August 2001

Second draft
Do not quote

Venezuela's growth implosion:

A neo-classical story?

Ricardo Hausmann
Kennedy School of Government
Harvard University

Abstract

Venezuela has seen a growth collapse over the past 20 years in which output per worker in the non-oil economy dropped to almost half its initial level. This decline came after 60 years of growth of non-oil GDP at an average annual rate of 6.7 percent. It took place in a country that initially exhibited very strong political and conflict management institutions by developing country standards. The collapse occurred in the context of declining oil income and higher cost of capital.

A simple model is presented that can account for the collapse as a consequence of these two changes. However, this does not mean that political economy considerations are not needed to account for the collapse. It does suggest that the channel through which these considerations matter is by increasing the required returns on capital.

Paper prepared for the seminar on Analytic Country Studies on Growth, held at Harvard University, Cambridge on April 20-21, 2001. I am indebted to Asdrubal Baptista and to Dani Rodrik for making their data available. I also acknowledge useful discussions with Lant Pritchett and Dani Rodrik. I thank Jose Campanella for his research assistance. The usual disclaimers apply.

A witch hunt

Once upon a time there was a prosperous village. Life was good and people were happy. One year the crops failed and living conditions deteriorated. When the same thing happened the following year, the town elders met and decided that such a second occurrence could not be a coincidence: it had to be the work of the devil, acting through some witch whose soul he had possessed. The problem had to be dealt with.

The elders decided to establish an inquisitorial committee to search for witches and burn them at the stake. They had scientific means of identifying them: since the soul of the devil was less dense than that of a good Christian, possessed individuals would tend to float abnormally when in water. Thus, they had a clear mechanism to establish guilt[1]. The committee quickly identified seven witches, all of them elderly women with patently strange behavior. After burning them at the stake in the central square, the committee concluded that they had rid the village of evil spirits and prayed for a better crop next year.

Next year came and the crops were better than the previous catastrophic year, but still not as good as usual. The committee debated what to do: one group, who called themselves the doves, argued that they should allow more time for nature to recover. Another group, appropriately named the hawks, suggested that they should search for more witches. The doves won the debate and the village anxiously waited for the following year's crop. It was an utter disaster: the crops failed again! The hawks, while saddened by the misery of the village, felt confirmed in their wisdom: they had been right all along. The doves had appeased the devil and caused the current disaster. The issue was clear: more witches needed to be found and summarily burnt at the stake. Compassion had no role when dealing with the devil.

The inquisition labored hard in order to thoroughly identify all the witches in the village and the surrounding valley. After much hard work they had put to death almost 80 elderly ladies, reigning in the opposition from relatives who could not come to understand that the soul residing in those women was not that of their loved ones, but instead, that of the devil. While the process was traumatic, the village was relieved when the crops improved the following year, although not to the levels of years past.

The story could continue, but we can leave it here. Once the relationship between crops and witches has been established, the question is how many old women should be burned at the stake. If enough possessed souls have been destroyed, the situation should improve. But one never knows how much is enough. Deteriorations are an indication that more needs to be done. Once the paradigm has been established, it is very hard to find it wanting. If witches actually do not exist, or if, while existing, they do not deal in crops,

[1] During the 300-odd years in which the witch-hunts took place, this was a common practice (Robinson, 1992). Unfortunately, osteoporosis has a similar effect on buoyancy increasing the likelihood that older women would get identified as witches.

the village will never find out. There are too few observations and too much fluctuation from year to year for the village scientist to prove the proposition one way or the other. But society cannot afford not to take a view on such a central matter.

The tragedy of growth collapses – or of disappointing growth in general – generates this kind of situation. If the belief is that the problem with growth is insufficient reform, then more privatizations or new financial regulations are needed to burn the witches. And if it does not work, more must be required. If the conviction is that corruption is the relevant witch, then throwing out the rascals out in the next election and starting a "witch-hunt" of former public officials should improve matters. And if it does not, then it must be that the new guys are still stealing and consequently more changes of government and new crackdowns are in order. If by any chance corruption, inefficient public enterprises or high tariffs are not central to the growth problems of a country, societies will have trouble finding that out.

This paper is about finding the witch that destroyed the prosperity of Venezuela. As we shall see, Venezuela, at 6.4 percent per annum, was the fastest growing of the major Latin American countries between 1920 and 1980. Its output per worker in the non-oil economy declined to almost half in the following 20 years.

To a large extent, Venezuela is a strange candidate for a growth implosion. It did not have a civil war like El Salvador or Nicaragua, or a political-economic transition like Eastern Europe. In fact, it was perceived at the time when its growth collapse started as the most stable democracy in Latin America. Unlike Mexico, there were two main parties that competed fiercely for power. Unlike Colombia, their membership reached into the millions and voter turnout was in excess of 90 percent. There was a carefully crafted balance of powers so that the opposition had important attributions in the Congress, the Supreme Court, the appointment of justices, the Comptroller General and the Attorney General. There were very strong labor and business institutions to negotiate social conflicts. Political competition and a free press created important checks and balances on the government. There was no history of inflation. In fact, of all the countries in the International Financial Statistics of the IMF, Venezuela experienced the lowest inflation rate between 1950 and 1980. As late as 1980, the country had a credit rating of AAA. Twenty years later, none of these things are true.

What happened? The Venezuelan public is convinced that the core explanation is corruption and has been kicking out whoever is in power. Growth has yet to resume. International agencies favor the assumption of insufficient structural reforms or poor institutions. Whichever explanation one chooses needs to account for the fact that the past 20 years were preceded by 60 remarkable years of growth, with probably similar institutions and degrees of corruption.

The academic literature has a few additional hints as to what may have happened. Some of the explanations start with the role of natural resources. Matsuyama (1992) argues if industries intensive in natural resources exhibit fewer growth externalities such as learning by doing, then static comparative advantage will lead to specialization away

from sectors such as manufacturing that may be more dynamic over time. Corroborating this, Sachs and Warner (1995) find that countries rich in natural resources tend to grow more slowly. This logic cannot possibly explain the Venezuelan experience. First, as we shall see, Venezuela's growth collapse took place after 60 years of expansion, fueled by oil. If oil explains slow growth, what explains the previous fast growth? Moreover, the growth collapse happened when oil revenues were declining, so that the Dutch disease should have operated in reverse, facilitating the growth of output in non-oil tradeables: it did not happen.

Other papers emphasize the political economy of oil rents. Lane and Tornell (1998) argue that oil booms may be problematic: overspending may result as different constituencies fight over the rights to appropriate a growing common pool of resources. While this logic may explain some dynamics around booms, it makes busts less problematic. Moreover, it does not explain a 20-year growth collapse.

Rodriguez and Sachs (1999) argue that the drop in growth is caused by the declining importance of oil income. Their argument is based on the idea that since oil resources are exhaustible, any optimal extraction plan will imply zero oil income in some distant future. They show that if there is a home bias in investment, countries will see their level of income and capital per worker overshoot the long-term steady state. Countries will approach the long run from above, by growing below trend. This argument has two main complications. First, the large and increasing volume of oil reserves makes arguments about exhaustion less compelling as a determinant of current trends. Secondly, the assumption of a home bias in investment implies that residents must be investing domestically at rates of return below those of the world, but decide to keep their savings at home anyway. While limits on borrowing can be explained as the consequence of problems of contract enforcement or sovereign risk, it is much harder to argue that over-investment is caused by limits to capital outward capital mobility. Moreover, there is scant evidence that profit rates were unusually low during the boom years.

Rodrik (1998) argues that the problem originates from the interaction between external shocks, latent social conflict and conflict management institutions such as democracy and the rule of law. The idea is that if a country gets a bad shock to which it must react, latent conflict and weak institutions may make it difficult to arrive at a politically viable solution. Adjustment may be delayed as constituencies fight over who will bear the burden, as in Alesina and Drazen (1991). While this explanation seems plausible in general, it is not a good explanation of the Venezuelan case. As we shall see, Venezuela did get a large external shock expressed in a large decline of oil rents. However, Venezuela - at the time in which the growth collapse started – had as strong a democratic political system as can be found in any developing country. A stable system of political parties, dominated by two main organizations was able to garner massive support in terms of party membership and turnout at elections. In addition, both labor and business organizations each formed large national organizations to negotiate the interests of the membership with the government. Moreover, for the first decade of the collapse, while

the system was not able to stop the decline, it did do a remarkable job at maintaining social peace and political participation[2].

All this did change over time. Society became much more conflictual and institutions did loose legitimacy. Nevertheless, this can best be understood as a consequence rather than a cause of the economic implosion.

Finally, other authors emphasize the impact of oil revenues on the state's political capacities. For example, Naím and Pinango (1984) argue that the presence of oil created mechanisms for conflict resolution based on redistribution of the oil rent. These mechanisms break down when oil revenues dwindle, making shocks harder to manage. Kharl (1997) argues that in oil-producing economies the political system is based on redistribution of petroleum rents, leaving the political system with no tradition of justifying the state's use of general taxation. This makes such oil-dependent societies less able to deal with revenue shortfalls.

Venezuela's growth implosion: some stylized facts

Figure 1 shows the evolution of output per worker in the economy excluding the oil sector. The non-oil economy hires about 99 percent of the labor force and generates around 80 percent of national income. We concentrate on it in order to focus our attention on a variable that is not itself directly impacted by oil discoveries, sudden changes in oil prices or output. It is more readily understandable in terms of traditional factors of production such as labor, physical and human capital, and productivity.

The graph shows the Venezuelan drama. Between 1950 and 1980 (peaking in 1978) output per worker increased at an annual rate of 2 percent (about 80 percent cumulative). Employment grew by 3.7 percent meaning that output expanded at about 5.8 percent. However, in the following 20 years, output per worker fell at a rate of about 3 percent per year, reaching again the levels of the early 1950s. As growth collapses go, this one is relatively big and follows what could arguably be called a growth miracle: 60 years of per capita growth in the non-oil economy of just under 4 percent: an enviable record. In fact, according to Maddison (1995, pp. 156-57) Venezuela's 6.4 percent per annum total GDP growth rate between 1920 and 1980 was the fastest of the 7 Latin American countries whose GDP he reports. This compares with 5.5 for Brazil, 4.8 for Peru and Mexico, 4.7 for Colombia, 3.4 for Argentina and 3.3 for Chile[3].

The fact that a 20-year-long growth collapse was preceded by a 60-year growth miracle implies that factors that are constant throughout the 80-year period will not be able to

[2] In any case, Venezuela's growth collapse is an outlier in Rodrik's paper. In his dataset, Venezuela appears as having a growth decline of only 3 percent. Three of his 5 main equations predict growth declines of about 1 percent. In our dataset, the growth puzzle is closer to 5 percent. These results are due to the fact that Venezuela appears as having low latent social conflict, as measured either by inequality, ethno-linguistic fragmentation or the proportion of the population which does not speak the main language. Moreover, Venezuela scores relatively high on measures of democracy and rule of law.

[3] For Mexico the data starts in 1921 and for Colombia in 1925

account for both sub-periods. For example, the supposed deleterious growth effects of natural resources or the origin of the legal code could not simultaneously explain miracle and collapse. Notice also in Table 1 the onset of the demographic transition in the decade of the 1940s. The growth collapse coincides with a period of declining dependency ratios, which usually makes growth easier.

The decline in output per worker cannot be explained either by inadequate accumulation of human capital. On the contrary, Venezuela exhibited very rapid improvements in social indicators. For example, between 1960 and 1990 life expectancy increased from 55 years to 71 years. Years of schooling of the female population over 25 jumped from 2 in 1950 to 5 in 1985. Thus, current Venezuelan workers have a similar output per capita as the workers of 1950, in spite of the fact that they are now endowed with much more human capital. How is it that after 50 years of technological progress at the global level, a more educated, healthier and more urban labor force, can only produce as much output per worker as in 1950?

While measures of human capital per worker have been trending up, physical capital per worker has been declining (see Figure 3). Panel 3.a shows four distinct periods: a rapid process of capital deepening in the 1950s, followed by a deceleration in the 60s, a rapid acceleration during the oil boom of the 70s and a decline in the last 20 years. Notice that while output per worker is back to levels circa 1950, capital per worker is not.

Panel 4.b plots the scattergram of output per worker vs. capital per worker. The graph is interesting in that it essentially shows a break in the quite linear relationship between the two variables. The period of up to 1978 exhibits a much higher production per worker per unit of capital per worker. This starts telling us a story. Capital deepening has been reversed. However, the reversal has been accompanied by a reduction in total factor productivity. To gauge how big the effect could be, we conduct the analysis in two forms. First, we ran a regression between output and capital per worker in the non-oil economy, including a trend and a dummy for the period 1983-99. To see how sensitive the break is to the dates chosen, we estimated the equation with and without taking into account the period between 1977 and 1982 inclusive. We find a very high elasticity of output to capital per worker. In fact, the point estimates, between 0.57 and 0.62 must be contrasted with the estimated share of capital income in the non-oil economy, which was about 0.3 in the 50s and has been trending up to about 0.45. This is consistent with the hypothesis that productivity growth has been correlated with capital deepening[4].

Table 2 also shows that, controlling for capital per worker, GDP per worker in the non-oil economy has been about 30 percent lower in the implosion period of 1983-99 compared to the 1950-1977 expansion[5]. If we follow Pritchett (2000) in arguing that traditional estimates of capital based on cumulative depreciated investment (which is what our source, Baptista (1997), uses) is not a good measure, because capital can become obsolete

[4] If productivity and capital deepening are correlated, the estimated term of the contribution of capital to growth will be over-estimated and the estimated productivity trend will be underestimated.
[5] We estimate the equation with and without including the 1977-1982 transition between miracle and implosion.

or wasted, then the decline in output of 0.3 is equivalent to a disappearance of half of the capital stock. Using the estimated elasticity of output with respect to capital of 0.6, this figure is equivalent to a reduction in the previously existing capital stock of 40 percent.

Table 3 decomposes growth in the traditional fashion. The decline in growth of GDP per worker between 1950-80 and 1980-99 is 5 percent per annum. The decomposition attributes about 2.8 percent to the reversal in capital deepening and 2.2 percent to the decline in total factor productivity trends. Obviously, both factors can be caused by the same phenomenon. If something lowers the overall productivity of the economy, then capital per worker and the Solow residual would be affected. Starting from a long run steady state, lower returns would prompt a reduction in the desired stock of capital. If technology is embodied in machines, this would lead to a decline in the rate of productivity growth.

It is important to point out that this decomposition does not take account of the rising level of human capital during this time period. Including this factor would lead to even bigger decline in total factor productivity growth.

Oil revenues and non-oil growth

We now turn to the relationship between growth and oil revenues. We again focus on the non-oil economy as our measure of growth in order to clarify the issues. We take as the relevant measure of the oil sector the value of its exports in terms of importables. Hence, we are indifferent between changes in the value of exports caused by movements in volumes or in the relative price of oil. Figure 4a shows these values in per capita terms. Figure 4b shows the GDP per worker in the non-oil economy and real oil exports per worker in the economy as a whole. Table 4 shows summary statistics of related information.

The broader picture is one of great co-movement between oil revenues and the non-oil economy. Oil revenues have gone through several distinct phases. There was a huge boom in production in the 1920s, when Venezuela started production and by 1929 became the largest oil exporter in the world. Then came the Great Depression with declining prices and low volume growth. In 1942 Venezuela reformed and extended its oil concessions leading to a new boom in production and prices that lasted until the boom of 1956-57 associated with the Suez Canal war. In 1958 three important things happened: prices declined, a democratic movement took over political power and oil policy became less encouraging of foreign investment. Oil revenues dropped and kept a declining trend until 1970. Revenues started to increase in the early 70s and boomed during the first (1973-74) and second (1979-1980) oil shocks. After 1982 revenues declined.

GDP per capita in the non-oil economy broadly follows these trends. There was a dramatic boom in the 1920s, stagnation in the 30s, and another boom in the 1942-57 period, followed by a period of slower growth in the 60s. Growth accelerated in the 70s and collapsed in the 80s. Two important points are in order. In the 60s, the economy kept

on growing in spite of the decline in oil revenues. Secondly, growth collapsed around 1978 before the second oil shock. Oil revenues only collapsed after 1982. These two periods make the relationship between oil revenues and overall growth less sharp. The experience of the 1960s is associated with a real depreciation and the adoption of import substitution policies, while the second can be related to the over-expansion of the economy in the 1974-78 period. The broad characteristics of the periods and economic policies are described in the appendix.

The real exchange rate (Figure 5) exhibited a remarkable stability until 1983. The nominal exchange rate was devalued in 1960, in response to the balance of payments crisis that followed the fall in oil exports of 1958. The devaluation translated into a permanent movement of the real exchange rate, which in fact kept on depreciating until the mid 1970s. Notice that the oil booms of the 1970s lead to remarkably little real appreciation. The period after the collapse of oil revenues in 1983 is characterized by dramatic shifts in relative prices[6]. Between 1982 and 1989 there was a massive real depreciation. In the 90s the overall pattern exhibits the opposite trend, in spite of the fact that oil revenues did not recover much. This is a fact that needs explaining.

It is important to note that it was the private sector, not the public sector, which drove the dynamics of investment and disinvestment in Venezuela. As Figure 6 shows, fluctuations in private investment per worker dwarfed movements in public investment. Hence, the evolution of investment is not a fiscal story with investment being simply influenced by changes in government revenue. It is a private reaction to changing market signals. Interestingly, if we look only at by focusing only on private investment, the picture is essentially the same as in Figure 3b. The collapse of output and investment and the apparent fall in productivity, or alternatively the destruction in the stock of capital is mainly a private sector phenomenon. So, arguments about the wastefulness of public investment, although possibly true, are not central to the story.

Finally, it is important to point out that in spite of the speed of the collapse in investment after 1978, capital per worker kept rising until 1983.

The simplest possible model

Much of the literature on resource rich countries focuses on the Dutch disease effect[7]. The idea is that a boom in the resource-based tradeable sector, such as oil, will cause a real appreciation and a fall in output in the non-resource based tradeable sector such as agriculture or manufacturing. Hence, oil booms should be bad for non-oil tradeable growth. If these are more capable of sustaining endogenous growth, then oil booms should be bad for growth. By contrast, oil busts should be good. This obviously is the opposite of the Venezuelan experience. To generate a model that has a fighting chance of illuminating the issues, it is better to focus on a model where non-oil production is essentially non-tradeable. It boils down to assuming that there is no non-oil tradeable

[6] During 1983-88 and 1994-96 there were multiple exchange rate. Figure 5 shows the real exchange rate calculated at the parallel rate.
[7] See for example Corden (1984), Corden and Neary (1982), Gelb (1988).

sector in the economy. This can be interpreted as there being such a large oil-induced Dutch disease that no other tradeable sector survives[8].

For this reason, we assume an economy that has only two sectors. The first sector z is constituted by oil, which is manna from heaven. The rest of the economy produces non-tradeables x with capital and labor. Capital is composed purely of tradeables. Since we are concerned about long run equilibria, we assume that capital adjusts to equalize international returns. Labor is constant and we normalize it to 1.

$$x = Ak^{\alpha} \tag{1}$$

Households have a Cobb-Douglas utility function over tradeables (which are imported) and non-tradeables.

$$U = C_T^{1-\beta} C_N^{\beta} \tag{2}$$

National income in units of tradeables is given by:

$$y = z + w + r^* \bar{k} \tag{3}$$

where we assume that the only endogenous variable is w. $\bar{k}$ is the stock of capital owned by residents which may be indistinctly held at home or abroad. It does not equal the capital invested in the non-tradeable sector.

Profit maximization implies that:

$$k = \left(\frac{\alpha A q}{r^*} \right)^{\frac{1}{1-\alpha}}$$

$$x = A^{\frac{1}{1-\alpha}} \left(\frac{\alpha q}{r^*} \right)^{\frac{\alpha}{1-\alpha}}$$

$$w = (1-\alpha) q x$$

Demand for non-tradeables is given by

$$C_N = \frac{\beta y}{q} = \frac{\beta \left(z + w + r^* \bar{k} \right)}{q} = \frac{\beta \left(z + r^* \bar{k} + (1-\alpha) q x \right)}{q}$$

Equilibrium in the market for non-tradeables is determined by:

[8] It is important to point out that non-oil exports of Venezuela amount to about 4 percent of GDP and are dominated by capital-intensive, resource-intensive industries such as steel, aluminum and petrochemicals. These sectors were developed during the oil boom as part of a diversification strategy. No significant new exports have emerged since the collapse of the real exchange rate in 1983.

$$x = \frac{\beta\left(z + r^{*}\bar{k} + (1-\alpha)qx\right)}{q}$$

$$x = \frac{\beta\left(z + r^{*}\bar{k}\right)}{\alpha q} = A^{\frac{1}{1-\alpha}}\left(\frac{\alpha q}{r^{*}}\right)^{\frac{\alpha}{1-\alpha}}$$

Therefore, the whole system is described by the relative price of non-tradeables q:

$$q = \frac{r^{*\alpha}\left(\beta\left(z + r^{*}\bar{k}\right)\right)^{1-\alpha}}{A\alpha} \tag{5}$$

$$x = \frac{A\left(\beta\left(z + r^{*}\bar{k}\right)\right)^{\alpha}}{r^{*\alpha}} \tag{6}$$

Under such a system, a collapse in real oil exports would lead to a decline in output in non-tradeables. To see how this works, assume that you start from an equilibrium position in which the return to capital in the non-traded sector is equal to the world interest rate. A decline in oil income leads to a fall in the demand for the non-traded good. This will cause a fall in the relative price q which will imply that the return to capital in that sector falls below the international level, leading to a reduction in the stock of capital invested. If capital is initially fixed and can only be adjusted gradually, then there will be a period in which returns to capital are below world levels and net private disinvestment will take place. Notice that the real exchange rate will overshoot its long run level: at the beginning of the decline, the excess capital in the non-tradeable sector implies a high supply of goods and hence a low relative price. As the disinvestments process proceeds, supply contracts and the relative price recovers partially. This would explain the sharp real depreciation in the 80s and the sharp appreciation in the 90s.

Explaining the growth implosion

Can the collapse in oil revenues explain the growth implosion? To give oil a maximum chance of explaining the fall, let us assume that there is no private sector capital wealth (r*k=0). Using equation (6) above, the decline in z will be reflected in a fall in x with an elasticity of α. As shown in Table 4, oil exports per capita at 1990 prices declined from a peak of 1600 in the 1978-82 period to about 600 US$ in the 1983-99 period (see Table 4). As shown in Table 5 shows, this decline in oil income under-predicts the fall in output that actually took place by some 30 percent. If instead, we make the more reasonable assumption that r*k takes on a value in line with the capital share of non-oil income circa 1978, then the equation under-predicts the fall by about 67 percent.

These calculations indicate that the decline in the value of oil exports alone cannot explain the magnitude of the collapse in output. Note that the model we use, by not including a non-oil tradeable sector that could expand in the context of a fall in oil income, gives oil the best possible chance to explain the growth performance.

Now, within the confines of this narrow model, can an explanation be found? One important variable is the interest rate r*. A rise in the interest rate in the context of our simple model would cause the required rate of return in the non-oil economy to go up and hence the equilibrium stock of capital to decline. As equation (6) above shows, an increase in the interest rate can have a powerful impact on the long run level of output. A doubling of the interest rate could explain a drop in output of 25 percent if α is 0.4. So a mix of a decline in the price of oil and a major increase in the interest rate could do it. But did such an increase actually take place?

In 1978, as mentioned above, Venezuela was rated AAA. By early 1983, in the context of the decline in oil prices, it defaulted on its foreign debt. It regained market access only after the Brady plan was renegotiated in August 1990. At present the country is rated B-. Table 6 shows recent spreads of the Emerging Markets Bond Index for the major Latin American countries. Venezuela is consistently one of the weakest credits among the major Latin American countries. The table shows data for July 1998, before the Russian crisis but at a time when the price of oil was very low and for January 2001, when the price of oil had recovered quite significantly. The table shows spreads for Venezuela on the order of 800 bp. This is equivalent to a real interest rate of the order of 11-12 percent. Hence a massive rise in the interest rates on foreign dollar-denominated borrowing did take place.

Is this the relevant rate to look at? When considering the cost of capital in Venezuela should we use the international riskless interest rate or should we correct for country risk? After all, is it not the case that a risk-neutral investor expects only to get the riskless rate in expected terms and the spread only compensates him for the states of nature in which he would receive a smaller amount? This depends on whether the risks that are considered are endogenous or exogenous to the project in which the capital is invested. If the risk is endogenous, then on average the project need only pay the riskless rate in expected terms. However, if the risks are exogenous to the project, it is the contractual interest rate that matters. To see this, assume that a project is riskless and that the factors that impede payment are exogenous to the project, such as expropriation risk. In this case, only projects that can generate an excess-return above the riskless rate would be undertaken. This requires a higher marginal product of capital and a lower capital stock. Hence, for the rise in the contractual interest rate to matter we need to assume that risks the associated risks are mainly exogenous to projects.

Table 7 asks whether our simple model can account for the Venezuelan collapse using only the fall in oil revenues and the increase in the interest rate. The table shows that the predicted fall is broadly in line with the actual decline. Hence, within the context of our very simple model, we can account for the collapse in output, broadly speaking, by

making reference to two variables: the decline in oil export revenues and the increase in the interest rate.

Where did the interest rate increase come from?

Does this mean that we have a neo-classical story of a growth collapse? Does the fact that we can account for Venezuela's growth collapse by making reference only to the fall in oil income and the interest rate mean that we can do away with political-economy considerations? The decline in oil revenues can be taken, to a very significant extent, as an exogenous factor determined mainly by the decline in international prices. However, the interest rate we have used includes country risk, a quite endogenous variable. Hence, the answer to the question depends on what interpretation is given to the increase in the interest rates.

We have already argued that in order to use this particular interest rate and not the riskless rate, we need to assume that risks are somehow exogenous to projects. This points us away from representative-agent (neo-classical) models, since it implies that problems arise in the aggregation, not in the individual projects themselves.

Moreover, in the neo-classical world defined in the simple model used in this paper, a permanent decline in oil income would not lead to a change in the return to capital, given the assumption of perfect capital mobility. If instead, we assume that capital is fixed in the short run, then a permanent fall in oil revenues would cause an immediate decline in the rate of return. If capital was contracted in the form of debt, such a fall could lead to returns below the contractual interest rate, causing defaults. This may well have taken place in Venezuela. However, this is only a transitional dynamic. Why would the interest rate remain high after 20 years?

The puzzle of the Venezuelan interest rate is even deeper. The country is a net creditor vis-a-vis the rest of the world. Table 8 shows the evolution of the current account in Venezuela. It indicates that the country accumulated surpluses during all periods, before and after the collapse in oil revenues. In fact, surpluses were even higher after oil income fell in 1983 than during the oil boom of the 70s and early 80s[9]. So a representative agent would not have any risk of defaulting, as she could use her international assets as collateral. In reality, the net assets are in private hands while the public sector has a net foreign debt, suggesting that political-economy considerations are behind the higher interest rate.

Moreover, Venezuela's low credit rating and high spreads stand out in international comparisons, given the fact that it exhibits much stronger credit ratios than other emerging markets with better credit ratings. Figure 9 shows the debt export ratios of selected Latin American countries for 2000. In the case of Venezuela, the ratio was also calculated for 1998, the year with the lowest oil prices since 1986. The picture is quite

[9] This is consistent with our model, as it indicates that after the fall, the demand for capital in the country declines leading to disinvestment.

clear. Venezuela's debt to GDP ratio is lower than that of investment-grade countries such as Chile, Uruguay and Colombia[10]. It is a fraction of that of Brazil and Argentina, two countries that exhibit spreads smaller than Venezuela's, as shown in Table 6. In fact, Venezuela's spread has remained high even after the dramatic recovery in the price of oil in 2000. In fact, Venezuela's structural current account surplus, its net creditor position, its high level of international reserves and its low debt ratio suggest that its low credit rating and high country risk are not determined by ability-to-pay factors, but reflect instead willingness-to-pay problems. This argues in favor of a distributive conflict surrounding the allocation of the decline in oil revenues.

One indication of distributive conflicts is the very high real exchange rate volatility exhibited after the collapse in the fixed exchange rate regime in 1983. This balance of payments crisis was followed by the adoption of at least 4 different regimes and the occurrence of 6 currency crises. As Table 9 shows, this increase in real exchange rate volatility cannot be associated to a rise in the volatility of changes in real oil revenue. In fact, the volatility of per capita real oil exports remained relatively stable since 1950 and if anything declined somewhat after 1983. The volatility of the real exchange rate shot up by a factor of 5 in the period after 1983 compared to the 33 prior years. So the increased real exchange rate volatility cannot be accounted for by the greater importance of real shocks. Instead, it points to the inability to settle distributive conflicts.

Movements in the real exchange rate have complicated distributive implications. On the one hand, the real exchange rate is the relative price at which the public sector exchanges its oil surplus for non-traded goods: it is the relative price of teachers in terms of oil dollars. On the other hand, it changes the relative price of foreign assets and liabilities in terms of non-traded goods. In addition, unanticipated changes in the nominal exchange rate affect the value of nominal assets and liabilities. This nominal dimension has been an important aspect of the problem as the post-1983 period has been characterized by highly negative average interest rates, which have eroded the real value of monetary assets, as shown in Figure 9. Since uncovered interest parity implies that ex-ante real interest rates cannot be negative, this indicates the important role of exchange rate and inflationary surprises in the post-1983 period.

Thus, all these factors point to a political-economy interpretation of the rise in the cost of capital. The data is consistent with the perception of higher risks, exogenous to individual projects and associated with more macro factors. The higher international interest rate cannot be accounted for through measures of external solvency and credit fundamentals, given that the country is a net creditor and that the gross debt is small relative to better-rated comparators. Real exchange rates have been unusually volatile, although real oil income volatility has not increase. Real interest rates have been on average highly negative, consistent with the idea that inflation and exchange rate surprises have been very important.

[10] The ratio for Mexico is distorted by the importance of low value-added maquila exports in the denominator.

Concluding remarks

Venezuela suffered a major growth collapse over the last two decades after 6 decades of remarkable growth. This collapse implies that today's non-oil sector workers have levels of productivity similar to those of 1950 in spite of major improvements in their human capital endowment and in the technologies available in the world. We explain this collapse as caused by two principal factors: the decline in oil revenues and the rise in the relevant interest rate.

First, the decline in oil revenues lowered the demand for the non-traded outputs of the economy. In a neo-classical framework with perfect capital mobility, this is also consistent with a decline in the capital per worker and the output per worker in that sector. However, quantitatively, this effect can only account for about half the decline in output per worker. Secondly, a major rise in the external interest rate would explain further declines in capital and output per worker, as projects would need to higher marginal returns on capital.

It is hard to make the rise in interest rates consistent with a representative agent, neo-classical story. The country is a net foreign creditor so it should be able to pay all its external debts in the aggregate. In addition, indicators of ability to pay are superior to better rated neighboring countries that pay smaller spreads. This points to willingness to pay problems that call into question the protection of property rights. In addition, the country exhibits a very volatile real exchange rate, which cannot be explained by an increase in the importance of real shocks and has experienced strongly negative real interest rate, which have eroded the value of nominal assets.

All this points to the notion that distributive conflicts are part of the story of the growth collapse. However, we suggest that the mechanism through which this conflict affects growth is by impacting the cost of capital, leading to declines in output and capital per worker. In the Venezuelan case, accommodating this increase has gone along with larger current account surpluses in spite of the decline in oil revenues.

Rodrik (1998) explains growth collapses as determined by the magnitude of the external shock and the quality of the conflict management institutions. This paper suggests that the intermediate variable through which the political economy effects may take place is the external interest rate, even if the country is not dependent on attracting foreign capital. This rate will affect the required marginal product of capital determining declines in output and capital per worker over and above those caused by the loss of external income.

Bibliography

Alesina, Alberto and Allan Drazen (1991). "Why are Stabilizations Delayed?", The American Economic Review, Vol. 81, No. 5., pp. 1170-1188.

Baptista, Asdrubal (1997), "Bases cuantitativas de la economia venezolana, 1830-1995", Caracas, Venezuela : Fundacion Polar.

Corden, Max (1984) "Booming sector and Dutch disease economics: survey and consolidation", Oxford Economic Papers, 36: 359-380.

Corden, Max and Peter Neary (1982) "Booming sector and deindustrialization in a small open economy", The Economic Journal 92 (December): 825-848.

Gelb, A (1988). *Oil Windfalls: Blessing or curse?,* Oxford: Oxford University Press. Carrie Kharl (199?)

Maddison, Angus (1995) *Explaining the economic performance of nations : essays in time and space*. Aldershot, Hants, England ; Brookfield, Vt., USA : E. Elgar., pp. 156-57

Matsuyama, Kiminori (1992) "A Simple Model of Sectoral Adjustment", The Review of Economic Studies, Vol. 59, No. 2. (Apr.), pp. 375-387

Karl, Terry Lynn (1997) The paradox of plenty: oil booms and petro-states. Berkely: University of California Press.

Naim, Moises and Ramon Pinango (1984) *El Caso Venezuela : una ilusion de armonia.* Caracas: Ediciones IESA.

Lant Pritchett (2000) "The Tyranny of Concepts. CUDIE (Cumulated, Depreciated Investment Effort) Is not Capital." World Bank Working Paper #2341.

Robinson, Enders A. (1992) Salem witchcraft and Hawthorne's House of the seven gables. Bowie, MD: Heritage Books, 1992

Rodrik, Dani (1998) "Why Do More Open Economies Have Bigger Governments?", The Journal of Political Economy, Vol. 106, No. 5., pp. 997-1032.

Sachs, Jeffrey D. and Andrew Warner, (1995) "Economic Reform and the Process of Global Integration", Brookings Papers on Economic Activity, Vol. 1995, No. 1, 25th Anniversary Issue. pp. 1-95.

Jeffrey Sachs and Francisco Rodriguez, (1999) "Natural Resources and Economic Growth: A Quantitative Exploration", mimeo HIID.

Tornell, Aaron and Lane, Philip R., (1998) “Voracity and Growth”, NBER Working Paper #6498.

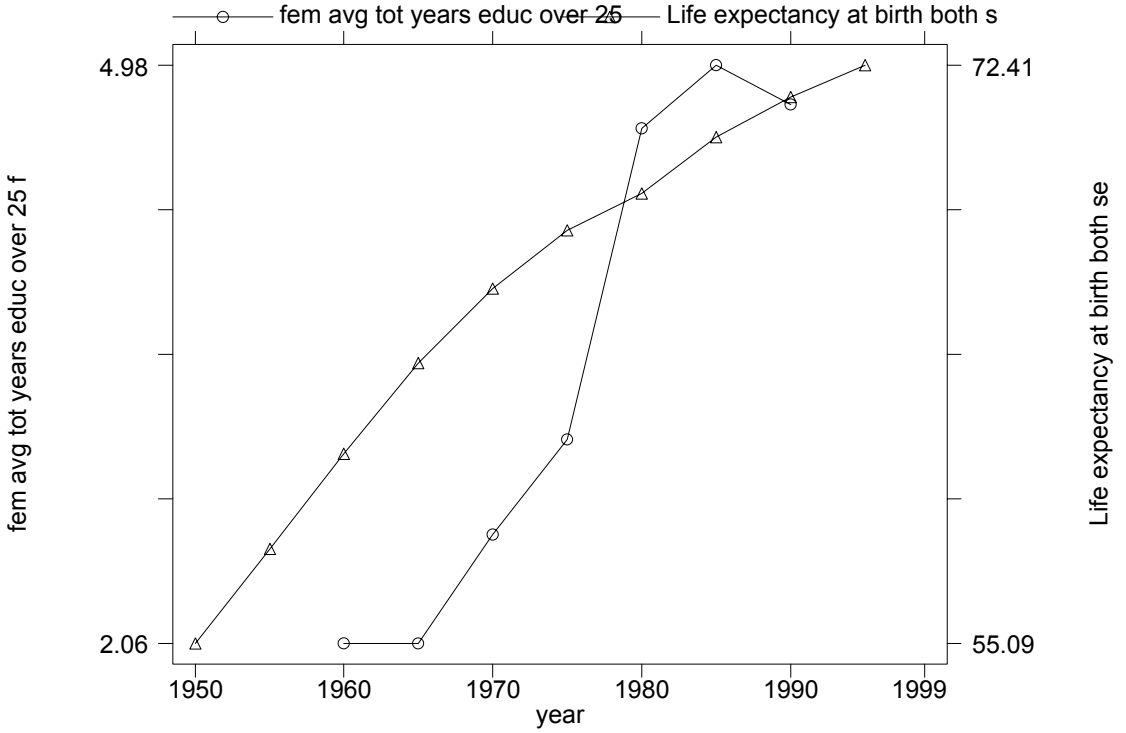
Appendix: A short overview of policy events.

Period	External situation	Policy orientation	Principal results
1964-73	Stagnant oil income	1. Fixed unified exchange rates 2. Fiscal discipline 3. Import-substitution industrialization	1. High but falling rate of growth (average 6.8%) 2. Very low inflation (1.7%) 3. External balance
1974-76	1. First oil shock 2. Higher world inflation	1. Expansionary fiscal policy 2. Emphasis on publicly owned basic industries 3. Nationalizations and restrictions on foreign investment	1. Acceleration in growth (9%) 2. Higher inflation but lower than world levels (9%) 3. Large and declining surpluses in fiscal and external accounts. Balance achieved in 1976.
1977-78	Declining oil income	1. Increase in public spending mainly in state enterprises. 2. Some attempts to cut back spending and credit	1. Decline in growth (3.5% in 1978) 2. Major external and fiscal deficits 3. Extensive supply bottlenecks: labor and installed capacity
1979-80	1. Second oil shock 2. Jump in world interest rates	1. Strong fiscal contraction (mainly in imports) 2. Price liberalization 3. Wage increase law 4. Some trade liberalization 5. Interest ceilings do not adjust fully for the rise in world rates	1. Growth falls to zero 2. Unemployment grows slowly 3. Inflation accelerates to record levels (21% in 1980) 4. Real exchange rate appreciates strongly 5. External and fiscal balance achieved 6. Capital outflows begin
1981-82	Oil income very high, starts to fall	1. Fiscal expansion in public works 2. Interest rates are freed but monetary policy is expansionary 3. Large deficits in public enterprise sector financed through foreign borrowing	1. Mediocre growth (1%) 2. High but falling inflation (16%) 3. Large current account deficit and massive capital outflow (US$8 bn. In 1982)
1983	1. Fall in oil income 2. Start of debt crisis	1. Adoption of a multiple exchange rate regime, average devaluation 30% 2. Import controls 3. Contractionary fiscal policy 4. Monetary policy expansionary 5. Generalized price controls are adopted	1. GDP falls 5% 2. Inflation kept at 7% 3. Large balance of payments surplus (US$4 bn.) 4. Still important fiscal deficit 5. Large expansion in money supply 6. Floating rate depreciates over 200%

1984-85	Oil income stable at lower level (US$13bn.)	1. Devaluation of official rate 2. Maintenance of import controls 3. Fiscal cuts 4. Interest rate controls adopted 5. Price controls are relaxed 6. Debt strategy: simple rescheduling	1. After an additional contraction in 1984 (-2%), economy starts to grow in 1985(3.5%); unemployment reaches peak 2. Inflation increases to moderate levels (15%) 3. Large fiscal and balance of payments surpluses
1986-88	Oil income collapses (US$8 bn.) No adjustment	1. Fiscal expansion adopted 2. Forced financing of imports 3. Major devaluation when situation becomes untenable 4. No change in interest rate ceilings	1. Economy grows at 5% average; unemployment falls back to 7% 2. Major balance of payments and fiscal deficit 3. Acceleration of inflation to over 3% 4. Floating rate depreciates by almost 200% over the period
1989-93	The day of reckoning	1. Exchange rate system unified in a floating arrangement 2. Interest rates and prices freed 3. Trade and foreign investment liberalized 4. Subsidies cut, public sector prices increased	1. GDP drops by almost 10 % in 1989 and recovers quickly 2. Inflation exceeds 80% and falls back to 30% 3. Exchange rate unified close to parallel rate and then crawls 4. Rapid initial current account adjustment followed by capital inflows 5. Bank credit boom 6. Political turmoil: two military coup attempts in 1992 and a presidential impeachment in 1993
1994-96	Unstable and low income	1. Banking crisis 2. Re-adoption of multiple exchange regimes 3. Structural reform stopped	1. Severe economic contraction 2. Inflation accelerates 3. Current account surplus and capital flight resumes 4.
1996-98	Oil prices collapse again	1. Exchange rate unified in a massive real depreciation 2. Economic liberalization resumes 3. Opening of oil industry to private investment	1. Initial enthusiasm followed by a contraction when oil collapsed 2. Inflation jumps to over 100 percent and starts to decline 3. Massive real depreciation followed by rapid appreciation

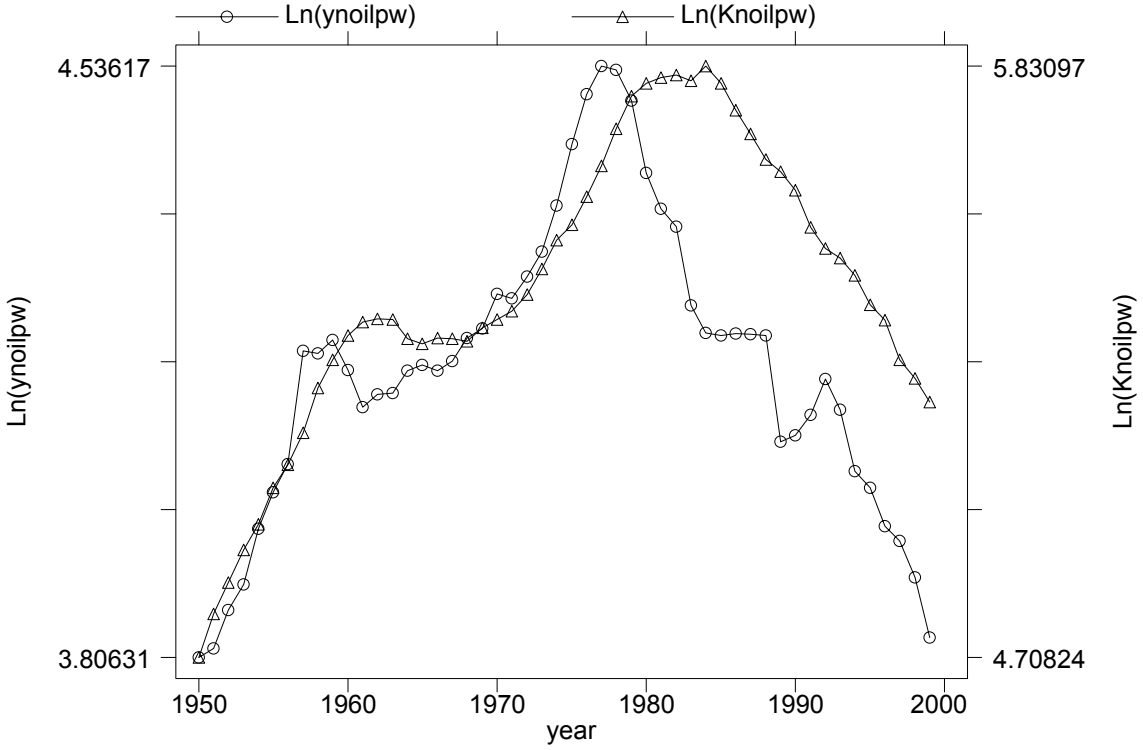
Figure 1. Venezuela: GDP per worker, excluding oil sector, in logs.

Figure 2. Venezuelan progress in health and education:
Life expectancy and average years of schooling of females over 25.



Source: World Bank

Figure 3 a and b: GDP and physical capital per worker 1950-99



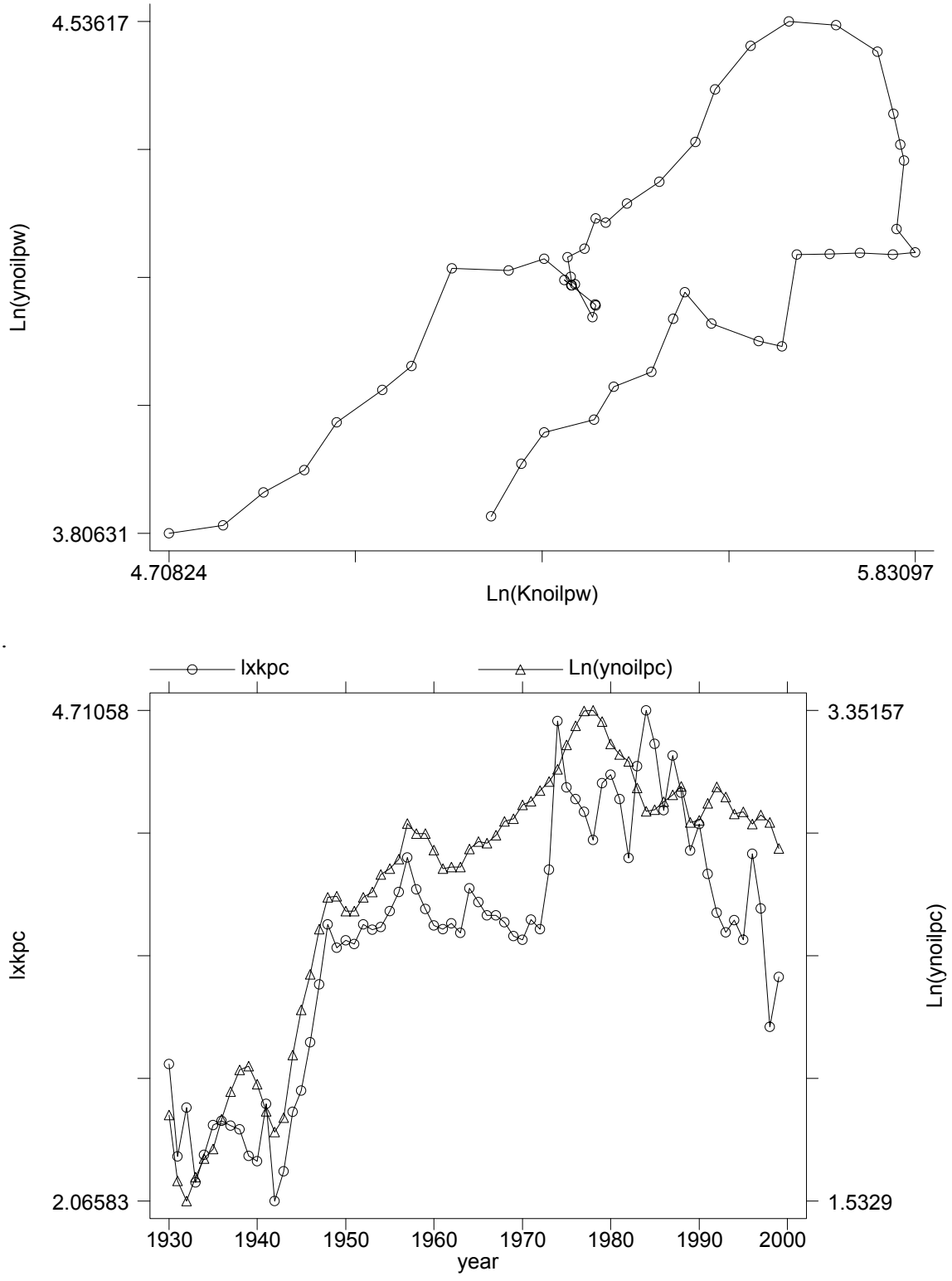


Figure 4a. Non-oil GDP per capita and real oil exports per capita

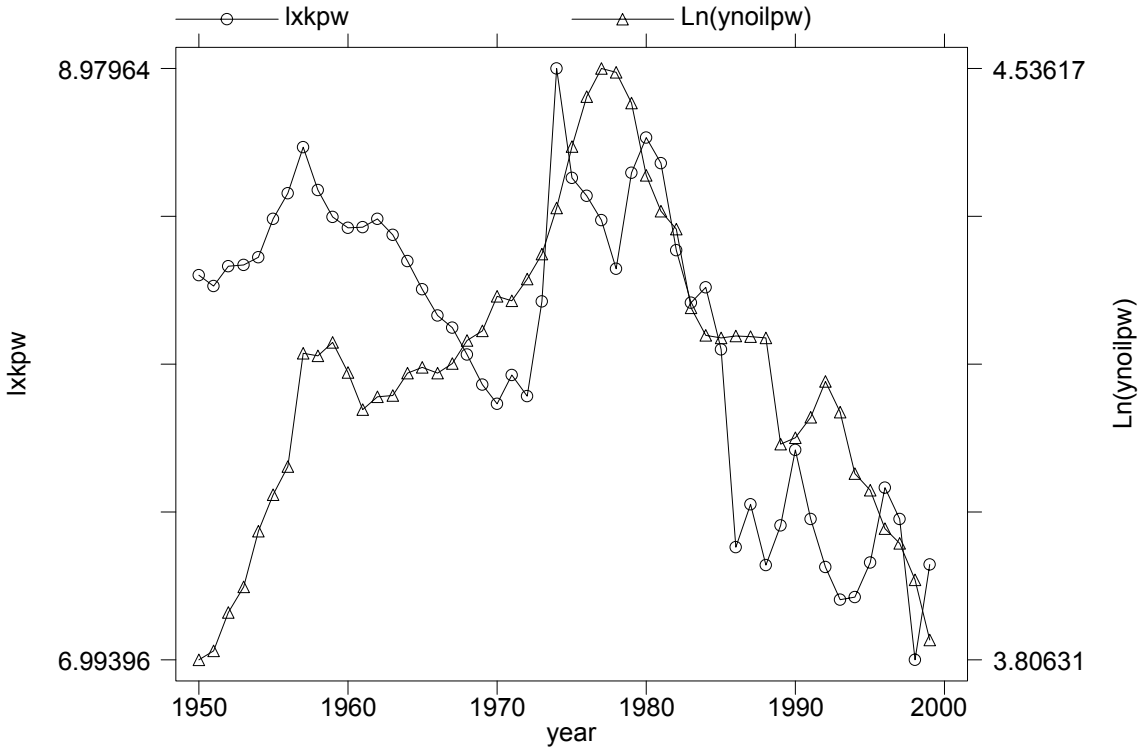


Figure 4b. Non-oil GDP per worker and real oil exports per worker

Figure 5. Real exchange rate and real oil exports per capita

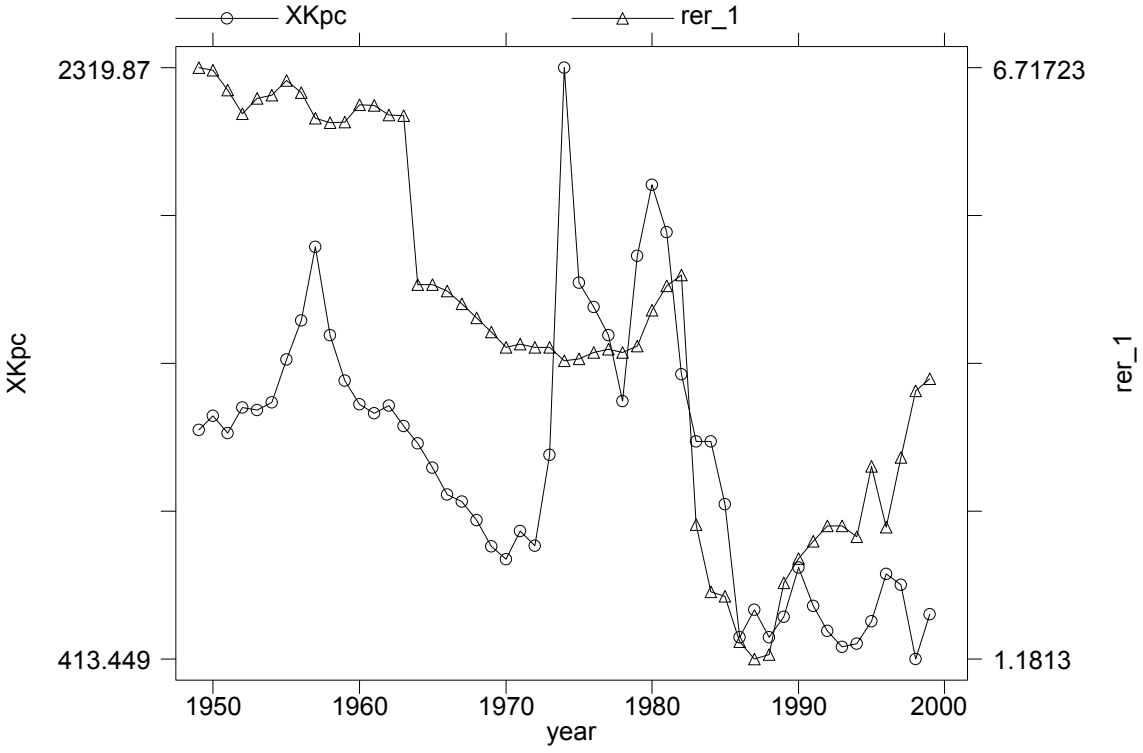


Figure 6. Gross fixed public and private investment per worker

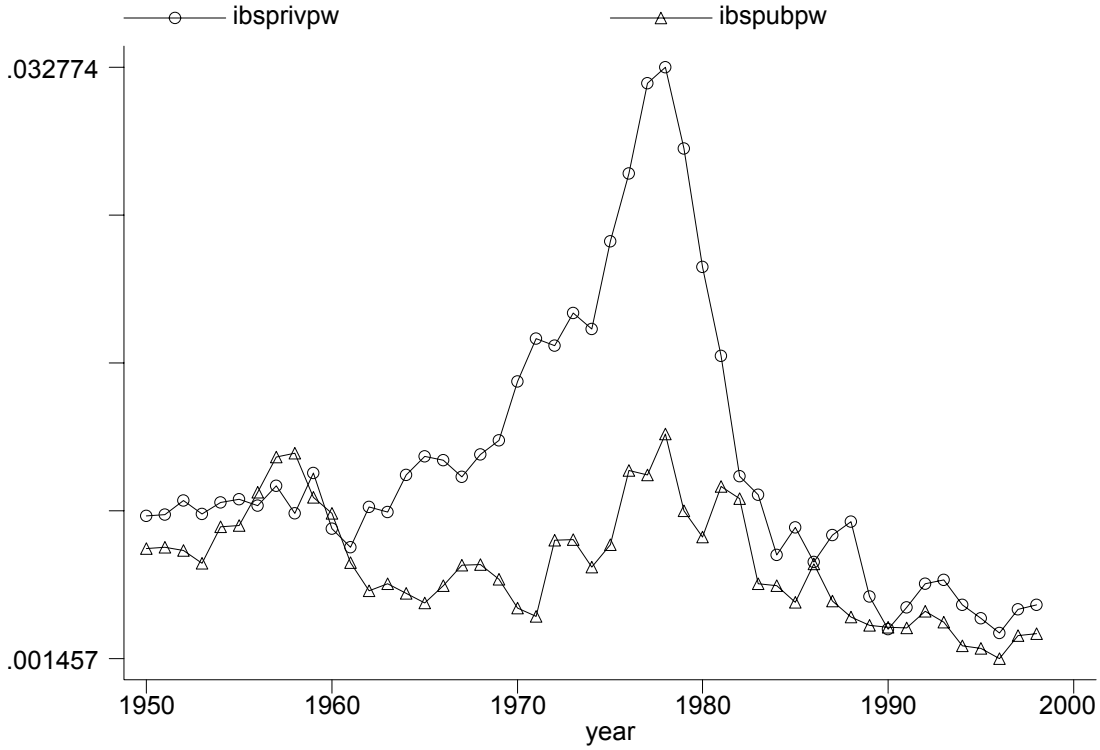
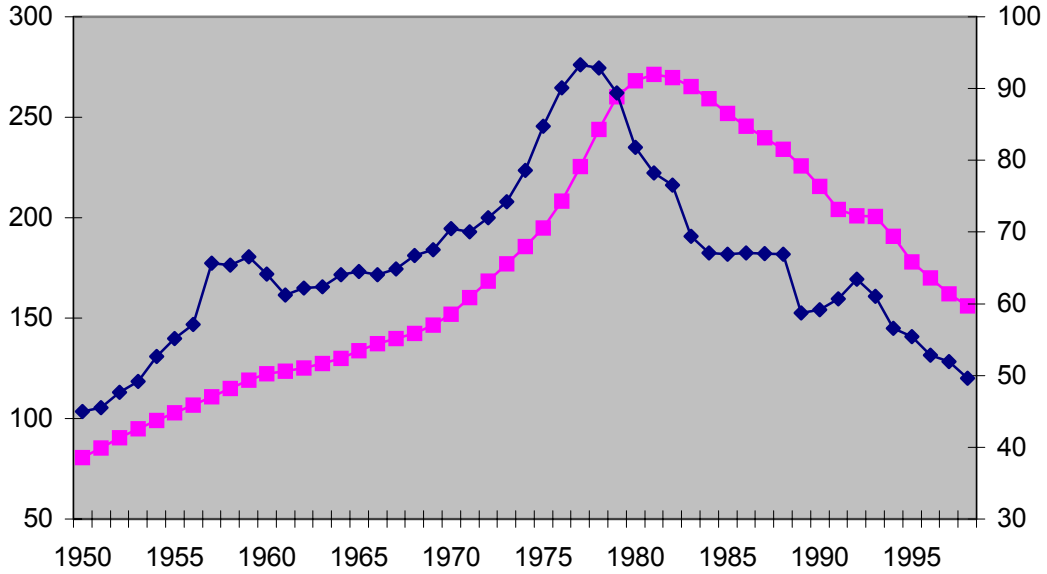


Figure 7. Private capital and output per worker in the non-oil economy



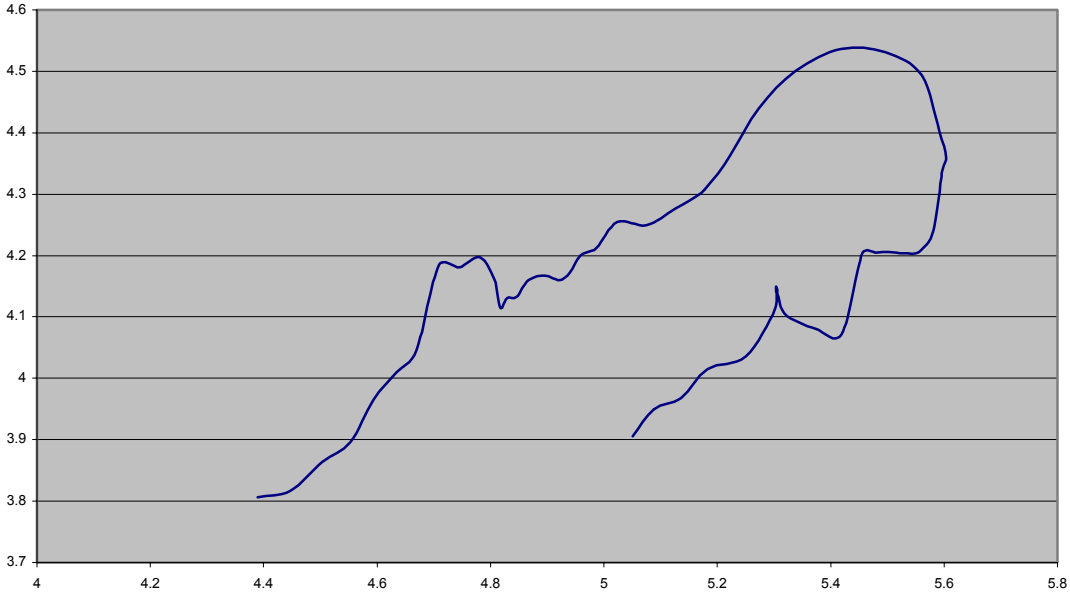


Figure 8. Debt export ratios in Latin America, 2000.

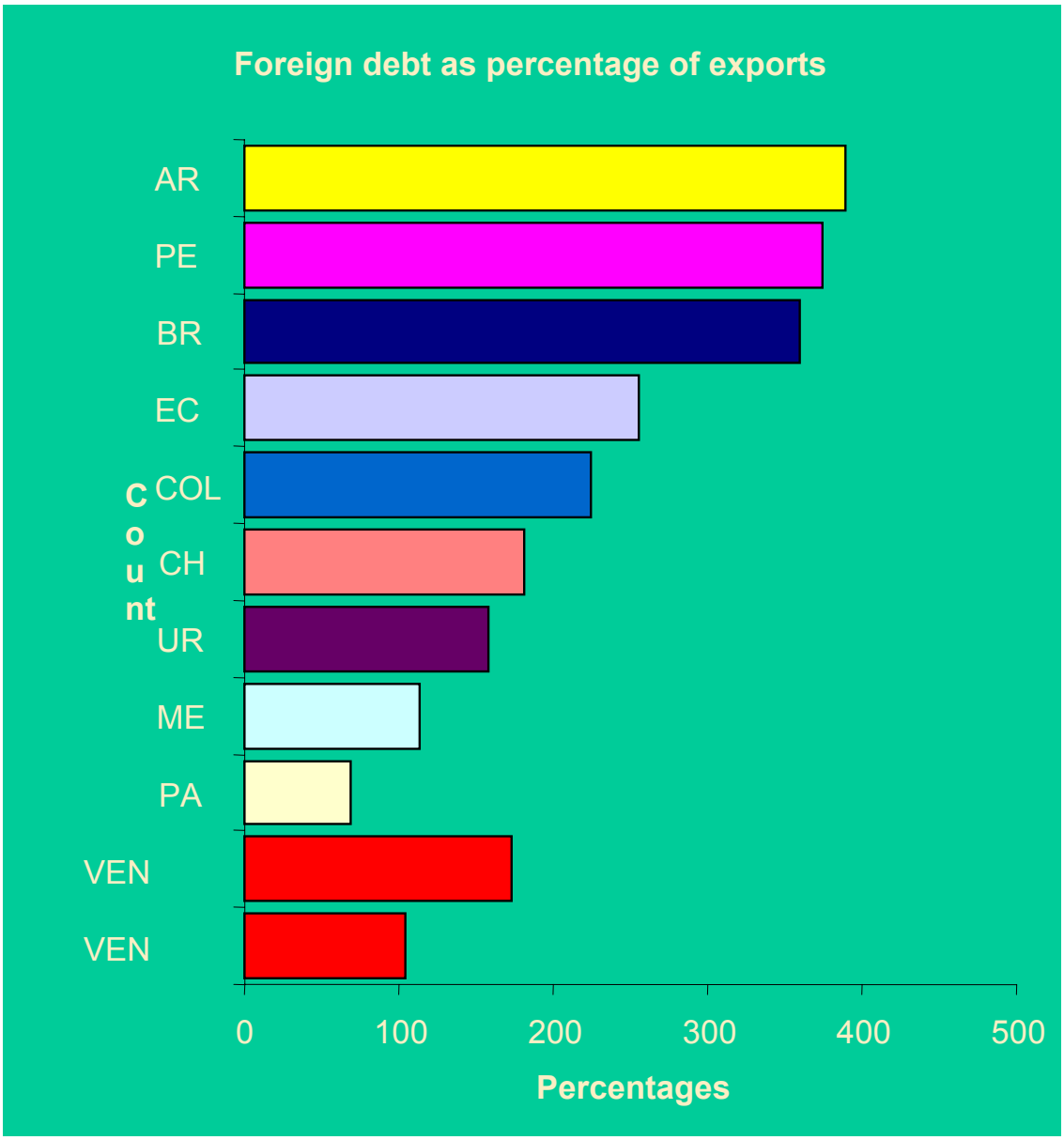


Figure 9. The collapse in nominal assets. M2 in constant US$ and in constant local currency prices.

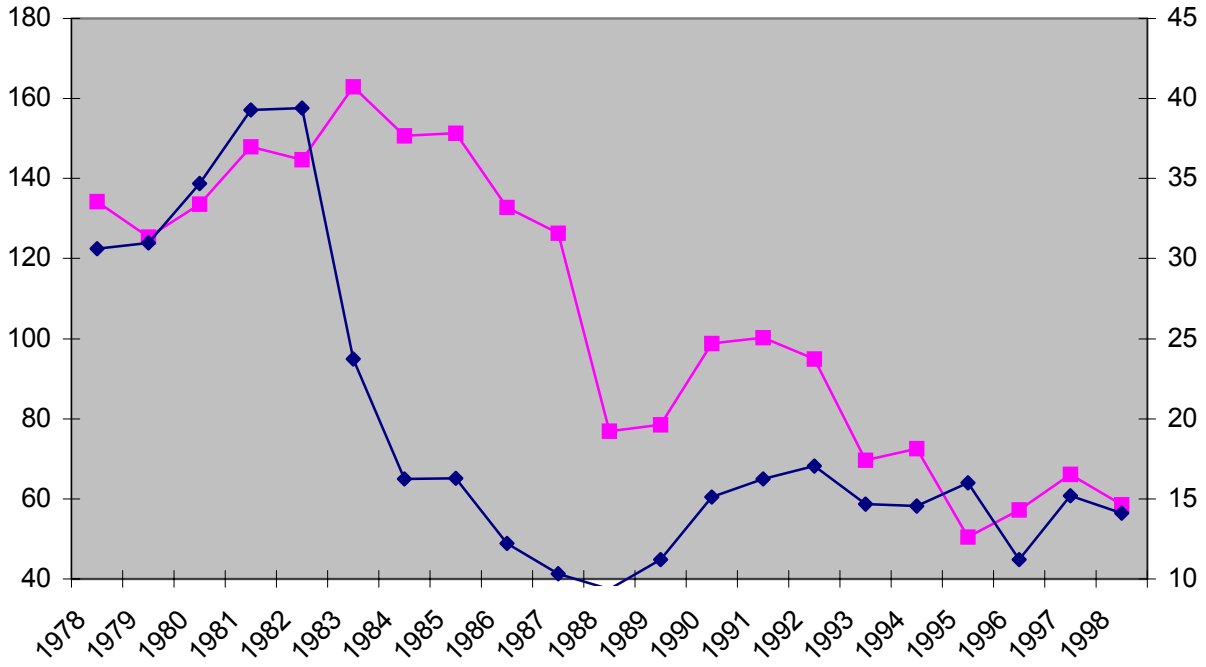


Table 1. The Venezuelan growth experience: 1920-1999

Annual rates of growth

	Non-oil GDP	Population Pop	Non-oil Employment	Non-oil GDP per capita	Non-oil GDP per worker	Total GDP per capita	Total GDP per worker
1920-80	6.7%	2.7%		3.9%		4.3%	
1920-50	7.5%	1.7%		5.7%		7.1%	
1950-80	5.8%	3.7%	3.7%	2.1%	2.0%	1.6%	1.5%
1950-70	5.9%	3.9%	3.6%	2.0%	2.3%	2.2%	2.5%
1970-80	5.6%	3.2%	4.0%	2.3%	1.5%	0.3%	-0.4%
1980-99	0.44%	2.51%	3.52%	-2.02%	-2.98%	-1.58%	-2.54%
1920-30	10.6%	1.0%		9.5%		13.7%	
1930-40	2.5%	1.3%		1.2%		0.5%	
1940-50	9.7%	2.8%		6.6%		7.5%	
1950-60	6.5%	4.1%	2.7%	2.3%	3.6%	2.1%	3.5%
1960-70	5.4%	3.7%	4.4%	1.7%	0.9%	2.2%	1.5%
1970-80	5.6%	3.2%	4.0%	2.3%	1.5%	0.3%	-0.4%
1980-90	0.0%	2.9%	3.3%	-2.8%	-3.2%	-2.6%	-3.0%
1990-99	0.9%	2.1%	3.8%	-1.2%	-2.7%	-0.4%	-2.0%

Source: Baptista (2000)

Table 2.

The collapse in output in the non-oil economy

Dependent variable: GDP per worker

Capital per worker	0.57	0.62
	(12.30)	(16.20)
Trend	0.02	0.03
	(1.40)	(2.90)
Dummy 83-99	-0.28	-0.34
	(7.70)	(10.00)
Years	1950-99	excludes 1977-82

Note: t-statistics in parenthesis.

Table 3. Venezuela: Growth decomposition 1950-1999

	GDP per worker	Capital per worker	Capital share 1	Capital share 2	Capital contribution 1	Capital contribution 2	TFP 1	TFP 2
1950-60	3.6%	6.3%	0.330	0.400	2.1%	2.5%	1.5%	1.1%
1960-70	0.9%	0.3%	0.343	0.400	0.1%	0.1%	0.8%	0.8%
1970-80	1.5%	4.6%	0.385	0.400	1.8%	1.8%	-0.3%	-0.3%
1980-90	-3.2%	-2.0%	0.462	0.400	-0.9%	-0.8%	-2.3%	-2.4%
1990-99	-2.7%	-4.4%	0.480	0.400	-2.1%	-1.7%	-0.6%	-1.0%
1950-80	2.0%	3.7%	0.353	0.400	1.3%	1.5%	0.7%	0.5%
1980-99	-3.0%	-3.1%	0.471	0.400	-1.5%	-1.3%	-1.5%	-1.7%

Note: Capital shares were calculated from actual national accounts using BCV(1990). However, there are three distinct base years for these accounts (1957, 1968 and 1984). In each successive system, the capital share rises discontinuously with the change in the base year. We use both a period specific share and a common share for all periods.

Table 4. Non-oil GDP growth and real oil exports

	Non-oil GDP per capita		Real oil exports per capita (US$ 1990 prices)			Capital per worker in the non-oil sector	
	Mean growth	St. dev.	Mean level	Mean growth	St. dev.	Mean growth	St. dev.
1920-80	3.9%	9.1%		17.6%	43.5%		
1920-50	5.7%	11.6%		26.4%	52.4%		
1950-80	2.1%	4.9%	1263	9.8%	29.9%	3.7%	3.1%
1950-70	2.0%	4.9%	1172	3.8%	8.1%	3.3%	3.5%
1970-80	2.3%	5.1%	1387	22.7%	46.8%	4.6%	2.0%
1980-99	-2.02%	5.5%	792	-0.4%	24.2%	-3.1%	2.8%
1920-30	9.5%	11.5%		71.0%	61.1%		
1930-40	1.2%	10.2%		-0.6%	28.1%		
1940-50	6.6%	12.5%		22.4%	29.7%		
1950-60	2.3%	5.8%	1331	6.6%	10.3%	6.3%	1.5%
1960-70	1.7%	4.4%	1019	1.1%	3.0%	0.3%	2.2%
1970-80	2.3%	5.1%	1387	22.7%	46.8%	4.6%	2.0%
1980-90	-2.8%	5.6%	1000	-2.6%	25.5%	-2.0%	2.9%
1990-99	-1.2%	5.3%	555	2.1%	25.1%	-4.4%	1.7%
1920-29	11.1%	11.0%		82.4%	57.2%		
1929-42	-0.8%	10.0%		-0.5%	31.9%		
1942-57	7.9%	9.2%		21.0%	23.4%		
1950-57	4.7%	5.6%	1330	12.4%	7.0%	6.3%	1.3%
1957-70	0.5%	5.4%	1075	-0.5%	8.0%	1.7%	3.3%
1970-78	4.5%	2.8%	1290	17.6%	50.9%	4.6%	2.0%
1978-99	-2.4%	5.3%	855	3.2%	25.9%	-2.4%	3.9%
1978-82			1604				
1983-99			634				

Table 5. Can the decline on oil income alone explain the growth collapse?

Peak oil income	1600	1600
r*k	0	1600
Recent average oil income	600	600
Recent/Peak	37.5%	68.8%
α	40.0%	40.0%
Predicted recent/max non-oil GDP per worker	67.5%	86.1%
Actual recent/peak	51.4%	51.4%
Under-prediction	31.4%	67.5%

Table 6. Recent Latin American spreads and the price of oil

Date	31-Jul-98	31-Jan-01
Argentina	444	603
Brazil	565	673
Colombia	426	666
Mexico	401	366
Uruguay	189	275
Venezuela	794	808
Average	470	565
Oil ($/b)	11.05	26.5

Argentina	**332**	**444**	**603**
Brazil	**371**	**565**	**673**
Colombia	**220**	**426**	**666**
Mexico	**296**	**401**	**366**
Uruguay	**150**	**189**	**275**
Venezuela	**334**	**794**	**808**
Average	**284**	**470**	**565**
Oil ($/b)	16.5	11.05	26.5

Table 7 Can the decline in oil and the increase in real interest rates explain the collapse in output?

Peak oil income	1600	1600
r*k	0	1600
Recent average	600	600
Recent/Peak	37.5%	68.8%
α	40.0%	40.0%
Real interest at peak	4.0%	4.0%
Recent real rates	12.0%	12.0%
Ratio peak/recent interest rates	33.3%	33.3%
Predicted recent GDP per worker (peak=100%)	43.5%	55.5%
Actual recent/peak	51.4%	51.4%
Proportional difference	-15.3%	7.9%

Table 8 Average current account balance

	Average Current Account
1960-70	2.0%
1970-80	1.6%
1980-90	1.1%
1990-99	3.2%
1960-72	1.5%
1973-82	1.9%
1983-99	2.3%

Table 9. Volatility of the annual rate of change of oil revenues and the real exchange rate

	Real exchange rate	Real exports
1950-82	6.3%	25.6%
1950-82*	2.5%	25.6%
1964-82	2.9%	34.0%
1983-99	30.1%	23.6%
1983-89	41.1%	22.9%
1990-99	13.6%	24.1%

* Excludes the nominal depreciation of 1963