tend to zero, but in the transition to this state, the natural resource allows an economy to afford extraordinary consumption possibilities. Finally, Hausmann and Rigobón (2002) remark on the concept of 'inefficient specialization' which implies a more volatile exchange rate and a slowdown in economic growth.

Unlike most of those papers, our paper does not provide a model, but instead considers a growth accounting exercise to analyze the factors behind the Venezuelan growth experience. We focus on the dynamics of non-oil real GDP due to the fact that changes over time in total GDP are practically the same as those observed for non-oil GDP in the 1950-2003 period, in spite of oil production accounting for around an average of 20 per cent of the total GDP in this period.

In particular, we perform a growth accounting exercise for the 1950-2003 period to quantify the extent to which the economic performance of the non-oil sector in Venezuela can be explained by physical capital accumulation or by the evolution of its TFP. One of our results is that in both subperiods – the 1960-1977 expansion period and the 1977-2003 depression period - the changes in the TFP in the non-oil sector are chiefly responsible for the growth experience in Venezuela. Therefore, the decline of the TFP explains the poor performance of the Venezuelan economy in the 1977-2003 period.

Moreover, through the calculation of certain correlations, we quantify the correlation between oil rents and non-oil TFP and between oil rents and physical capital accumulation. Finally, we

find that both correlations are clearly negative. In particular, the negative correlation between oil rents and non-oil TFP over the 1960-2003 period indicates that increases in oil rents are negatively correlated with the dynamics of the non-oil sector, thus supporting the above-mentioned channels through which oil rents have a negative effect on the economy.

The rest of the paper is organised as follows: In Section 2 the data sources are given and some statistics are provided to support the description of the Venezuelan economy and show that Venezuela is in a ‘great depression’. In Section 3 a growth accounting exercise is performed to quantitatively assess the factors that explain not only the good performance of the Venezuelan economy in the 1960-1977 period, but also the collapse of growth in the 1977-2003 period. A simple statistical analysis between oil rents and the non-oil sector is analyzed in Section 4, while conclusions are presented in Section 5.

## **2 Data and Stylised Facts**

### **2.1 Data**

We use three different databases in this section. Firstly, we use the Penn World Table Version 6.2 (Heston A. et al., 2006) from which we take the following variables: Total Population, Investment Share of Real Gross Domestic Product per capita, Government Share of Gross Domestic Product per capita and Real Gross Domestic Product Chain per worker and per capita.

Secondly, since the Penn World Table gives no information about the distribution of Gross Domestic Product (GDP) between oil GDP and non-oil GDP, we use the Central Bank of Venezuela (BCV) database, in particular the National Accounts through Series Estadísticas de Venezuela (1940-1999) and Agregados Macroeconómicos (1994-2003) to gather information about oil rents and total GDP, both in constant terms (base year 1997).

We also use the Total Economy Database from The Conference Board and Groningen Growth and Development Centre (version September 2006) to calculate the average hours worked (per year) and the average labor force growth rate in order to perform the growth accounting exercise for the 1950-2003 period.

### **2.2 Stylised Facts**

This section provides some significant facts mentioned in the introduction regarding the growth experience in Venezuela and the candidate factors that may explain it, with particular attention given to oil rents since Venezuela has an oil abundant economy.

## 2.2.1 Venezuela is an oil abundant economy

### (i) Net World Oil Exporters.

As shown in Table 1 for the year 2000, Venezuela - the only American member of OPEC - was the world's fourth largest net oil exporter and the eighth largest overall world oil producer, with vast proven oil reserves. Accordingly, Venezuela is considered to be an oil abundant country.

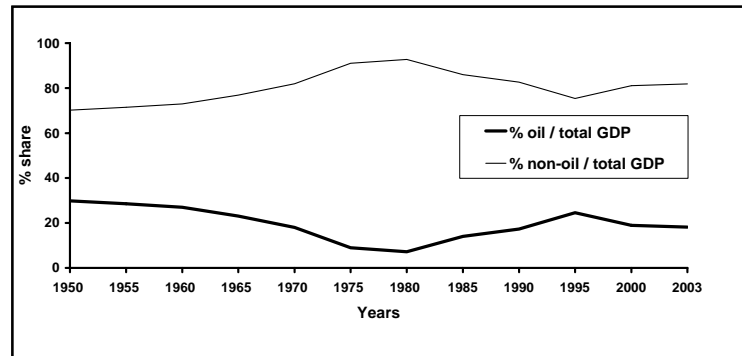
		Production	Consumption	NetOilExporter	ProvenOilReserves	
Country <sup>1</sup>	OPEC	/day <sup>2</sup>			/cap <sup>2</sup>	per cent/TW <sup>3</sup>
Saudi Arabia	yes	9.12	1.28	7.84	12,817.9	24.4
Russia	no	6.71	2.4	4.31		
Norway	no	3.32	0.21	3.11		
<i>Venezuela</i>	<i>yes</i>	<i>3.14</i>	<i>0.48</i>	<i>2.66</i>	<i>3,175.5</i>	<i>7.1</i>
Iran	yes	3.81	1.22	2.59	1,564.6	9.2
U. Arab Emirates	yes	2.51	0.33	2.18	32,277.2	9.1
Iraq	yes	2.59	0.5	2.09	4,870.1	10.4
Kuwait	yes	2.25	0.2	2.05	44,084.1	9
Nigeria	yes	2.15	0.29	1.86	271.2	3.2
Mexico	no	3.48	2.04	1.44		
OPEC					1,648.7	78.5

<sup>1</sup> Ranked by its exports, <sup>2</sup> Measured in millions of barrels of oil, <sup>3</sup> TW=Total World.  
Source: Energy Information Administration (EIA).

The Organization of Petroleum Exporting Countries (OPEC) accounted for 40 per cent of the world's oil production in 2000, but its members hold 78.5 per cent of the world's proven oil reserves and a significant portion of the global oil trade. Sixty percent of the oil pumped by non-OPEC countries is almost entirely used for domestic consumption and their oil exports are very low and decreasing rapidly.

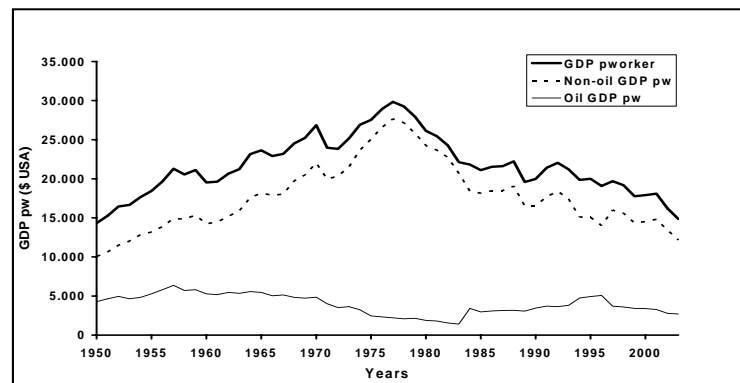
### (ii) The share of oil revenues in total GDP in Venezuela is around 20 per cent.

Figure 2 uses data from the Central Bank of Venezuela to show GDP at constant prices in local currency for oil and non-oil sectors as a percentage share. We can see the extent to which the total GDP has relied on oil rents in Venezuela in recent years and also that the ratio of the oil sector to total GDP is around 20 per cent.



**Figure 2. per cent Share of Crude Oil in Total GDP**

In order to breakdown the Penn World Table data on GDP per worker into oil and non-oil data as shown in Figure 2.1, we have used the share of these two components from the Central Bank of Venezuela database. The correlation between total GDP and non-oil GDP in the 1950-2003 period is 0.96. This contrasts with the correlation between total GDP and oil GDP in the same period, which is -0.36.



**Figure 2.1. Venezuela's GDP per worker (PPP)**

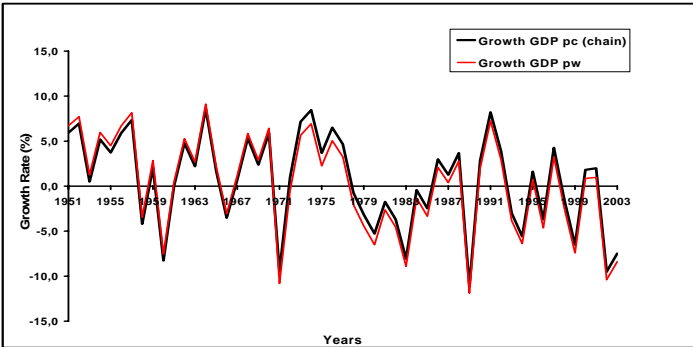
## 2.2.2 Growth experience

(i) *Changes over time in the economic growth rate in Venezuela.*

Venezuela had a high positive economic growth rate in the 1950-1977 period and a low economic growth rate in the 1977-2003 period.

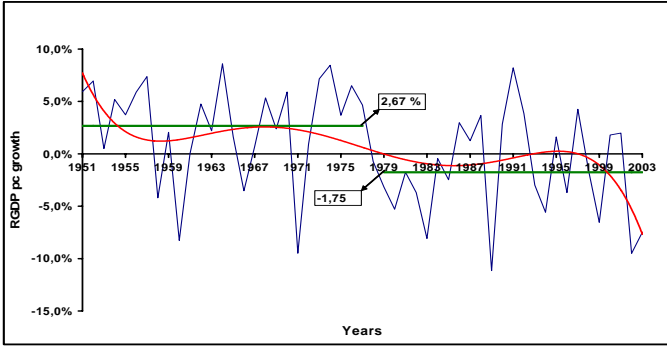
Using data from the Penn World Table, Figure 3 shows the growth experience in Venezuela over the past fifty years through the growth rate of Real GDP at the 1996 constant price (PPP)

in per capita (Chain series) and per worker terms<sup>2</sup>. Notice that the growth rate is practically the same for the two variables.



**Figure 3. Venezuela’s Real GDP growth (per capita & per worker)**

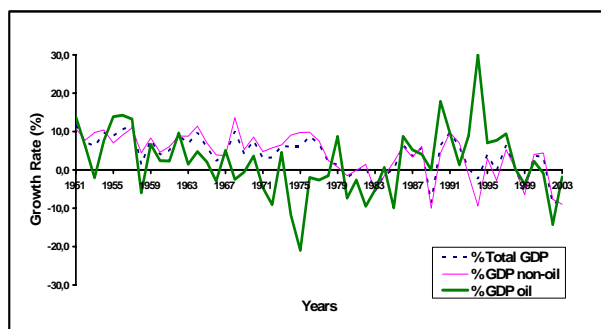
When using data from the Penn World Table to analyze the paradoxical experience of Venezuela’s GDP growth rate in per capita terms, Figure 4 shows that there is, on average, a positive growth rate of 2.67 per cent for the 1950-1977 expansion period and a negative growth rate of -1.75 per cent for the 1977-2003 implosion period.



**Figure 4 Venezuela’s Real GDP growth (per capita)**

On the other hand, Figure 5 shows that most of the changes observed in total GDP are the result of non-oil GDP dynamics (both data at constant prices from the Central Bank of Venezuela). Therefore, the factors behind both the good times and the bad times or depression experienced in Venezuela must be the same factors that explain the evolution of non-oil GDP. The correlation between the total GDP growth rate and the non-oil GDP growth rate in the

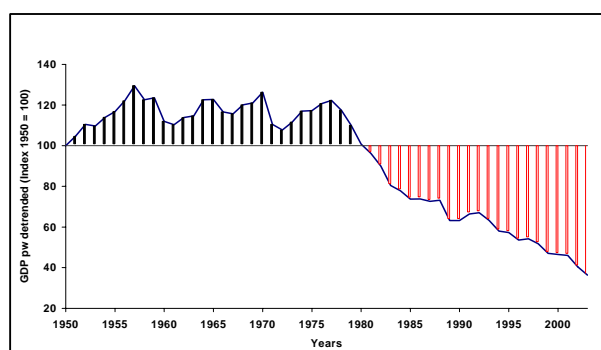
1950-2003 period is 0.92, while the correlation between the total GDP growth rate and the oil GDP growth rate in the same period is 0.11.



**Figure 5. Venezuela's GDP growth at constant prices.**

(ii) *Venezuela's GDP as a deviation from a trend.*

Figure 6 reports Venezuela's GDP per worker (data from the Penn World Table) as a deviation from the 1950 trend through the solid line which has been detrended by a common 2 per cent growth rate as described in Kehoe and Prescott (2002)<sup>3</sup>. Consequently, in Figure 6 we can see the deviation of the Venezuelan GDP per worker from the 1950 trend. We find that the behavior of the Venezuelan economy, as indicated in Bello and Restuccia (2002), can be broken down into two different subperiods. In the 1950-1977 subperiod, per worker output was above the 1950 trend and peaked in 1957 at about 30 per cent above the 1950 trend. In contrast, from the eighties onwards, the economy has been significantly below the 1950 trend value, falling to 36 per cent below the 1950 trend in 2003.

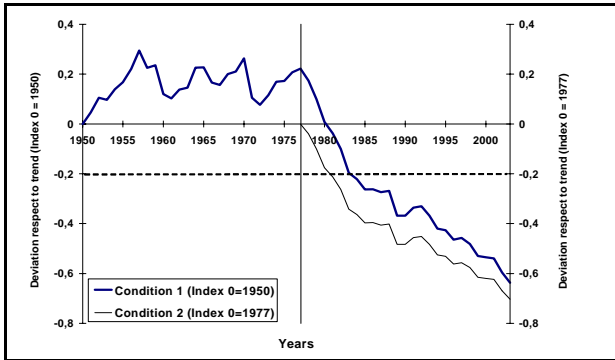


**Figure 6. Venezuela's GDP per worker (detrended by 2 per cent)**

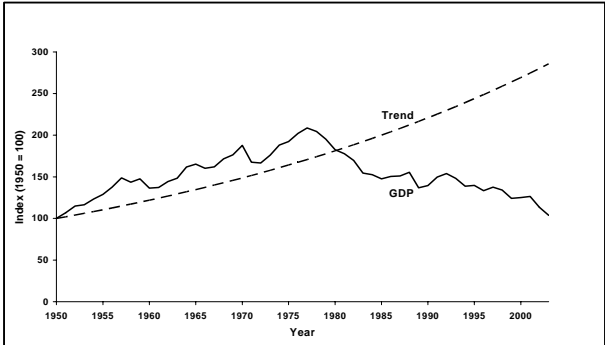
Since the beginning of the implosion period in 1977, the Venezuelan economy has declined in both a marked and rapid manner, so much so that Venezuela is considered to have been in a great depression for the last thirty-odd years, as defined by Kehoe and Prescott (2002, 2007). We have chosen 1977 as the initial year of the depression period, satisfying the three



conditions stated by these authors. First, there is a deviation of at least 20 per cent below trend in some years after the start of the recession. Second, detrended GDP per worker falls by at least 15 per cent between 1977 and 1987. Figure 7 shows these two technical conditions. Since 1983 the economy has been at least 20 per cent below trend and within the first decade from the start of the depression, in particular from 1980 onwards, the economy fell by more than 15 per cent. Third, Figure 7.1 reveals that the deviation is sustained, that is the growth rate of real GDP per worker in Venezuela was below the 2 per cent trend in the 1980-2003 period.



**Figure 7. Depression conditions according to Kehoe and Prescott’s definition**



**Figure 7.1. Real GDP per worker in Venezuela, 1950-2003**

(iii) *International Real GDP per capita (constant prices).*

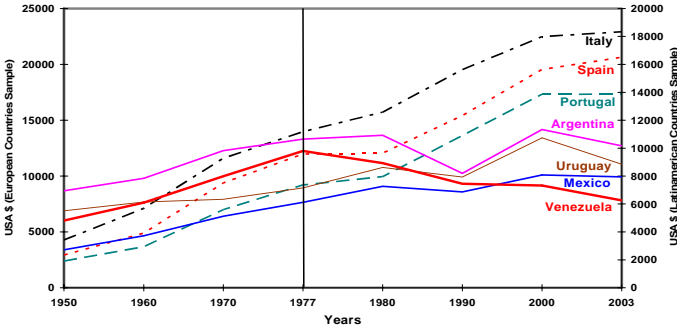
Using data from the Penn World Table (2006), Table 2 shows the Real GDP per capita at 1996 Constant Prices (Chain series) in PPP for a sample of European and Latin American countries, including Venezuela. We can see that in the fifties Venezuela was almost twice as rich as Mexico, Spain or Portugal and only slightly poorer than Uruguay. In 1977, Venezuela was 60

per cent richer than Mexico, 37 per cent richer than Uruguay and almost as rich as Portugal. However, in 2003 Venezuela was in the throes of a very deep depression, with a real GDP per capita that was three times lower than Portugal and barely 70 per cent of that of Uruguay. Venezuela was much richer in 1977 than in 2003.

<b>Table 2. GDP per capita (PPP) in constant prices</b>			
<b>Country</b>	<b>1950</b>	<b>1977</b>	<b>2003</b>
Spain	2928	11978	20644
Portugal	2386	9208	17333
Uruguay	5515	7152	8855
Mexico	2709	6127	7938
Venezuela	4809	9802	6253

Source: Penn World Table (2006)

Extending upon the previous sample, Figure 8 shows that in terms of relative GDP per capita (PPP), Venezuela was comparable to European countries like Italy or Spain during the country’s period of growth. Moreover its relative GDP per capita (PPP) was higher than other Latin American countries, with the sole exception of Argentina. In the period of recession, not only does Venezuela fall below the European average, but even below countries such as Uruguay or Mexico and in 2003 it is the poorest country in the sample.



**Figure 8. Relative GDP per capita (PPP).**

This fact is also supported through an analysis in relative terms. Table 3 shows the relative wealth of the Venezuelan economy together with a sample of other countries, with respect to the United States’ Real GDP per capita in constant prices (PPP) obtained from the Penn World Table data. Whereas Venezuela’s relative wealth in the 1950-1977 period was around 0.46, from 1977 onwards it has decreased, falling to only 0.18 of the US GDP per capita in 2003. A

decrease in the GDP of Mexico in relation to the United States' Real GDP per capita is also observed, although the drop is not as spectacular.

<b>Country</b>	<b>1950</b>	<b>1977</b>	<b>2003</b>
United States	1	1	1
Spain	0.26	0.58	0.59
Portugal	0.21	0.45	0.50
Uruguay	0.49	0.35	0.25
Mexico	0.24	0.30	0.23
Venezuela	0.43	0.47	0.18

Source: Penn World Table (2006)

### **3 Growth Accounting**

This section uses a growth accounting exercise for the 1950-2003 period to analyze the factors that explain not only the good performance of the Venezuelan economy in the 1950-1977 period, but also the collapse of growth in the 1977-2003 period. The results do not consider the initial period of 1950-1960 in order to eliminate the effects of initial conditions and are shown in two subperiods: the expansion period and the depression period. Our aim is to quantify how far the economic performance of the non-oil sector in Venezuela can be explained by physical capital or by the evolution of total factor productivity.

As mentioned in the previous section, the growth experience in Venezuela in the 1950-2003 period is mainly driven by the non-oil sector. Furthermore, since oil production in Venezuela depends on OPEC quotas and the added value of the oil sector depends mainly on international prices rather than domestic market conditions, we focus on an analysis of the non-oil GDP. This approach is fairly widespread in the relevant literature (amongst others, see Schliesser and Silva, 2000 and Arreaza and Dorta, 2004).

We consider that the technology of the non-oil sector can be represented by an aggregate Cobb-Douglas production function:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha}$$

where  $Y_t$  is final output (non-oil),  $K_t$  is physical capital,  $L_t$  is labor, and  $A_t$  is TFP.

We will consider that the labor force is the product of employment times the average hours worked (per year). Therefore, we can express the non-oil production per worker in the following way:

$$\frac{Y_t}{N_t} = A_t \left( \frac{K_t}{N_t} \right)^\alpha \left( \frac{h_t N_t}{N_t} \right)^{(1-\alpha)}$$

where  $N_t$  denotes employment at time  $t$  and  $h_t$  denotes average hours worked (per year)<sup>5</sup>. We can obtain the value for Total Factor Productivity as follows:

$$A_t = \frac{\left( \frac{Y_t}{N_t} \right)}{\left( \frac{K_t}{N_t} \right)^\alpha h_t^{(1-\alpha)}}$$

where  $(Y_t/N_t) \equiv y_t$  is Gross Domestic Product per worker in the non-oil sector<sup>6</sup> and  $(K_t/N_t) \equiv k_t$  is the stock of physical capital in per worker terms.

To generate a series for  $k_t$  we follow the paper by Bergoeing et al. (2002), among many others (see Kehoe and Prescott, 2007), using the perpetual inventory method (Conesa and Kehoe, 2005). First of all, from the investment process, we have the following law of motion for the physical capital per worker,

$$k_{t+1}(1+n) = (1-\delta)k_t + i_t,$$

where  $i_t$  is total investment per worker<sup>7</sup>,  $\delta$  is the constant depreciation rate and  $n$  is the labor force growth rate<sup>8</sup>.

We have chosen to set a constant depreciation rate of 0.10, which is the standard value for the depreciation rate used in real business cycle literature (see, among many others, Kydland and Prescott, 1982). Other values considered are, for example, 0.09 for Japan in Hayashi and Prescott (2002) or 0.05 for México and Chile in Bergoeing et al. (2001).

Following Conesa, Kehoe and Rhul (2007) among others, the initial stock of physical capital is obtained such that the ratio of physical capital stock per worker to total non-oil GDP per worker in 1950 is equal to the average ratio of physical capital stock to total non-oil GDP per worker over the 1950-1960 period.

Regarding the choice for  $\alpha$ , we consider the standard value of 0.36 used in the real business cycle literature. This contrasts with the figure used in some growth accounting exercises performed for Venezuela, in which the capital share is much higher (see Table 42 Elías, 1992).

However, as already highlighted by Saez and Puch (2004) among others, the labor share in some countries might be underestimated as it is not adjusted to include self-employed or family workers when calculating the share of total income accounted for by labor. As Bergoeing et al. (2002) point out, a high share of capital in total GDP implies an implausibly high figure for the return on physical capital.

Given the synthetic series for  $k_t$  and our choice for capital share  $\alpha$ , we can calculate the non-oil TFP per worker series,  $A_t$ . Taking the natural logarithms of the production function per worker, we have:

$$\ln A_t = \ln y_t - \alpha \ln k_t - (1 - \alpha) \ln h_t$$

In the growth accounting exercise we have followed Bergoeing et al. (2002), which in turn follow Hayashi and Prescott (2002). As Kehoe and Prescott (2002) state, we know that on a balanced growth path the growth of output per worker is equal to the growth of total factor productivity and the ratio capital-output is constant. In order to isolate the effect of total factor productivity and the accumulation of physical capital per worker on the growth of output per worker, we follow Hayashi and Prescott (2002) and Bergoeing et al. (2002), among others. Thus we have decomposed the growth of real GDP per worker in the contribution of TFP changes, in the contribution of changes in capital-output ratio and in the contribution of changes in average hours per worker:

$$\begin{aligned} (\ln y_{t+s} - \ln y_t) / s &= (1/1 - \alpha) (\ln A_{t+s} - \ln A_t) / s + (\alpha / 1 - \alpha) (\ln(k_{t+s} / y_{t+s}) - \ln(k_t / y_t)) / s \\ &\quad - (\ln(h_{t+s}) - \ln(h_t)) / s, \end{aligned}$$

where, following Hayashi and Prescott (2002),

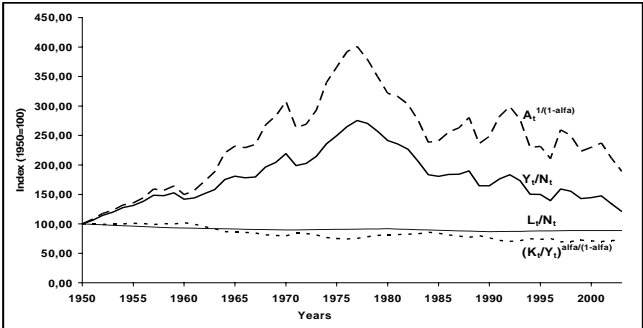
$$y_t = A_t^{1/1-\alpha} (k_t / y_t)^{(\alpha/1-\alpha)} h_t$$

In Table 4 below, we present the results of the growth accounting exercise performed for the Venezuelan economy for the 1960-2003 period. Table 4 shows that in both subperiods (that is the 1960-1977 expansion period and the 1977-2003 depression period), the growth in real non-oil GDP per worker,  $y_t$ , is chiefly accounted for by changes in the TFP,  $A_t$ . Therefore, most of the changes in the non-oil output in per worker terms was due to changes in total factor productivity, rather than to changes in the physical capital,  $k_t$ . See also Figure 9 where it is

clearly shown that the growth experience in real GDP per worker in Venezuela over the period is driven by the evolution of the productivity factor, in particular, the sharp drop in  $y_t$  from 1977 to 2003, while the average hours per worker,  $h_t$ , has remained constant throughout the period. However, the TFP,  $A_t$  has fallen as well as real GDP per worker.

<b>Table 4. Venezuela's Growth Accounting</b>	
Average Annual Changes ( per cent)	
<b>(1960-1977)</b>	
Growth $y_t$ (non-oil)	3.90
Due to $A_t$	5.80
Due to $k_t/y_t$	-1.78
Due to $h_t$	-0.12
<b>(1977-2003)</b>	
Growth $y_t$ (non-oil)	-3.20
Due to $A_t$	-2.89
Due to $k_t/y_t$	-0.17
Due to $h_t$	-0.10

Source: Authors' calculations.



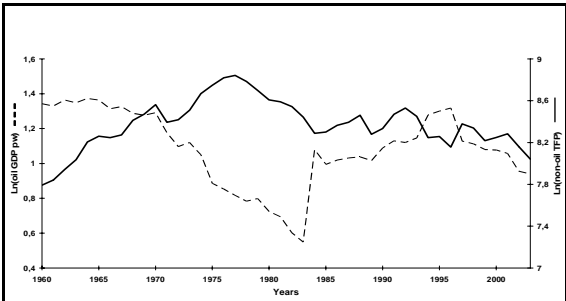
**Figure 9. Venezuela's Growth Accounting (1950-2003).**

We have shown the results of the growth accounting exercise in two subperiods because we are interested in determining whether the driving force behind the expansion period is the same as in the depression period. As mentioned above, we do not consider the 1950-1960 period to eliminate the effects of initial conditions.

**4 Oil rents and their correlation with the non-oil sector**

In the following figures we ask whether oil revenue could have had some effect on non-oil TFP and/or on physical capital accumulation even though it accounts for only around 20 per cent of total GDP (and cannot explain the growth experience in Venezuela).

Figure 10 compares the performance of non-oil TFP and oil rents, both in logarithm terms, for the 1960-2003 period. In order to show both series in the same graph, we have used two different scales. We can see that non-oil TFP has not been positively affected by oil rents. Table 5 shows significantly negative correlations (-0.61) for the 1960-2003 period. Moreover, when we divide the total period into two subperiods, we can see that the correlation between oil revenue and non-oil TFP is clearly negative in both subperiods, suggesting that increases in oil rents are negatively correlated with non-oil sector dynamics. This supports the channels of transmission from natural resources to economic growth through which oil rents have a negative effect on the economy.

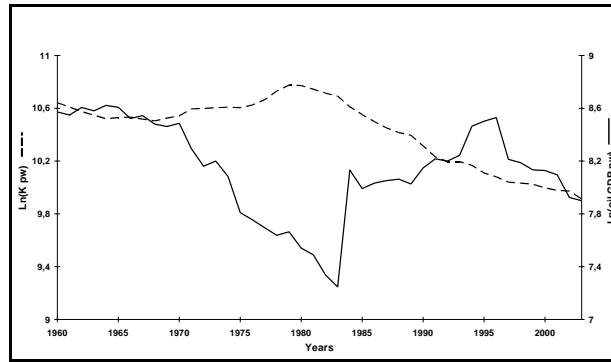


**Figure 10. Ln(oilGDP) & Ln(non-oilTFP) in per worker terms**

<b>Table 5. Correlations</b>		
OilGDP	non oil TFP	stock of K
1960-2003	-0.61	-0.25
Subperiods:		
1960-1977	-0.88	-0.89
1977-2003	-0.56	-0.71

Source: Authors' calculations.

On the other hand, Table 5 shows that oil rents per worker in logarithm terms are negatively correlated with physical capital per worker in logarithm terms (-0.25) when considering the entire 1960-2003 period as well as when calculating the correlations for the expansion and depression subperiods, which are -0.89 and -0.71, respectively. Figure 11 reveals that oil rents were negatively correlated with physical capital stock in the 1960-2003 period. As in Figure 10, Figure 11 shows the series using two different scales. One is used for physical capital stock and another for oil rents in logarithm terms in order to show both in the same graph. We can see that oil rents have not had a positive effect on physical capital accumulation from 1970 onwards.



**Figure 11. Ln(oilGDP) & Ln(K) in per worker terms**

Concerning the use of oil rents by the Venezuelan government, there is some degree of consensus that i) there are two distinguishable economic periods (good and bad policies) and ii) until the seventies oil rents were mostly used to modernise the Venezuelan economy. Schliesser and Silva (2000) mention that the urban process underwritten by oil rents increased labor productivity between 1950 and 1973, in contrast to the later 1974-1992 period. Karl (1997) and Del Bufalo and Rios (2002), amongst others, state that the use of oil rents financed the country's urban development and that profiteering took place outside standardised parameters after the first oil crisis when oil rents decreased sharply. Rigobon in Jatar et al. (2003) mention that oil rents in the last thirty years no longer sufficed to finance the growth of public expenditure (subsidies and so forth) and this, amongst other factors, increased public debt in Venezuela in the 1976-2000 period.

If we take a quick look at Figures 10 and 11, it appears that oil rents decreased in the 1960-1977 period, while the performance of physical capital accumulation and overall non-oil TFP was quite good during this time.

This observation is consistent with the above papers which claim that oil rents were used in a good manner up to the late 1970s. Furthermore, the observation that oil rents performed well, while the non-oil sector performed badly during the eighties confirms their claim that oil rents have been managed poorly in recent years.

## **5 Conclusions**

This paper focuses on Venezuela's growth experience over the past fifty years, which is characterised by a high economic growth rate during the 1950-1977 expansion period and a low economic growth rate in the 1977-2003 depression period. This growth experience has



already been noted by other authors such as Arreaza and Dorta (2004), Bello and Restuccia (2002), Del Bufalo and Ríos (2002), Hausmann (2002), Hausmann and Rigobón (2002), Rubio (2002) and Schliesser and Silva (2000), amongst others.

Our first finding is in line with the definition of ‘depression’ by Kehoe and Prescott (2002, 2007), namely that Venezuela has suffered from a great depression since the late seventies (as also pointed out by Bello and Restuccia, 2002).

We show that although Venezuela is an oil abundant economy, this growth experience is mainly accounted for by the evolution of real GDP in the non-oil sector of the economy. Furthermore, we perform a growth accounting exercise to quantify the extent to which the growth experience in the non-oil sector is due to physical capital accumulation. Our results show that most of this growth can be accounted for by the evolution in TFP.

Finally, there is a vast amount of literature that analyzes the channels through which oil rents might adversely affect the manufacturing sector of the economy such as Dutch disease, rent seeking, corruption or lack of human capital accumulation. There also exists a wealth of literature which examines the use of oil rents in Venezuela. In particular, there are some papers (see, among others, Del Bufalo and Rios, 2002 and Schliesser and Silva, 2000) which claim that although oil rents in Venezuela were managed well until the late seventies, this was not the case from 1977 to 2003.

We have made simple correlations to analyze the effect of oil rents on the non-oil sector. We find a clearly negative correlation between oil rents and physical capital accumulation as well as between oil rents and non-oil TFP. We also find that oil rents decreased, while physical capital accumulation and overall non-oil TFP performed quite well during the 1960-1977 period. This observation is in agreement with the papers we have cited, which claim that oil rents were put to good use until the late seventies. Moreover, the observation that oil rents performed well during the eighties, but that the non-oil sector performed poorly during this same period confirms the claim that oil rents have been managed badly in the last years.

## Notes

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<sup>1</sup> These authors focus on the distortion in the allocation of resources due to the larger share of state enterprises and consider a sectorial allocation model to assess the impact of these distortions on total factor productivity.

<sup>2</sup> GDP per person is total GDP over total population, while GDP per worker is total GDP over labor force, which is a census definition based on the economically active population.

<sup>3</sup> Kehoe and Prescott (2002) claim that the trend growth rate is defined as the average growth rate of the industrial leader since in the absence of any barriers or constraints, all industrial countries should grow at the same rate. In

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the 20th century the US was the industrial leader with an average growth rate of 2 per cent. This is why we have chosen this figure for the trend.

<sup>4</sup> We consider employment instead of working age population for two reasons: (i) lack of data on working-age population, (ii) we have used the data on Gross Domestic Product per worker provided by the Penn World Table (2006) so there is consistency across the variables used.

<sup>5</sup> The data for average hours worked per year are taken from The Conference Board and Groningen Growth and Development Centre (2006).

<sup>6</sup> Even though we should take into account the exact fraction of the total labor force working in the non-oil sector, if the share of the labor force in each sector is constant throughout the period, it should be adjusted by a constant and therefore should not affect the results. However, Bello and Restuccia (2002) claim that this is not the case. If we consider that the labor force working in the oil sector is virtually null, then the analysis performed is wholly correct.

<sup>7</sup> To obtain the data for total investment per worker, we use the share of investment in Real GDP per capita times the level of Real GDP per worker, both of which are at constant prices (PPP). Concerning the evolution of total population and labor force, these should be quite similar since the average growth rate of both variables is practically the same (3 per cent) in the 1950-2004 period (The Conference Board and Groningen Growth and Development Centre, 2006; PWT 6.2, 2006).

<sup>8</sup> We use the data of total population (see footnote 7) calculating its average annual growth rate in the period (1950-2003) PWT.

## References

- [1] Arreaza, A. and M. Dorta (2004), 'Sources of Macroeconomic Fluctuations in Venezuela', Serie de Documentos de Trabajo, BCV, 56.
- [2] Bello, O. and D. Restuccia (2002), 'Venezuela's Growth Experience' mimeo, University of Toronto.
- [3] Bergoing, R. et al. (2002), 'A Decade Lost and Found: Mexico and Chile in the 1980's', Review of Economic Dynamics, 5(1), 166-205. (Also NBER 8520.).
- [4] Conesa, J. C. and T. J. Kehoe (2005), 'Productivity, Taxes and Hours Worked in Spain: 1970-2003', mimeo.
- [5] Conesa, J. C., Kehoe T. and Rhul (2007), 'Modelling Great Depressions: The Depression in Finland in the 1990's', Federal Reserve Bank of Minneapolis Quarterly Review 31, 16-44. (Also NBER 13591.)
- [6] Del Bufalo, E. and G. Rios (2002), 'Venezuela: From Stability to Turmoil', mimeo.
- [7] Djankov, S. et al. (2002), 'The Regulation of Entry', Quarterly Journal of Economics, Vol. CXVII (1), 1-37.
- [8] Elias, V. J. (2004), 'Sources of Growth: A Study of Seven Latin American Economies', International Center for Economic Growth and Fundación del Tucumán Press.
- [9] Gylfason, T. (2001), 'Nature, Power and Growth', Scottish Journal of Political Economy.
- [10] Gylfason T. (2001a), 'Natural Resources and Economic Growth: What is the Connection?', mimeo CEPR, CESifo, University of Iceland.

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- [11] Gylfason T. (2001b), 'Natural Resources, Education and Economic Development', *European Economic Review* 45, May, 847-859.
- [12] Hayashi F. and E. C. Prescott (2002), 'The 1990s in Japan: A Lost Decade', *Review of Economic Dynamics*, 5 (1), January, 206-35.
- [13] Hausmann, R. (2002), 'Venezuela's Growth Implosion: A Neo-classical theory?', mimeo, Kennedy School of Government, Harvard University.
- [14] Hausmann, R. and R. Rigobón (2002), 'An alternative interpretation of the Resource Curse.: Theory and Policy Implications', NBER WP, 9424.
- [15] Heston, A. et al. (2002), Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP). October, 2002.
- [16] International Labor Organization (ILO), LABORSTA Labor Statistics Database Internet.
- [17] Karl, T.L. (1997), 'The Paradox of Plenty. Oil booms and Petro-States', University of California Press.
- [18] Kehoe, T. and C. Prescott. (2002), 'Great Depression of the 20<sup>th</sup> Century', *Review of Economic Dynamics.*, 5, 1-18.
- [19] Kehoe, T. and C. Prescott, editors (2007), *Great Depressions of the twentieth Century*, Federal Reserve Bank of Minneapolis.
- [20] Kydland, F.E.. and E.C.Prescott (1982): 'Time to Build and Aggregate Fluctuations?', *Econometrica*, 50(6), 1345-1370..
- [21] Melcher, D. (1992), 'La Industrialización de Venezuela', mimeo, Facultad de Ciencias Económicas y Sociales, Revista de Economía, 10, IIIES, Universidad de los Andes.
- [22] Rubio, M. (2002), 'Historical Environmental National Accounts for Oil Producers', mimeo presented at IX Simposio de Historia Económica Publicación: Condiciones medioambientales, desarrollo humano y crecimiento económico, UAB, Spain.
- [23] Saez, F. and L. A. Puch (2004), 'Shocks Externos y Fluctuaciones en una Economía Petrolera', Serie de Documentos de Trabajo, BCV, 59. English version: 'Trade shock and aggregate fluctuations in an Oil-Exporting Economy.', Universidad Complutense de Madrid, ICAE, 0301, 2002.
- [24] Saez, F. and J. G. Pineda (2004), 'Productividad y Crecimiento en Venezuela: Un Marco Referencial', Serie de Documentos de Trabajo, BCV, 61.
- [25] Schliesser, R. and J. I. Silva (2000), 'La Renta Petrolera y el Crecimiento Económico en Venezuela - Análisis del período 1913-1995', Serie de Documentos de Trabajo, BCV, 23.
- [26] 'The Conference Board and Groningen Growth and Development Centre', Total Economy Database, version September 2006, <http://www.conference-board.org/economics>.

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