Nigeria's Growth Record: Dutch Disease or Debt Overhang?

Nina Budina

World Bank

nbudina@worldbank.org

Gaobo Pang

World Bank

gpang@worldbank.org

Sweder van Wijnbergen

University of Amsterdam

and Tinbergen Institute

s.j.g.vanwijnbergen@uva.nl

Abstract

Nigeria's oil boom has not brought an end to perennial stagnation in the non-oil economy. Is this the unavoidable consequence of the resource boom or have misguided policies contributed? This paper indicates that the extreme volatility of expenditure rather than Dutch Disease effects is behind the disappointing non-oil growth record. Fiscal policies failed to smooth highly volatile oil income; on the contrary government expenditure was more volatile than oil income. The authors provide econometric evidence showing that volatility of expenditure was increased by debt overhang problems. Moreover, they also find evidence of voracity effects that exacerbated expenditure volatility prior to 1984.

I   Introduction

Oil has been the dominant factor in Nigeria's economy for the past 50 years. Since the oil discoveries in the early 1970s made Nigeria one of the world's top ten oil exporters, Nigeria has followed the boom/bust cycles of the world oil market. Yet the many years with oil money have not brought the population an end to poverty nor, at least not until recently, allowed the economy to break out of what seems like perennial stagnation in the non-oil economy. Is this record the unavoidable consequence of the so called resource curse, or have misguided policies contributed to slow growth? The answer has a bearing on current policies: Nigeria has changed its macroeconomic policies recently and has simultaneously seen much improved economic performance. Are there any lessons Nigeria should learn from its poor record in the past that could help insure that current favorable developments become structural and last beyond the end of the current windfall gains?

Traditional explanations of poor performance in oil rich countries (ORCs) include the so called Dutch Disease, named after Holland's poor record in managing its natural gas wealth in the 1960s. Spending out of oil wealth increases demand for non-tradables and so draws productive resources into that sector. Since the presumption is that technological progress is faster in T-sectors than in NT-sectors, the explanation of low growth naturally follows. However, there are difficulties in simply labeling Nigeria another instance of the Dutch Disease. While such resource pressure seems to characterize the period before 1980, the next twenty years have seen widespread and persistent excess capacity and unemployment, features that cannot easily be reconciled with a DD related explanation of low growth.

Another line of reasoning looks at the volatility of spending, rather than at its level, as a factor impeding growth. Commodity prices and revenues from natural resources tend to be volatile and may translate into macroeconomic instability and a highly volatile real exchange rate. High volatility is in effect a tax on investment, as highly volatile relative prices discourage the irreversible commitments to specific sectors that capital investment implies (van Wijnbergen (1986)). One plausible explanation for this volatility, quite plausible for federal states like Nigeria, is the "voracity effect" (see Tornell and Lane (1995)), which leads to resolution of distributional conflicts at the expense of future generations.

There is an alternative, or possibly complementary, explanation of high volatility in ORCs, an explanation that starts from the surprising fact that many ORCs have landed themselves in debt problems, their oil wealth notwithstanding. The empirical analysis in this paper strongly indicates that Nigeria has faced debt overhang problems in the past. With the exception of the years leading up to the 1984 crisis,
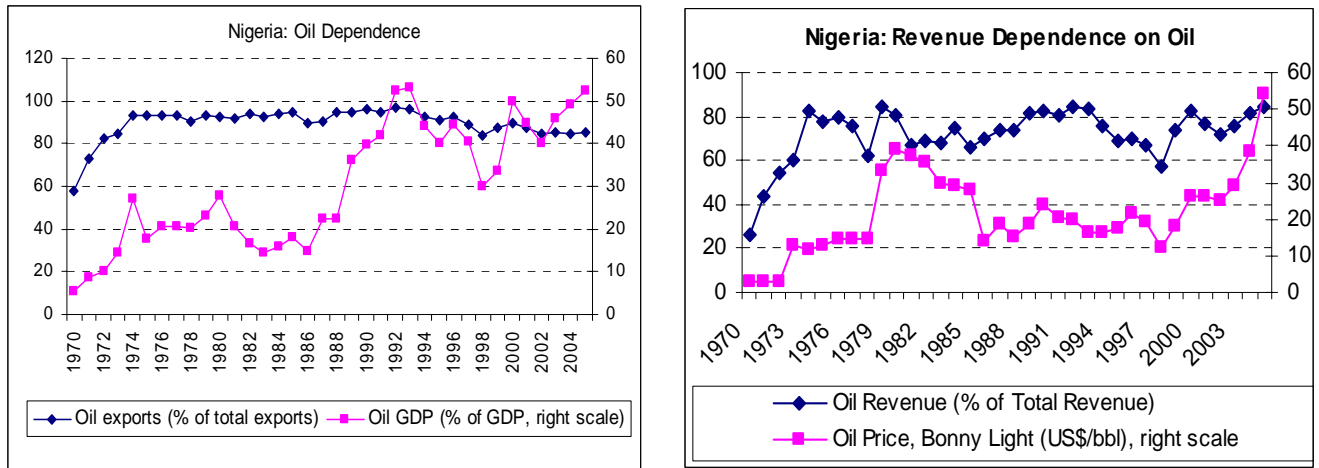
spending in upturns has not been excessive (although may be not smoothing volatility enough either), but adjustments in down turns have been harsh as access to capital markets dried up at the very moment it was needed most, when oil prices slumped.

Section II analyzes Nigeria's macroeconomic record as an oil producer, its uses of the windfall gains, and the macroeconomic consequences of the fiscal and exchange rate policies followed in response to the vagaries of the oil market. In Section III we ask the question of why Nigeria did so poorly in terms of economic growth. Key conclusions are that fiscal and exchange rate policies added to, rather than smoothed out, the volatility of oil prices. Thus the government itself became an additional source of macroeconomic volatility. Section IV provides econometric evidence on the main drivers behind that perverse role of fiscal policy, pointing to debt overhang as a major factor explaining the strongly pro-cyclical role of fiscal policy in Nigeria. Section V benchmarks Nigeria's macroeconomic record with managing the recent oil windfall with a peer group of 22 ORCs and Section VI concludes.

II   The Macroeconomic Record

Nigeria discovered oil in 1956 and began to export oil in 1958. Since the oil discoveries in the early 1970s, oil has become the dominant factor in Nigeria's economy. Using 1970 as a benchmark, Nigeria gained an extra $390 billion in oil-related fiscal revenue over the period 1971-2005, or 4.5 times 2005 GDP, expressed in constant 2000 dollars. The sizeable oil windfall of course does present net wealth and thus additional spending room, but it has also complicated macroeconomic management and led to an extreme dependency on oil, a highly volatile source of income. The share of mining in total GDP increased substantially, representing about a half of GDP in 2005. Oil also accounts for about 90 percent of total exports and about four-fifths of total government revenues (see Figure 1).

Figure 1: Nigeria: Indicators of Oil Dependence

Nigeria: Oil Dependence

Oil exports (% of total exports) — Oil GDP (% of GDP, right scale)

Nigeria: Revenue Dependence on Oil

Oil Revenue (% of Total Revenue) — Oil Price, Bonny Light (US$/bbl), right scale

II.1   Policy response to the oil windfall of the 1970s.

After an initial lag in 1973 and 1974, when large surpluses were saved and invested abroad, consolidated public expenditure accelerated rapidly: by 1976 it absorbed the entire oil windfall (Figure 2). By 1977 combined federation and states capital expenditure increased six fold over their 1970 level. Public capital expenditure accelerated so strongly that it alone accounted for the spending of more than half of the entire oil windfall.
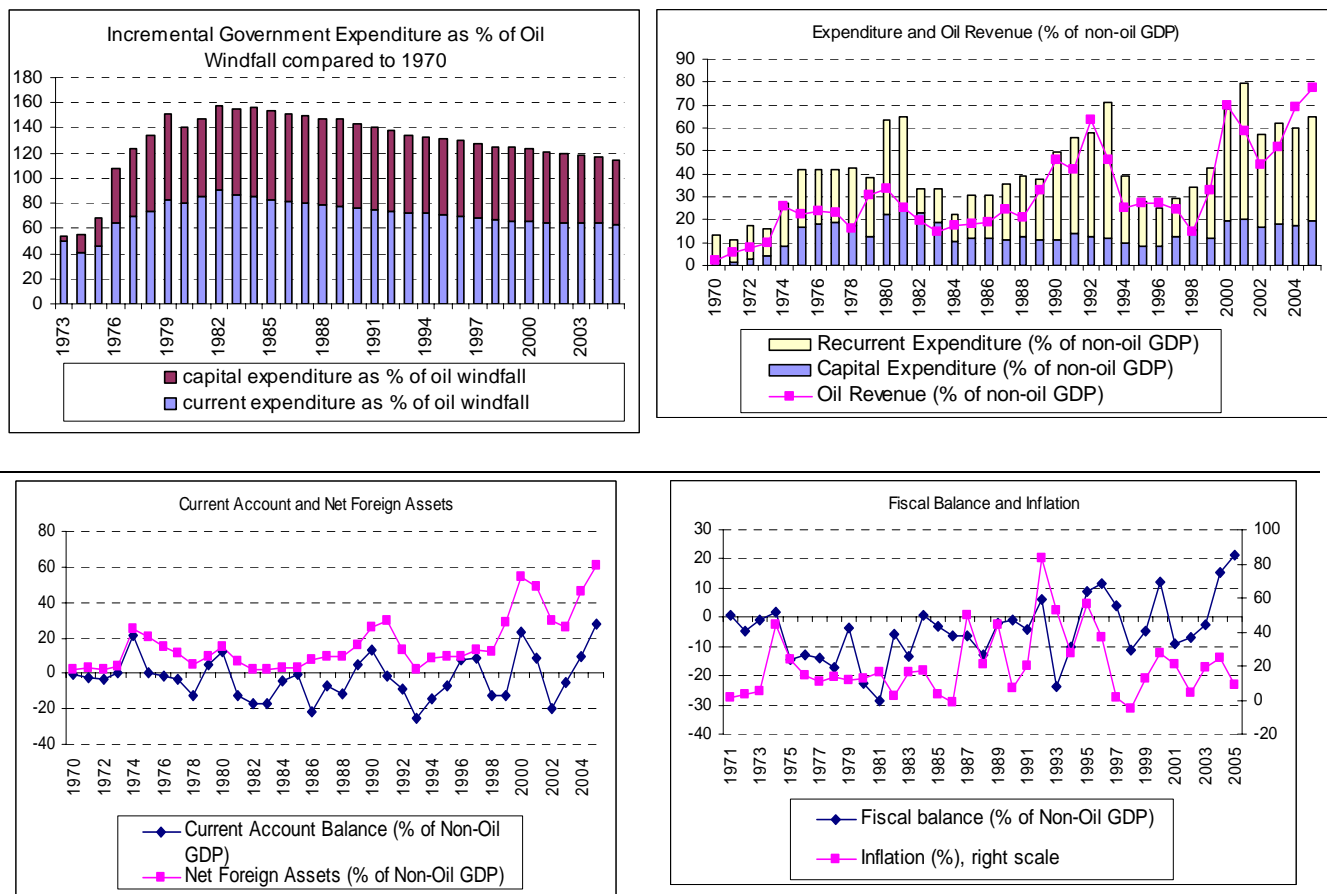
However, Nigeria's continued failure to improve its ranking in measures of educational success or infrastructure quality suggest that much of this expenditure was conceived too hastily and ended up largely leading to waste and corruption. Weak institutions and poor governance have contributed substantially to Nigeria's public debt problems, as the majority of projects financed by public borrowing during the late 1970s and 1980s failed to generate an adequate rate of return needed to improve the repayment capacity of the country.[1]

Thus during the 1970s, public expenditure was primarily financed from oil revenues, made possible by the high oil prices in the 1970s, some domestic borrowing, and relatively modest external borrowing. At the time of the second oil shock in 1980, when oil prices jumped to almost $40/bbl, the

---

[1] A study carried out by the Federal Ministry of Finance in 1996 of commercial external loans from bilateral and commercial creditors (amounting to about 70 percent of external debt outstanding in 1996) has documented problems encountered by externally financed projects. Many of these projects have not been completed, owing to cost overruns or lack of finance. Of these projects completed, many are inoperative owing to a lack of power or other missing links in the manufacturing sector. Furthermore, the maintenance of completed infrastructure assets has often been inadequate. In some cases, imported goods, financed by loans, could not be located. Finally, no significant project that was completed and documented by this study appears to have generated foreign exchange revenues.

stock of gross external debt stood at a very modest $4.3 billion (6.6 percent of GDP). Foreign reserves still stood at $10.6 billion[2].

Figure 2 Uses of Oil Windfall, Fiscal Balance, Inflation and External Position.

Incremental Government Expenditure as % of Oil Windfall compared to 1970

capital expenditure as % of oil windfall
current expenditure as % of oil windfall

Expenditure and Oil Revenue (% of non-oil GDP)

Recurrent Expenditure (% of non-oil GDP)
Capital Expenditure (% of non-oil GDP)
Oil Revenue (% of non-oil GDP)

Current Account and Net Foreign Assets

Current Account Balance (% of Non-Oil GDP)
Net Foreign Assets (% of Non-Oil GDP)

Fiscal Balance and Inflation

Fiscal balance (% of Non-Oil GDP)
Inflation (%), right scale

II.2.   The oil price collapse in 1980s - the origins of the debt problem

Since the oil prices collapse in the early 1980s, Nigeria experienced rapid external debt built-up and dwindling foreign exchange reserves: public and publicly guaranteed external debt increased from $4.3 billion to $11.2 billion, while foreign exchange reserves were almost exhausted, from $10 billion to $1.23 billion, all between 1981 and 1983. Despite of its low-income status today, in early 1980s Nigeria

---

[2] Data on domestic public debt for the 1980s are not available, so the public debt stock figures for that period consist of external public debt only. Since 1990, data on domestic public debt, although available, are likely to understate the true domestic debt burden, as information on state governments' domestic debt is not available. In addition, these figures do not include the substantial stock of domestic contractual and pension arrears, which at least in 2003 were large.

was borrowing heavily from commercial sources, mostly at floating interest rates. Most of this borrowing (short-term trade credits) was done by the states, but with explicit guarantees by the federal government through the federal export credit agency.

The consistent record of repeated rescheduling and continuing arrears since early 1980s have effectively shut Nigeria out from international capital markets for most of the past two decades.[3] Evidence of this lack of market access is the prohibitive mark-ups that Nigeria would have had to pay on primary issues that can be derived from secondary market information (Figure 3). It is only after the recently concluded debt relief agreement that mark-ups have fallen to manageable, although still high levels.

**Figure 3. Nigeria: Net Public Debt to GDP ratio and Risk Premium on external Debt.**
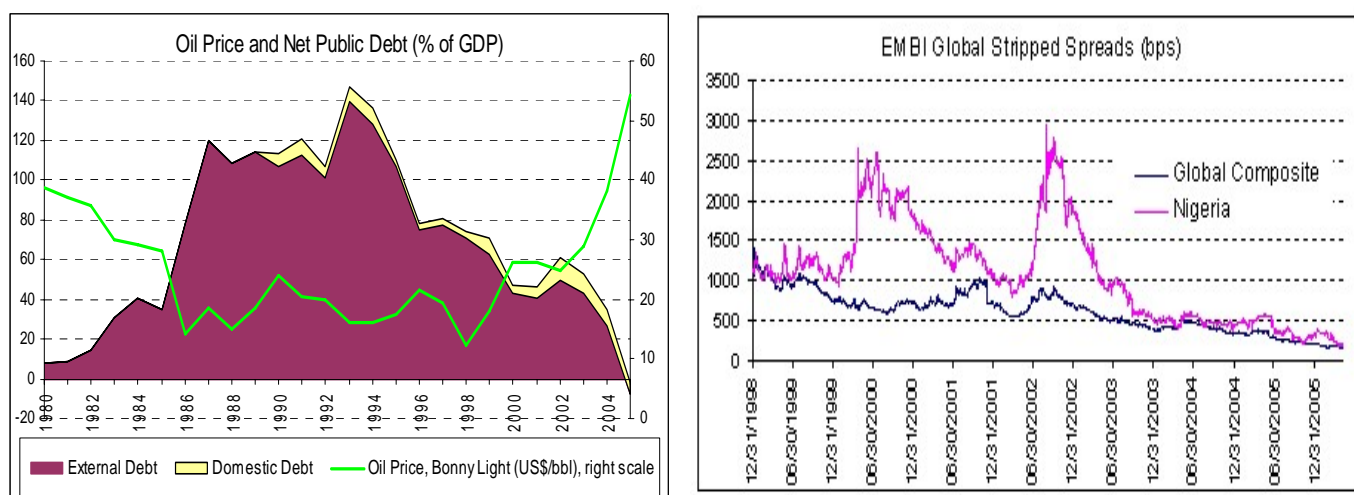
Data Source: a) Annual Statistical Abstract, Central Bank of Nigeria, various issues, IMF and World Bank Staff Reporting and b) JP Morgan.

To better understand the factors behind the large public debt buildup during 1980-1993, and its subsequent reduction since then until 2005, figure 4a shows key debt determinants of changes in net public debt-to-GDP ratio. The decomposition results show that fiscal policy has been the major factor behind the debt expansion during the period of oil price collapse (1981-1983). While the non-oil deficit was reduced substantially as a result of the sizeable public expenditure cuts, the drop in oil revenue as a result of the oil price collapse was much larger (see Figure 4b). As a result, the average annual non-oil

---

[3] In 1982 and 1983, Nigeria accumulated trade arrears for the first time. Nigeria was running arrears on its external debt ever since and the bulk of the increase of its external debt since mid-1980s reflected not so much new lending, but rather converted past commercial debt arrears. Nigeria's arrears on external debt have been rescheduled in successive agreements with the London Club (1984, 1987, 1989, and 1992) and the Paris Club (1986, 1989, 1991, and 2000). The last Paris Club debt reduction agreement, which was reached in October, 2005, has brought significant external debt relief (see Annex II).

deficit for the period exceeded the average annual oil revenues by more than 50 percent of non-oil GDP! The resulting large fiscal deficits translated in large current account deficits, which amounted to $18 billion cumulatively over 1981-1983. This in turn led to a rapid build up of external (public) debt.

Figure 4 a) Public debt decomposition results and b) Trends in Non-oil primary deficit and Oil revenues.
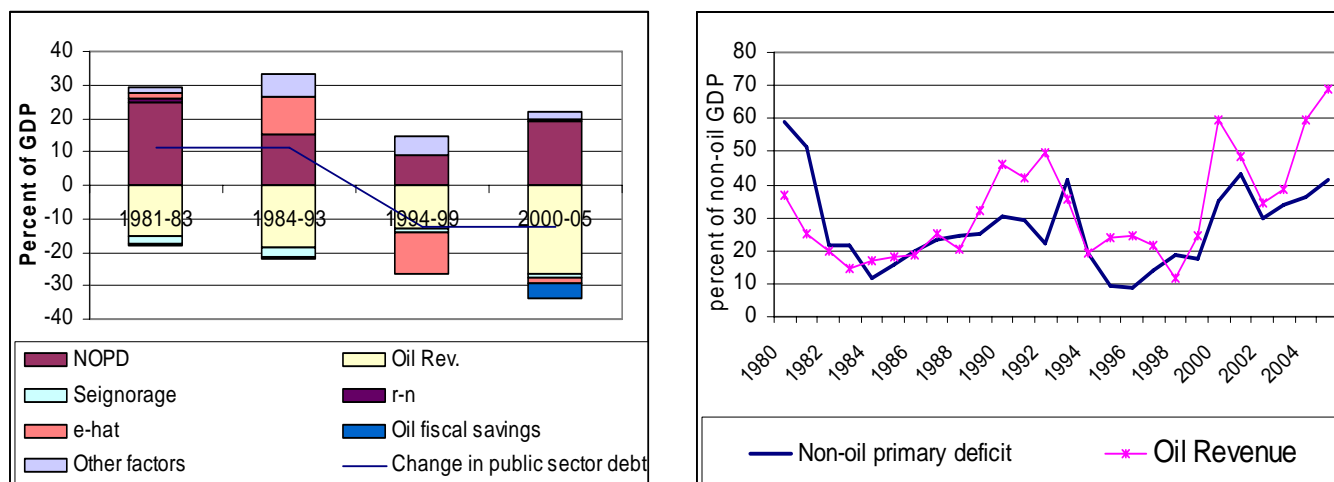
During 1984-1993, the public debt to GDP ratio increased substantially and reached a staggering 140 percent of GDP! During this period, public debt increased largely as a result of the large exchange rate depreciation in 1986. Furthermore, the contribution of "other factors" has been particularly large in this sub-period. Other factors would include debt arrears, other hidden/contingent liabilities (a number of guarantees on external state borrowing have been called), and measurement errors.

However, fiscal policy had a debt reducing impact, as the spending came to an abrupt halt when Nigeria effectively was cut off from external capital markets during and after the crisis of 1984. The government responded by a drastic cut in federal and state expenditure, including a priority ranking of the investment program, reduction in public sector employment and reduced subsidies and more broadly, improving cost recovery in the parastatals. This led to halving the non-oil primary deficit compared with its level during the previous period, which actually contributed towards public debt reduction during the period. In addition, seigniorage was used to a substantial degree in the immediate aftermath of the 1984 crisis, but much less so from 1993 onwards.

II.3   *The most recent oil windfall – 2000-2005*

Despite its long history of poor economic performance, Nigeria appeared to be experiencing an economic turnaround since the year 2000. Real non-oil GDP grew at an annual average rate of 5.9 percent during 2000-2005, which together with the significant oil windfall has resulted in more than doubling of GDP per capita in current US dollars over the same period. There are also signs that FDI is increasing.

Contrary to earlier responses to steep increases in oil revenues, Nigeria has accumulated sizeable foreign exchange reserves, $28 billion at end of 2005 up from $5.5 billion in 1999, while external debt was reduced from 35 billion dollars to five billion dollars in the 2005 debt reduction deal with the Paris Club. As a result, gross public debt was reduced from a stifling 85 percent of GDP in 2000 to 31 percent of GDP in 2005, while net public debt virtually disappeared.

Recent fiscal reforms have improved fiscal discipline since 2004, although slippage set in almost from the onset. As a result of these fiscal reforms and high oil prices, the overall fiscal balance switched from a deficit of 1.3 percent of GDP in 2003 to a surplus of 7.7 percent of GDP in 2004, and was close to 10 percent of GDP in surplus in 2005. While a big part of this improvement was of course due to the fact the price of Nigeria's crude oil has gone up by almost 50% - from $38 in 2004 to $55 per bbl in 2005, the increasing overall surpluses also suggest that at least some part of the windfall was saved.

The adoption of an oil-price based fiscal rule (OPFR) in the 2004 and 2005 budgets has been an important step in the implementation of the fiscal reform agenda. This rule is designed to link government spending to some notion of a long-run oil price, thereby de-linking government spending from current oil revenues. This should both lower the volatility of public expenditure and lead to the saving of at least part of the current oil windfall receipts.

Furthermore, reform efforts directed towards strengthening the budget office, adoption of a medium term expenditure framework to guide public spending policies and enhancing transparency and moving towards greater exchange rate flexibility are also in the right direction.

Despite these improvements, signs of fiscal slippage remain: first, the non-oil primary deficit (expressed as a percentage of non-oil GDP) expanded substantially from close to 30 percent in 2002 to 35 percent in 2004 and further to almost 40 percent in 2005, while in 2006 the non-oil deficit to non-oil GDP ratio is estimated at more than 42 percent (Figure 5a). This rapid increase suggests that a substantial part of the oil windfall was spent, with the trend forming a cause for concern. As a result, consolidated public expenditure has more than tripled in current dollars and spending pressures related to the upcoming elections are mounting. (Figure 5b). The strong expansion of the deficit in 2005 was caused by an increase

in the budget reference price used for the OPFR – the 2005 budget was based on revenues calculated at a still conservative $30 per bbl, compared with a reference price of $25 per bbl used for the 2004 budget. For 2006 the reference price was increased once again, to $35 per bbl.

Figure 5 a) Non-oil primary balance to No-GDP ratio and b) Growth in consolidated expenditure in $..
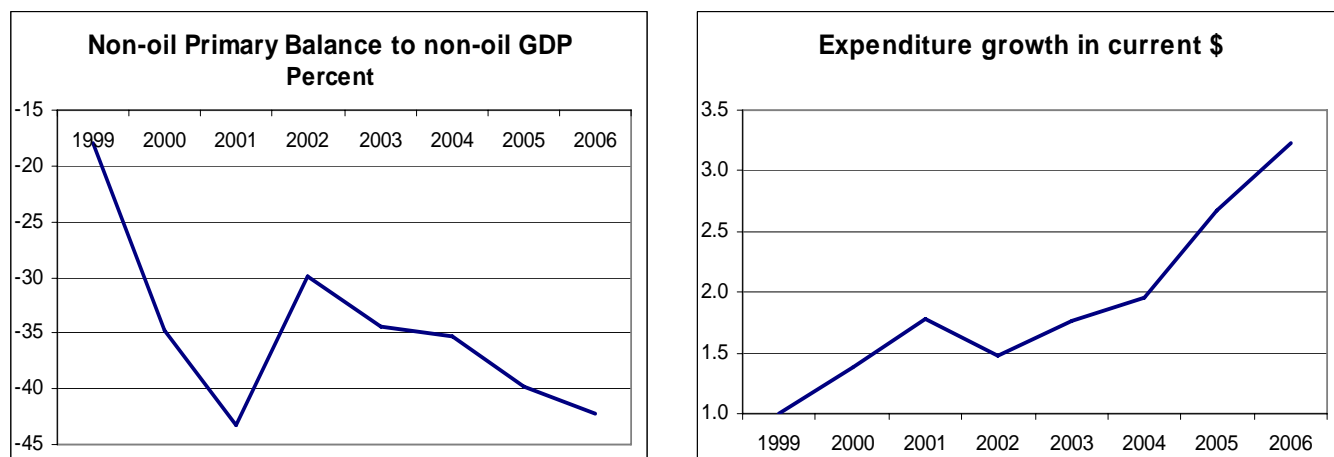
There is also evidence of domestic payments arrears to contractors of N 275 billion and pension arrears under the pay-as-you go system of about N 100 billion (about 6 percent of non-oil GDP), indicating that the non-oil primary deficit to non-oil GDP ratio might be up to 6 percentage points higher than recorded.[4] Finally, the failure to fully pass on crude oil price increases to consumers resulted in an implicit subsidy of 4.7 percent of non-oil GDP for 2005[5], which is a drain on resources that will persist for every year domestic energy prices fail to reflect the high world price of oil. The non-oil primary deficit in 2005, therefore, is much higher - nearly 51 percent of non-oil GDP, if one accounts for payment arrears and for implicit fuel subsidies, the combined effect of which amounts to nearly 11 percent of non-oil GDP.

Altogether the record is still mixed. The rapid increase in the non-oil deficit and increasing off-budget deficit items of several percentage points indicate that stricter adherence to the oil price fiscal rule, together with continued fiscal tightening, is critical to avoid a slide back into the spending sprees

---

[4] While technically speaking, the stock of these arrears should be added to public debt, rather than deficit, it still represent past spending that has not been included in past level of fiscal deficits.
[5] Note that the smaller IMF estimate of the implicit subsidy reflects the decision of the regulatory authority as of August 26, 2005 to allow gasoline prices to increase by 25 percent. See IMF (2005), pp.11., Country Report No.05/432, December 2005, entitled "Nigeria: Request for a Two-Year Policy Support Instrument - Staff Report; Staff Statement; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Nigeria"

following past oil booms. Several promising reforms have been undertaken to tighten up the budget process, and implement a more flexible exchange rate policy, but signs of slippage are appearing. Moreover, issues related to the setting of budget priorities, project selection, investment project implementation and monitoring need to be addressed before Nigeria can confidently claim an end to the wasteful spending of the past.

III   Diagnosing the Past: Dutch Disease or Debt Overhang?

Figure 6. Trends in per capita income in constant 2000 US$.

Despite its vast oil revenues and additional resources from external borrowing since 1970, GDP per capita in constant 2000 US dollars today is substantially below its value in 1970, and much lower than average income per capita in Sub-Saharan Africa (SSA). Nigeria is also lagging behind other countries from Sub-Saharan Africa on most social indicators.
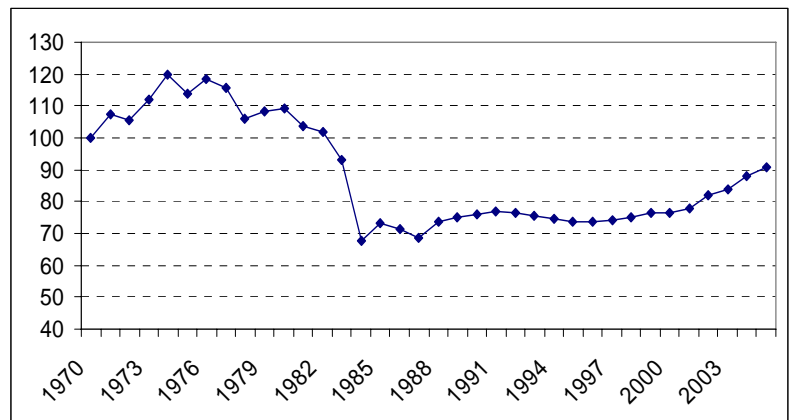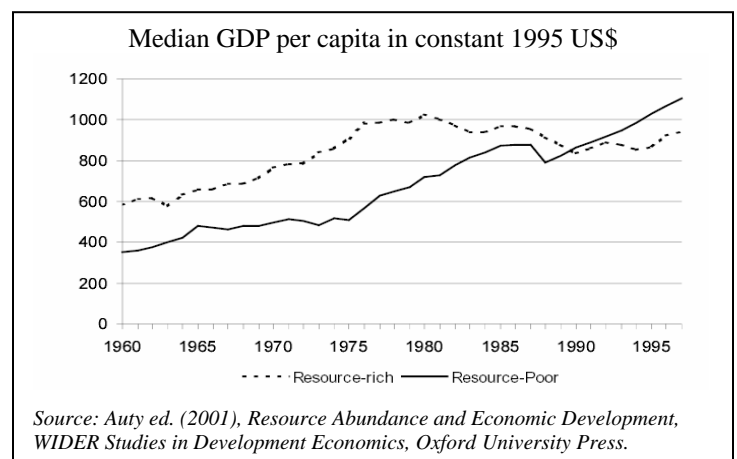

The preceding section painted a dismal history of problematic and stagnating development, a history that is summarized in Figure 6: non-oil per capita GDP has fallen dramatically since the early 1970s. An upturn may be occurring in recent years, but whether the recent upturn is a demand-driven blip or the beginning of a new more promising era of structurally higher non-oil growth, is as yet an open question. To answer this question we analyze in this and the next section the most likely explanation of the Nigeria's clear failure to effectively translate its oil riches into sustained non-oil growth.

Figure 7. The Resource Curse

International evidence (Fig. 7), suggests that this is not an easy challenge; it highlights what has been called a "natural resource curse": resource-rich countries are characterized by slow or stagnating growth, de-industrialization, low savings, lagging

Median GDP per capita in constant 1995 US$

- - - - Resource-rich ——— Resource-Poor

Source: Auty ed. (2001), Resource Abundance and Economic Development, WIDER Studies in Development Economics, Oxford University Press.

10

human and physical capital accumulation, and stagnating or declining productivity.

III.1   Why the poor growth Record: the Dutch Disease?

Traditional among explanations of poor performance in ORCs is the so called Dutch Disease (van Wijnbergen (1984a,b), Corden and Neary (1984)). This literature named after Holland's poor record in managing its natural gas wealth in the 1960s, points out that spending out of oil wealth increases demand for non-tradeables and so draws productive resources into that sector. Since the presumption is that technological progress is faster in T-sectors than in NT-sectors, the explanation of low-growth naturally follows. If moreover some of the higher growth is related to effects that are not captured directly by private entrepreneurs, such as sector-wide learning by doing effects, there is a case for an explicit government supported economic diversification strategy (van Wijnbergen (1984b)).

However only when oil revenues are temporary, and, critically, capital market failures or misguided spending policies cause an associated temporary spending boom, a strong case for industrial diversification emerges. Countries following a Permanent Income rule, sharing the oil wealth with future generations and smoothing out expenditure into the far future, do not need to face a nearby future without oil wealth and with depressed economic activity, and therefore have no need to worry about future declines in exchange rates. In such circumstances there is no clear cut case in favor of intensified diversification policies after an increase in oil wealth (van Wijnbergen (1984b)). Nigeria has had periods of excessive spending, but also periods of underspending, and started an explicit expenditure smoothing policy in 20904. As long as that policy is maintained, there will be no real Dutch Disease problem now or in the foreseeable future.

Moreover, there are other difficulties in simply labeling Nigeria as another instance of an ORC succumbing to the Dutch Disease. In particular, the mechanism through which high spending out of what in essence is a tradeable resource leads to low growth is a fight for scarce resources drawing labor and capital out of the T-sector. Critical in this explanation is that there is resource scarcity at going factor prices, otherwise increases in NT activity can be met without decline in T-sectors. And that is where the story of Nigeria as a Dutch Disease victim falters.

In Figure 8 various measures of excess capacity are plotted against time. While capacity utilization surveys indicate higher capacity use in the early oil boom years than in later years, the utilization ratio never exceeds 75%, and, except 1980 and 1981, hovers at 60% or lower. Unemployment data that far back are unfortunately not available, but the figures that are available also point at considerable slack in resource utilization. Such numbers are at variance with Dutch Disease style pressure on scarce labor and

11

capital, with scarce resources being diverted from high productivity growth T sectors to a booming but low productivity growth NT sector. For an explanation of Nigeria's poor growth record we will have to look elsewhere.

Figure 8 Capacity Utilization and Unemployment
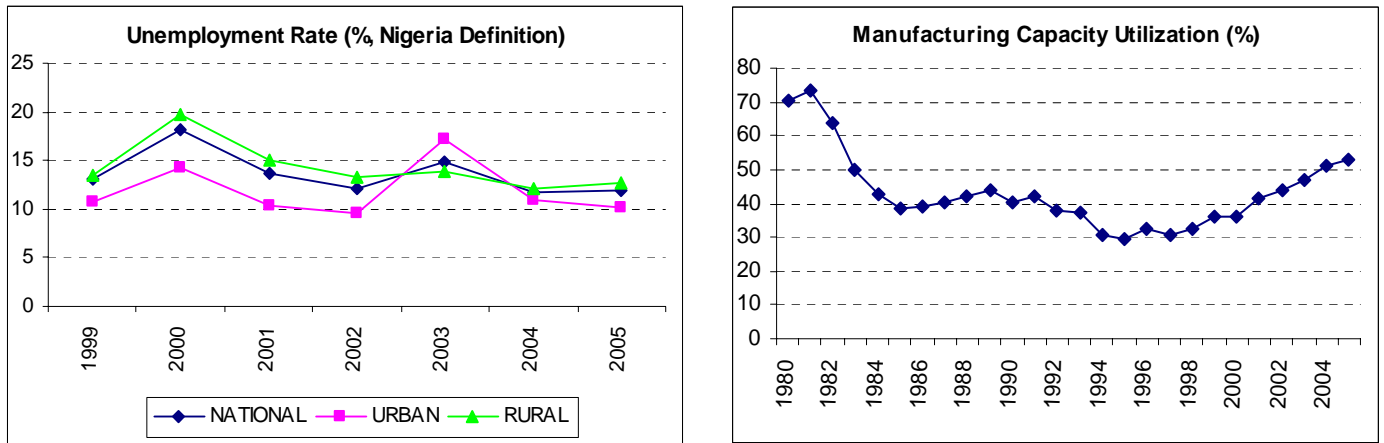
There maybe another exchange rate related problem in the presence of large increases in oil revenues, related to capital markets rather than goods markets. There could be capital-flow induced overvaluation, if financial markets anticipate future oil wealth but expenditure is slow to catch up (Neary and van Wijnbergen 1986). But Nigeria is not integrated in world capital markets and anyhow was not slow to catch up, on the contrary. The Neary-van Wijnbergen (1986) argument really applies to countries that have discovered oil but cannot get it out yet, like the UK in the 1970s).

III.2   Why the Poor Growth Record: Volatility and Growth

Another line of reasoning looks at the volatility of spending, rather than at its level, as a factor impeding growth. Commodity prices and revenues from natural resources tend to be volatile and may translate into macroeconomic instability and a highly volatile real exchange rate. Volatility can be seen as a tax on investment. Investment requires irreversible decisions: capital once installed cannot be moved to other sectors. Highly volatile relative prices discourage the irreversible commitments to specific sectors that capital investment implies (van Wijnbergen (1986)).

Aghion e.a. (2006) have shown empirically that high volatility slows down productivity growth by a substantial margin in countries with a relatively underdeveloped financial sector, like Nigeria. In their

sample, a 50% increase in volatility slows down productivity growth by 33% on average. And there is substantial evidence that ORCs have more volatile economies than non-ORCs (Hausman and Rigobon (2002)). Thus there is logic to a focus on volatility as an explanatory factor for Nigeria's poor growth record.

To explain high volatility in ORCs, it has been argued that countries with many interest groups competing for the resource rents are likely to overspend in good years, and under-adjust in bad years. Each interest group tries to overexploit windfall gains in an attempt to at least partially offload adjustment costs to others while fully capturing the gains from its lobbying efforts (the "voracity effect", see Lane and Tornell (1995)). Federal states like Nigeria are thought to be especially vulnerable to what amounts to an equivalent of overgrazing the commons. An expenditure behavior that leads to overspending in good days and under-adjustment in bad days may end up with an economy with even higher volatility than is to be expected on the basis of the volatility in its revenue streams alone.

There is an alternative, or possibly complementary, explanation of high volatility in ORCs, an explanation that starts from the surprising fact that many ORCs have landed themselves in debt problems, their oil wealth notwithstanding. Borrowing may well have been restricted after the sudden reduction in net resource inflows associated with lower oil prices, because lenders fear too much of "project returns" will be diverted to the servicing of old debt, thereby undermining the credit quality of any new debt. This is the classic *debt overhang* problem. *Ex post* debt overhang problems can be resolved by renegotiating the old debt and/or creating senior classes of new debt. *Ex ante* the possibility of debt overhang calls for stretching maturities, maintaining reserves, and generally for caution in incurring debt. Manzano and Rigobon (2001) have suggested a link between debt problems and slow growth in resource rich countries, without, however, identifying the specific channels through which this link operates.

III.3 *Sources of macroeconomic volatility in Nigeria*

Nigeria was ranked as the third most volatile economy in terms of trade volatility out of 90 countries and the fourth in terms of (real) exchange rate volatility out of 84 countries in a recent World Bank study covering the period 1961-2000.[6] Large oil wealth exposes many oil producers to oil price volatility. Because volatility acts as a tax on investment in traded goods production, notably in agriculture and manufacturing, such an exposure could have an adverse impact on growth. This is further complicated

---

[6] World Bank (2003), Nigeria: Policy Options for Growth and Stability, PREM3, Africa Region, Report No. 26215-NGA.

by extreme dependence of the budget on volatile fiscal revenue from oil. Note that the degree of revenue dependence on oil is also volatile, following the pattern of oil prices.

Nigeria was following a passive fiscal policy; public expenditure has been highly correlated with current revenues. As a consequence the public expenditure share in non-oil GDP has been highly volatile too: public expenditure increased sharply during the 1970s – from about 10 percent in 1971 to more than 60 percent in 1980 and then back to 20 percent in 1984. Since then, public expenditure increased again, reaching 70 percent in 1993, soon to follow another through of below 30 percent in 1997, which again was followed by a sharp increase during the end 1990s and reaching a staggering 80 percent in 2001. Since then, public expenditure settled at around 60 percent, despite sizeable increases in total revenue for the past four years. Most recently a catch up process seems to have started: expenditures are rising again.

Linking government expenditures to current revenues is furthermore likely to lead to wasteful spending, and a low productivity of public investment projects. When investments are made during boom periods in line with the increase in current income, projects are likely to be beyond the country's ability to absorb, while maintenance of the new projects may suffer when prices subsequently fall. This has clearly been a problem in Nigeria. The majority of projects financed by public borrowing during the late 1970s and 1980s have indeed failed to generate the rate of return needed to improve the repayment capacity of the country.[7]

And there is another problem with too close a link between expenditure and current income. When oil prices unanticipatedly drop, it is often difficult and costly to adjust expenditure downwards, while the need to do so may in fact be larger than the actual decline in income triggering the need for adjustment to begin with. This is because ORCs, and Nigeria very much also, have a peculiar problem concerning capital market access. Obviously, their need to borrow is lowest when oil prices are high, and is high when prices are low. However their borrowing capacity is inversely related to their borrowing need, because the value of their *de facto* collateral, oil wealth, also peaks when prices are high and drops when they are low.

Thus access to external finance becomes more difficult precisely when it is most needed: the value of Nigeria's collateral, its oil wealth, is falling at the same time income drops and the need to borrow increases commensurately. This perverse link between income shortfalls, declining collateral values and reduced resource inflows are an obvious recipe for *debt overhang problems:* new lenders will fear too

---

[7] A study carried out by the Federal Ministry of Finance in 1996 of commercial external loans from bilateral and commercial creditors (amounting to about 70 percent of external debt outstanding in 1996) has documented problems encountered by externally financed projects.

much of their money will be diverted to service old debt, thereby reducing the value of their claims even if projects financed by the new moneys have a sufficiently high rate of return to service the new debt in the absence of old claims outstanding. This is the classic debt overhang (DO) problem, triggering a larger need for adjustment than just the current fall in income, as debt repayments coming due cannot be refinanced either. In this way debt overhang problems raise the costs of adjustment substantially and may also explain why volatility of government expenditure in Nigeria has exceeded the volatility of oil prices.

It is important to note that debt overhang problems can arise in countries with relatively little debt; what matters is short term cash flow needs. So a modest debt but all coming due in the near future is more damaging than a much higher debt with amortization smoothly stretched. And the worse the debt service record, the more likely it is there will be a debt overhang problem. The point that they did not service their existing debt actually reinforces the argument: debt overhang exists when debt has strong equity characteristics (i.e. is only serviced in good times) and accordingly trades at a large discount.

A.   Fiscal policy as a source of volatility

Fiscal policy in Nigeria has in fact contributed to volatility, rather than smooth the impact of volatile oil prices on the economy. Despite the government's attempts to save past oil windfalls, public expenditure has remained highly correlated with oil fiscal revenue and fluctuated widely as a result of weak fiscal discipline and high oil price volatility (Figure 9a.).

Figure 9 a. Revenues and Expenditures, 1971-2005 b. Expenditure volatility and Growth
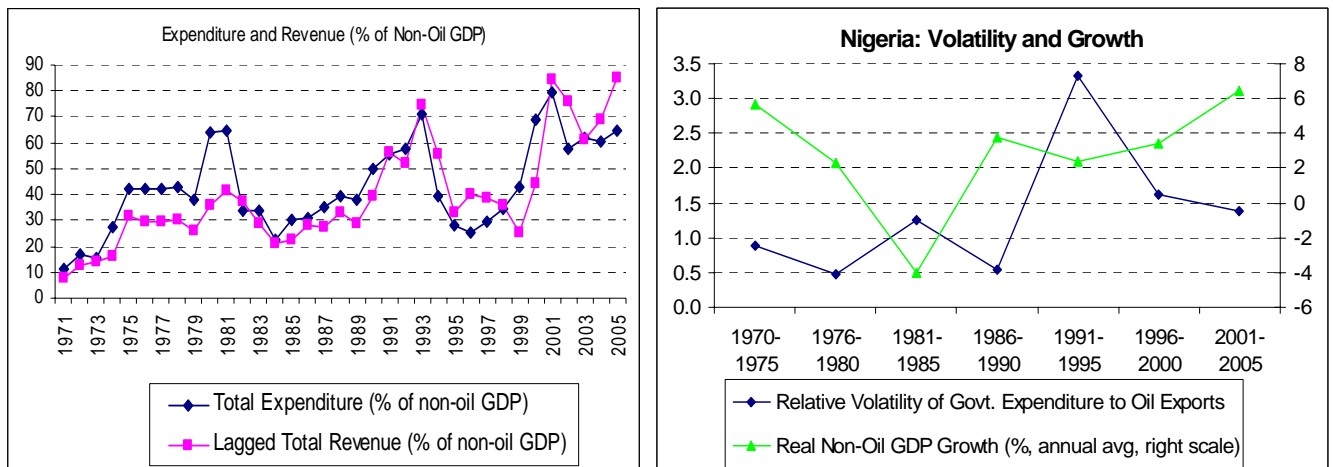
Figure 9b gives a series of volatility measures; each data point represents the coefficient of variation of government expenditure over the past 5 years divided by the corresponding measure using oil revenues.[8] The figure indicates that the volatility of public expenditure was in fact higher than the volatility of oil revenues during the first half of 1980s and during the1990s. So government expenditure exacerbated, rather than smoothed, the volatility of oil revenues! The measure of relative volatility has declined from its astounding peak of 3 in the early nineties, but even in the most recent past it has not sunk below one. The period of forced austerity in the second half of the eighties is the only period where oil revenues were more volatile than Government expenditure.

Clearly fiscal policy has pushed volatility beyond the volatility stemming from variable oil prices; **the Government itself has become a source of macroeconomic volatility**. Figure 9b also suggests that this comes at a high cost. The figure clearly indicates that there is a negative correlation between the excess-volatility of public expenditure over oil revenue and non-oil economic growth. During the periods of high excess volatility of public expenditure, non-oil GDP growth was lower and vice versa.

B.   Inflexible exchange rate policy – an additional drag on growth

The impact of high expenditure-volatility on output and growth was further exacerbated by an inflexible exchange rate policy not attuned to the many shifts in aggregate expenditure triggered by the oil price volatility. If expenditure is highly volatile, a flexible real exchange rate can at least prevent or reduce impact on output volatility and growth. However, Nigeria followed a rigid nominal exchange rate policy, relying on inflation and parallel markets to provide the necessary real exchange rate adjustment.

But inflation is a noisy and staggered process, even under a de facto fixed nominal regime influenced by many other factors than commodity market imbalance. While the nominal exchange rate remained fixed, the real exchange rate appreciated substantially nevertheless in the early periods of oil price increases as inflation took off. Spending pressures in the early eighties, created by large fiscal stimuli sometimes even in excess of the higher oil revenue, led to rising relative prices and wages in sectors producing non-tradeables. This shift in relative prices led to a corresponding shift in the allocation of domestic resources and economic structure away from the production of export goods (agriculture), and into the services sectors. A further consequence of the appreciation of the real exchange rate has been an increasing in imports and a decline in traditional export industries.

---

[8] The coefficient of variation (CV) is the standard deviation divided by the mean. The relative volatility is measured as the CV of government expenditure (as % of GDP) divided by the CV of oil exports (as % of GDP).

In an effort to tightly manage the exchange rate, the government rationed foreign exchange and created multiple windows for foreign exchange transactions, which created a parallel market for foreign exchange. Exporters that had to surrender foreign exchange at official rates effectively faced a high tax, further discouraging non-oil exports.[9] This was not enough to resolve the imbalance: an inflationary process further fuelled by substantial deficit financing through money issue by the public sector, brought about further real exchange rate appreciation.

The periods of the highest over-valuation, as indicated by rapid increases in parallel market premia, obtained in the periods after high oil prices came to an end. As a result, while the nominal exchange rate remained relatively stable, the black market premium reached 330 percent when oil prices collapsed (Figure 10b). Failure to adjust the exchange rate to the decline in expenditure necessitated by declining oil prices and more difficult access to external finance, resulted in unemployment rising instead. In the end, the oil price collapse, high interest rates and public debt problems as of early-1980s, made the high nominal exchange rate unsustainable and massive nominal and real exchange rate depreciation followed (Figure10a). Thus exchange rate policy has also been responsible for the 'boom and bust' cycles experienced by Nigeria over the past 30 years.

Figure 10 a. The REER 1980-2002 b. Premium between Official and Market Exchange Rate
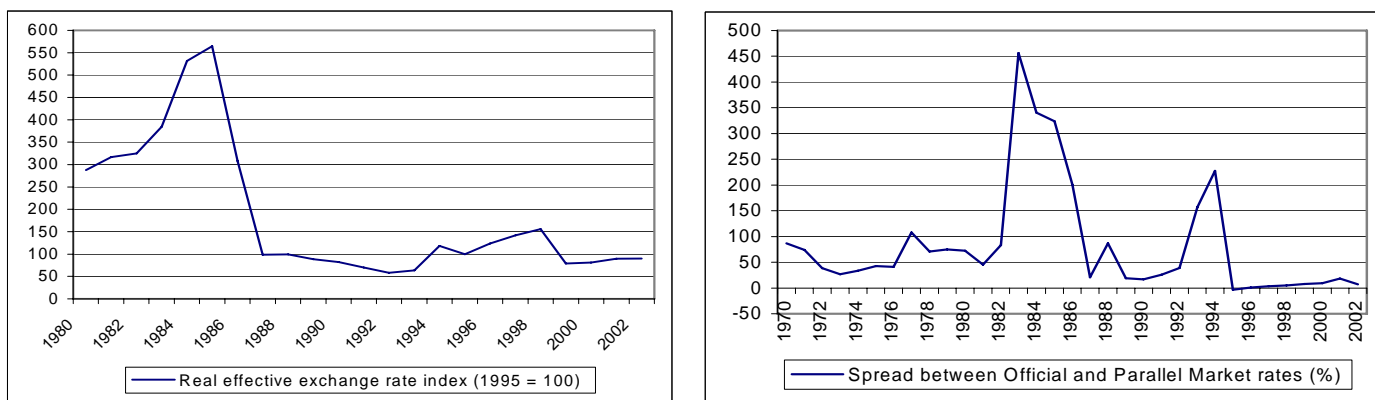
Source: World Bank (2004), Nigeria: Petroleum Revenue Management

Some real appreciation was inevitable, given the high oil prices during the 1970s and the inevitability of at least some increase in expenditure following the windfall. But a reasonable question is whether this appreciation should have been moderated keeping in mind that oil prices could subsequently

---

[9] At the same time, granting import licenses at preferential exchang rates has led to a substantial redistribution of oil wealth, effectively subsidizing well-connected importers. On this, see Pinto (1987, 1990, 1991)).

fall, and if so how that could have been done. Expenditure restraint would have been a necessary element in any macroeconomic package designed to take pressure off the real exchange rate; but no such restraint has been forthcoming until very recently.

Crucially, Nigeria's economy has been more volatile than most, and more so than can be explained from oil price volatility alone. Expenditure patterns are one factor behind the high volatility, but exchange rate policy has been another. High expenditure volatility requires exchange rate flexibility to accommodate downturns, but until recently no such flexibility has been forthcoming: after the crash of 1984, the nominal exchange rate has been too rigidly maintained. As a consequence, downturns in oil income translated in slumps in the non-oil economy.

IV   Volatility of Public Expenditure, the Voracity Effect and Overborrowing

IV.1   Why has public expenditure volatility in Nigeria been so high?

In this section we analyze the factors that led to the extreme volatility of public expenditure plaguing Nigeria. We have identified two different explanations for the high volatility, the voracity effect and debt overhang problems. We saw that the *"voracity effect"* (VE), an institutional inability to reconcile competing claims for oil money, results in a marginal propensity to spend out of rising oil wealth larger than one, but a propensity to adjust in years of falling income that is smaller than one, and thus certainly smaller than the coefficient in "good" years. In effect, conflicts over resource use are resolved at the expense of future generations. The DO hypothesis generates the exact opposite prediction, an adjustment coefficient in years of falling revenue that exceeds the coefficient in years of rising revenue. Thus what matters is NOT whether oil income is above or below trend, whatever the trend maybe, but whether oil income is rising or falling. This point is at the basis of the empirical analysis that follows.

The issue matters, since the two hypotheses have different implications for policy. If the VE hypothesis is dominant, the top priority should be institutional reform; there is then a need for non-discretionary allocation mechanisms guaranteeing that expenditure plans remain within financial limits set by current income; the "overgrazing of the commons" needs to be stopped. The DO hypothesis has more macroeconomic consequences. Because under this hypothesis it is more than likely that external funds will not be forthcoming in years of falling oil income, the case for the build up of financial buffers in the form of an easily accessible oil fund is much stronger than without debt overhang problems. Such a fund-

rule should obviously be started in good years, which in turn has the added benefit that expenditure volatility will not only be brought down to the level of income volatility, but will be reduced further.

To test the VE hypothesis versus the DO hypothesis, we run a regression of government spending (also its components – current and capital spending) on oil-related fiscal revenues over the period 1970 – 2005. All data are presented in constant dollars. We first show the results for regressions with symmetric adjustment in years with rising and years with falling revenues: see Table 1 below.

The regression shows a very strong relation between expenditure and revenues from oil, as is to be expected. The coefficient indicating the dependence of aggregate expenditure on fiscal revenues from oil is significantly higher than one. Moreover there seems to be a strong bias toward current expenditure, the relevant coefficient exceeds the coefficient in the investment only regression by more than two-thirds.

But there is also a serial correlation pattern in the errors. The DW coefficient is too low in all three regressions, and the Breusch-Godfrey Serial Correlation LM test rejects the H_0 hypothesis of no-serial correlation. Analysis of the error terms furthermore suggests a before and after 1984 difference. The Chow Breakpoint test for 1984 strongly rejects the H_0 of no structural break in 1984 in all three equations. See Annex 2 for the results of these tests.

Table 1 Government Spending and Fiscal Oil Revenues – Nigeria (1970-2005, levels in constant $)

	Total Government Expenditure	Current Expenditure	Capital Expenditure
	1.45	0.87	0.52
Oil Revenue	(9.87)	(10.29)	(6.36)
	1.76	1.10	0.26
Constant	(0.83)	(0.90)	(0.22)
No. of Obs.	36	36	36
R-sq. overall	0.73	0.75	0.53
DW	1.13	1.46	0.73

Note: 1. Data source: IMF World Economic Outlook database. 2. t-statistics in parentheses.

We included a dummy term for the period up to 1984 and now also include asymmetric adjustment coefficients: a dummy that equals zero in years of rising revenue and one in years of falling revenue is entered multiplicatively with the oil revenue term. One should expect a negative coefficient under the Voracity hypothesis, and a positive coefficient under the DO hypothesis. Table 2 lists the results.

Table 2 Government Spending and Fiscal Oil Revenues – Nigeria (1970-2005, levels in constant $)

	with Overhang Variable and 1984 dummy		
	EQ. 1a	EQ. 2a	EQ. 3a
	Total Government Expenditure	Current Expenditure	Capital Expenditure
Oil Revenue	1.49	0.88	0.56
	(16.6)	(14.74)	(10.36)
Constant	2.69	1.45	0.97
	(2.11)	(1.70)	(1.26)
Overhang variable[10]	0.52	0.31	0.23
	(4.70)	(4.29)	(3.56)
Dum84*Oil revenue	-0.63	-0.30	-0.37
	(-5.93)	(-4.36)	(-5.82)
No. of Obs.	35	35	35
R-sq. overall	0.92	0.90	0.84
DW	2.22	2.24	1.38

Note: Data source: IMF World Economic Outlook database. 2. t-statistics in parentheses.

For more details, see Annex A2

The results come out very strongly, but this time without indications of serial correlation (except for the investment equation). Consider first the regression taking total public expenditure as dependent variable. Before 1984 the spending coefficient in good years is still high at 1,49, and significantly higher than one. Thus at least before 1984, the fight for resources was clearly settled by shifting the burden out to the future, on the margin spending exceeded revenue. This changed in 1984, however. The 1984 interaction term suggests that the marginal spending propensity (*msp*) dropped by a substantial margin, bringing the coefficient in good years down marginally (although not significantly) below one, to 0,97. Thus the analysis suggests that there was a voracity effect operative before 1984, but there is no sign of excess spending (on the margin) afterwards. Again there is a bias in favor of current over capital expenditure.

Most interesting are maybe the coefficients on the overhang dummy, which should be negative for the voracity effect to be dominant, and positive if the DO hypothesis is to be accepted as the dominant explanation of excess volatility. The overhang-dummy is strongly positive and significant in all three regressions. So the coefficient during upturns (increases in oil revenues) is lower than the coefficient in downturns (decreases in oil revenues). Moreover, the value of the *msp* in bad years is clearly and significantly larger than one both for total spending and for government consumption, as the DO

---

[10] The overhang variable is the product of the overhang dummy and real oil revenue.

hypothesis projects, while the *msp* in good years is below or equal to 1 in all cases, also in line with the DO hypothesis but at variance with the VE hypothesis. Thus the econometrics suggest a clear conclusion: there was a voracity effect before 1984, particularly in government consumption, but over the whole period and certainly after 1984 the debt overhang hypothesis dominates strongly. After the debt crisis in 1984, capital markets gave no leeway anymore to the voracity effect[11].

V   Is Nigeria Atypical: Windfall Gains and Fiscal policy in Other Oil Rich Countries

To see whether this is a Nigeria-specific problem or a more widely spread issue in all ORCs, we compare our results with the results from a panel regression for 22 oil-rich countries. However, since we generally do not have data for oil-related fiscal revenue, we have to use oil exports as a proxy for oil-related fiscal revenues. Once again, we regress public expenditure and their components on oil exports.

While we find that the coefficient on oil exports is positive and significant in all three equations, it is much lower than one. The coefficient of the overborrowing variable (see the last three columns) is positive and statistically significant in two of the three regressions (for total expenditure and for capital expenditure). The results therefore also suggest that overborrowing, rather than voracity, was the main issue in the sample of 22 ORCs: there is clear evidence of a higher propensity to spend out of oil revenues in years of falling oil revenues than in years of rising oil revenues. However there is no ORC-wide indication of a spending coefficient larger than one in years of falling prices; thus the Debt-Overhang situation Nigeria finds itself in seems more severe than obtains in other ORCs. The need for a policy response is correspondingly larger.

---

[11] There is no econometric evidence for a 1984 break in the overhang coefficient (test results available on request).

Table 3 Government Spending and Oil Exports – Oil-Rich Countries, levels in const $

	Fixed effects			Fixed Effects with Overborrowing Dummy		
	Total Government Expenditure	Current Expenditure	Capital Expenditure	Total Government Expenditure	Current Expenditure	Capital Expenditure
	0.52*	0.21*	0.39*	0.51*	0.19*	0.32*
Oil Exports	(5.28)	(3.95)	(3.15)	(5.12)	(3.33)	(2.70)
	24.12*	12.18*	6.28*	23.26*	12.11*	3.19***
Constant	(16.31)	(13.43)	(3.25)	(15.22)	(13.33)	(1.65)
Overhang				0.22**	0.06	0.77*
variable				(2.11)	(1.07)	(6.17)
No. of Obs.						
(No. Of	524	546	513	524	546	513
Groups)	(21)	(22)	(22)	(21)	(22)	(22)
R-sq. overall	0.26	0.26	0.11	0.28	0.26	0.16
F Statistic	F=27.89	F=15.59	F= 9.90	F=16.27	F=8.37	F=24.36
(Prob > F)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: 1. Data source: IMF World Economic Outlook database.

2. Sample: 1980-2005; Real Oil exports = Oil exports in current US$ divided by US GDP deflator

3. t-statistics in parentheses; * indicates significance at 1%, ** at 5%, and *** at 10%.

Another interesting difference is that in most ORCs there is a much tighter link between capital expenditure and oil revenues than in Nigeria. In Nigeria oil income goes mostly into consumption, in ORCs capital expenditure dominates. That is good in that assets are not just eaten up, there is an apparent attempt to use the drawing down of assets that oil extraction implies to build up other assets, in particular physical capital. The dark side of this medal is that the adjustment on bad days falls correspondingly heavier on investment; the debt overhang dummy is positive and significantly so for capital expenditure and for total expenditure, but not for government consumption. This is different in Nigeria where the adjustment in bad days has to fall much more on consumption: most likely because there simply is not enough public investment out of oil to implement the entire downward adjustment in bad days through cutting back capital expenditure.

In comparison with other oil rich countries), a number of facts stand out. Nigeria has tended to spend more out of windfalls, allocate more of that already high expenditure to consumption rather than to

investment. Of the investment it did undertake, most projects failed. The overborrowing dummy indicates debt overhang problems in ORCs too, but smaller, and mostly falling on investment rather than on consumption, unlike in Nigeria where the dummy only shows up significantly in the consumption equation..

VI   Concluding Remarks

Nigeria's checkered past has important lessons for the future, lessons that should be heeded if the upturn since 2004 is to be more than just a demand driven upturn foreboding another crash once prices fall again. The combination of exuberance in good years and debt-overhang-induced, draconian adjustment in bad years makes for disastrous non-oil growth records over longer horizons. Nigeria's pre-2000 record of fiscal policy actually increasing expenditure volatility above levels induced by oil prices themselves constitutes an additional tax on non-oil growth.

Moreover, the impact of such policies is much exacerbated if coupled with exchange rate policies that do not accommodate upturns and do not adjust to downturns. Real exchange rate adjustments will take place anyhow, but when not accommodated through nominal adjustments, they will come about through outbursts of inflation in boom periods and prolonged recessions in down periods. And inflation processes have their own overshooting dynamics, leading to larger collapses and deeper recessions than if either more orderly appreciation mechanisms would have been found, or appreciation pressures would have been lessened through expenditure smoothing.

The point is brought out most clearly by the experience of the nineteen eighties, and confirmed by the econometric analysis presented. In the beginning of the 1980s, oil prices where substantially higher than they are now in real terms, and predictions of a secular rise in prices abounded, just as some now predict $60+ oil for years to come. Yet a downturn in the West triggered a collapse from which (real) prices have still not recovered. Nigeria followed the optimists' advice then and continued spending, only to find out that capital markets would not accommodate such policies; subsequent adjustment exceeded the decline in oil revenues as short term debt coming due could not be rolled over. A classic case of debt overhang resulted, to break out of which required a new oil boom and substantial debt relief.

The lesson should be clear. Planning on long run expenditure commitments low enough to be met from much lower oil revenues than currently projected on the basis of recent price developments is the only way to ensure sustainability and avoid another debt overhang induced decade of misery. This means

non-oil deficits geared towards sustainable overall balance based on oil prices in a range of 25~35 US$. The importance of complementing the oil price fiscal rule with such a non-oil deficit policy should be clear: putting money aside with one hand but borrowing on the side with the other, to sustain incompatible overall deficits makes the OPFR totally ineffective.

Of course windfall gains in excess of that price range do not need to be carried over exclusively in the form of foreign exchange; physical capital is also a way of sharing wealth with future generations. But no investment projects should be undertaken which cannot be entirely financed from already accumulated and ring fenced oil fund assets, and whose recurrent costs cannot be met within the long run sustainability constraints just outlined. Otherwise the capital market problems that Nigeria will without doubt face again during future down turns will once again make fiscal policy a source of volatility and low growth. Moreover Nigeria's extraordinary poor record on public investment productivity suggests substantial improvements are necessary in the institutional infrastructure for project analysis, selection and implementation, before strategies of transforming oil wealth in improvements of public infrastructure should be considered, however necessary such improvements may be.

The second lesson concerns exchange rate management. Unless public expenditure completely smoothes over oil revenue fluctuations, and no private spending boom is triggered either, the real exchange rate will have to appreciate when oil prices rise. Not accommodating through nominal exchange rate flexibility implies that high domestic inflation becomes unavoidable. Unfortunately inflation once started is often difficult to stop even if pressure for appreciation falls away. The ensuing overvaluation of the real exchange rate will then trigger unemployment and the necessity of overly harsh downward adjustments later on once a crisis has brought a by now overvalued nominal rate down. Thus a cautious move towards more exchange rate flexibility, coupled with expenditure restraint to reduce pressure towards real appreciation, will be essential if Nigeria wants to avoid the boom-bust cycles of the past. The extent to which exchange rates will rise with rising oil prices is directly related to the degree to which the Government succeeds in smoothing out expenditure levels through the use of an oil fund facility. If such a facility is used, only structural upshifts in oil income require real exchange rate adjustment.

Volatility is harmful to economic growth, a problem that is especially relevant in RRCs because of the extremely high volatility of their income streams. Nigeria's experience suggests that managing income volatility in order to isolate expenditure from it as much as possible is the main challenge in RRCs. Nigeria's experience sofar also indicates that managing volaotility in a poor institutional environment is especially difficult, stressing the need for institutional reform. Nigeria's recent reforms (implementing an

oil price based fiscal rule, moving towards more exchange rate flexibility, and improving the process of selecting, implementing and monitoring public investment projects) are exactly in the areas where reform was needed. But there are clear dangers of slippage: non-oil deficits have been above safe levels, in particular if off budget commitments and arrears are taken into account, and have been increasing. And finally, Nigeria's poor record on public investment performance makes it clear that reform of the public investment process, including anti-corruption measures, should remain at the top of the policy agenda. Only if the reform process is brought back on track and maintained in the years to come, is there a chance that Nigeria's oil wealth will turn from a curse into a blessing.

References

Aghion, Ph., Ph. Bacchetta and R. Ranciere (2006), Ëxchange Rate Volatility and Productivity Growth: the Role of Financial Development", NBER WP 12117

Budina, N. and S. van Wijnbergen (2006), "The Dutch Disease revisited: Low Growth in Oil Rich Countries", mimeo, World Bank

Corden, M. and J. P.Neary (1984), "Booming Sector and Deindustrialization in a Small Open Economy", Economic Journal, vol.92

Hausman, R. and R. Rigobon (2002), Än Alternative Interpretation of the Resource Curse: Theory and "Policy Implications", NBER WP 9424

IMF(2005), Nigeria: 2005 Article IV Consultation – Staff report; Staff Supplement; and Public Information Notice on the Executive Board Discussion, IMF country report No. 05/302.

Lane, Phillip R. and Aaron Tornell, "Power, Growth and the Voracity Effect," *Journal of Economic Growth*, Vol. 1(2), 1995

Manzano and Rigobon (2001), Resource Curse or Debt Overhang?, NBER Working Paper 8390.

Pinto (1991), "Black markets for foreign exchange, real exchange rates and inflation", Journal of International Economics 30, 121-135, North Holland.

Pinto (1990), "Black market premia, exchange rate unification and inflation in Sub-Saharan Africa", The World Bank Economic Review, Vol. 3, No. 3: 321-338.

Pinto (1990), "Nigeria during and after the oil boom: a policy comparison with Indonesia", The World Bank Economic Review, Vol. 1, No. 3, pp. 419-445.

Wijnbergen, S. van, "Inflation, Employment and the Dutch Disease in Oil Exporting Countries: A Short-Run Disequilibrium Analysis", Quarterly Journal of Economics, May 1984

Wijnbergen, S. van, "The Dutch Disease: A Disease After All?" The Economic Journal, March 1984

Wijnbergen, S. van, "Trade Reform, Aggregate Investment and Capital Flight: on Credibility and the Value of Information", Economic Letters, 1986

World Bank (2003), Nigeria: Policy Options for Growth and Stability, Report No. 26215-NGA, PREM3 Africa Region, Washington DC.

World Bank (2004), Nigeria: Petroleum Revenue Management, Poverty Reduction and Economic Management Sector Unit, Sub-Saharan Africa region, Washington DC.

World Bank (2005), Nigeria's Opportunity of A Generation: Meeting the MDGs, Reducing Indebtedness, PREM Anchor Report Prepared for the Africa Region, Washington DC.

World Bank (2006), Debt Sustainability Analysis in Oil-Rich Countries, PRMED Note, Washington DC.

Annex 1: Nigeria's External Debt Restructuring Agreements

Commercial debt restructurings
In 1983, in response to accumulation of short-term credit arrears, the government offered promissory notes for eligible uninsured short-term credits, issued by the Central Bank of Nigeria and guaranteed by the federal government. US$4.9 billion of these promissory notes have been restructured again in 1988.[12] Trade credit arrears to London Club commercial banks amounting to US$5.8 billion were restructured in 1984, 1987 and 1989. In 1992, Nigeria concluded a Brady debt reduction operation, which reduced London Club bank debt substantially, from US$5.8 billion to US$2.0 billion, including payments of Nigeria of US$2.2 billion. This operation had the following menu of options: a buy-back of US$3.4 billion debt at a 60 percent discount, a US$2 billion debt converted at par to collateralized "Brady Bonds" maturing in 2020, and a prepayment of US$0.4 billion of debt arrears and US$0.2 of principal collateral.

Paris Club debt restructurings
Insured short-term trade credits were assumed by the federal government as debt to Paris Club creditors. Between 1984 and 1992, Nigeria concluded three non-concessional rescheduling agreements with the Paris Club (1986, 1989, 1991), restructuring in total US$16.6 billion of arrears and debt service payments on publicly and publicly guaranteed debt, of which nearly US$12.5 billion (44 percent of total external debt) consisted of amounts overdue and late interest. Almost all of the debt in question consisted of commercial credits guaranteed or insured by governments or agencies of the creditor countries. The agreements took place in the context of Standby arrangements with the IMF. Continued rescheduling agreements, implied that after the third Paris Club agreement in 1991, arrears dropped to US$0.96 billion. In 1993, the government limited actual debt service payments to Paris club to no more than 30 percent of net oil revenues, in anticipation of a debt operation, comparable to the Brady debt restructuring operation of 1992, which led to a further increase in external debt to US$33 billion during the same year. As a result of this policy, arrears increased sharply in years when oil revenues were low, such as 1994-1995 and the share of Paris Club debt in total external debt increased from roughly 60 percent in 1992 to 77 percent in 2000.

In 2000, following the democratic elections in 1999, Nigeria concluded a Standby Arrangement with the IMF and reached a fourth non-concessional rescheduling agreement with the Paris Club in December of the same year. The agreement restructured US$21.3 billion of payment arrears and US$0.3 billion in maturities falling due between August 2000 and July 2001. It also capitalized moratorium interest of US$1.8 billion and deferred arrears of US$0.6 billion on post-cut off date debt.[13] The restructured amount exceeded 90 percent of the total debt owed to Paris Club.

Paris Club debt reduction agreement, October 20, 2005
The PC debt reduction agreement has been implemented in two phases: (i) Nigeria repays its arrears due on all categories of debts and PC creditors grant 33% cancellation of eligible debts; and (ii) a second tranche of debt cancellation by PC creditors of 34 percent on eligible debt, while Nigeria will buy-back remaining eligible debt. This agreement allows Nigeria to obtain a debt cancellation estimated at $18 billion (including moratorium interest). This represents a face value debt reduction of about 60 percent of its PC debt (around $30 billion). PC creditors are paid an amount of $12.4 billion, representing regularization of arrears of $6.3 billion, plus a balance of $6.1 billion to complete the exit strategy. As a result of this two-stage debt deal, public external debt has been reduced from $35.9 billion in 2004 to $20.5 billion in 2005 and further to estimated $4.8 billion in 2006. At the same time, Nigeria used up $8 billion from its forex reserves in 2005 and an estimated additional $4.5 billion in 2006 for the cash pre-payment to the PC creditors.

Source: IMF, Selected Issues and Statistical Appendix, 2002 IMF (2006)..

---

[12] These promissory notes were restructured over a period of 22 years including 2 years grace period at a fixed interest rate of 5%.

[13] Post-cut off debt consisted mainly of commercial project financing contracted in the late 1980s and early 1990s and is largely due to the federal government.

Annex 2: An Empirical Analysis of Sources of Volatility in Nigeria over 1970-2005.

Testing the VE versus the DO Hypothesis

This annex provides an empirical test that will help single out the main source of volatility in Nigeria for the past 36 years. We have identified two different explanations for high expenditure volatility in Nigeria: *"voracity effect"* (VE), and Debt Overhang (DO).

VE is defined as an institutional inability to reconcile competing claims for oil money, resulting in a marginal propensity to spend out of rising oil wealth larger than one, but a propensity to adjust in years of falling income that is smaller than one, and thus certainly <u>smaller</u> than the coefficient in "good" years. DO hypothesis generates the exact opposite prediction, an adjustment coefficient in years of falling revenue that <u>exceeds</u> the coefficient in years of rising revenue.

To test the VE versus the DO hypothesis, we run a regression of government spending (also its components – current and capital spending) on oil-related fiscal revenues over the period 1970 – 2005. All data are presented in constant dollars. We first show the results for regressions with symmetric adjustment during "good" and "bad" years (defined as years with rising and years with falling oil revenues, respectively). Regression results are shown in Table A.1.

Table A.1. Government Spending and Oil Revenues for 1970-2005, levels in constant $

	EQ.1 Total Government Expenditure	EQ. 2 Current Expenditure	EQ. 3 Capital Expenditure
Oil Revenue	1.45 (9.87)	0.87 (10.29)	0.52 (6.36)
Constant	1.76 (0.83)	1.10 (0.90)	0.26 (0.22)
No. of Obs.	36	36	36
R-sq. overall	0.73	0.75	0.53
DW	1.13	1.46	0.73

Note: 1. Data source: IMF World Economic Outlook database. 2. t-statistics in parentheses.

All three regression equations, for total, current and capital expenditure show a very strong relation between expenditure and revenues from oil, as is to be expected. But there is also a serial correlation pattern in the errors (see Table A.2). The DW coefficient is too low in all three regressions, and the Breusch-Godfrey Serial Correlation LM test rejects the H_0 hypothesis of no-serial correlation (except for the second regression equation, for current expenditure). Analysis of the error terms furthermore suggests a before and after 1984 difference. The Chow Breakpoint test for 1984 strongly rejects the H_0 of no structural break in 1984 in all three equations.

Table A.2. Government Spending and Oil Revenues for 1970-2005, levels in constant $

	EQ.1 Total Government Expenditure	EQ. 2 Current Expenditure	EQ. 3 Capital Expenditure
	Breusch-Godfrey Serial Correlation LM Test		
F-statistic (Prob.)	3.11(0.06)	0.83(0.44)	9.82(0.00)
Obs*R-sq. (Prob.)	5.86(0.05)	1.78(0.41)	13.69(0.00)
	Chow Breakpoint Test: 1984		
F-statistic (Prob.)	16.31(0.00)	10.29(0.00)	17.70(0.00)
Log likelihood ratio (Prob.)	25.30(0.00)	17.88(0.00)	26.82(0.00)

Note: Data source: IMF World Economic Outlook database. 2. p-values in parentheses.

We therefore ran the three regressions including a dummy term for the period up to 1984 (see Table A.3). We also include the asymmetric adjustment coefficients: a dummy that equals one in years of rising revenue and 0 in years of falling revenue is entered multiplicatively with the oil revenue term. With this definition one should expect a positive coefficient under the VE, and a negative coefficient under the DO hypothesis. The adjustment coefficient is negative and significant in all three equations, supporting the DO hypothesis.

Table A.3. Government Spending and Oil Revenues in Nigeria: VE versus DO

	with Overhang Variable and 1984 dummy		
	EQ. 1a Total Government Expenditure	EQ. 2a Current Expenditure	EQ. 3a Capital Expenditure
Oil Revenue	1.49 (16.6)	0.88 (14.74)	0.56 (10.36)
Constant	2.69 (2.11)	1.45 (1.70)	0.97 (1.26)
Overhang variable	0.52 (4.70)	0.31 (4.29)	0.23 (3.56)
Dum84*Oil revenue	-0.63 (-5.93)	-0.30 (-4.36)	-0.37 (-5.82)
No. of Obs.	35	35	35
R-sq. overall	0.92	0.90	0.84
DW	2.22	2.24	1.38

Note: Data source: IMF World Economic Outlook database. 2. t-statistics in parentheses.

We then check again if there are any problems with serial correlation in the three regression equations (see Table A.4). The results again come out very strongly, but this time without indications of serial correlation (except for the investment equation).

Table. A.4. Breusch-Godfrey Serial Correlation LM Tests

	EQ.1a Total Government Expenditure	EQ. 2a Current Expenditure	EQ. 3a Capital Expenditure
F-statistic (Prob.)	1.51(0.23)	0.66(0.52)	5.71(0.008)
Obs*R-sq. (Prob.)	3.29(0.19)	1.52(0.47)	9.88(0.007)

Note: Data source: IMF World Economic Outlook database. 2. p-values in parentheses.

These regression results suggest there is a strong indication that the marginal propensity to spend out of oil revenue is highly asymmetric (see table A.5). The asymmetric adjustment coefficient, as described above is negative and significant in all three regressions, suggesting that expenditure adjustment (or the coefficient on oil revenues) in years of falling oil revenue exceeds the coefficient in years of rising oil revenue. This actually confirms the DO hypothesis and therefore, we call this variable an overhang variable.

However, our results also suggest that there was a structural break around 1984. Before 1984, the marginal propensity to spend out of rising oil wealth was larger than one (the spending coefficient in good years is for total public expenditure is 1.49), confirming that at least before 1984 there is an indication for VE.

Table. A.5. Evidence for an asymmetric adjustment of public spending to oil revenue in Nigeria.

	EQ.1a Total Government Expenditure	EQ. 2a Current Expenditure	EQ. 3a Capital Expenditure
Before 1984			
Good years, defined as $d(oilrev\_r)>0$	1.49	0.88	0.56
Bad years, defined as $d(oilrev\_r)>0$	2.01(=1.49+0.52)	1.19(=0.88+0.31)	0.79(=0.56+0.23)
After 1984			
Good years, defined as $d(oilrev\_r)>0$	0.86(=1.49-0.63)	0.58(=0.88-0.30)	0.19(=0.56-0.37)
Bad years, defined as $d(oilrev\_r)>0$	1.38(=1.49+0.52-0.63)	0.89(=0.88+0.31-0.30)	0.42(=0.56+0.23-0.37)

We have tested the following variables for stationarity:

- *Gexp_r* - real total GG expenditure in 2000 US dollar
- *Cpub_r* - real current GG expenditure in 2000 US dollar
- *Kpub_r* - real capital GG expenditure in 2000 US dollar
- *Oilrev_r* - real oil fiscal revenue in 2000 US dollar

Table A.6.   Nigeria: Unit Root Tests, 1970 - 2005

	Level		First Difference	
	with intercept	With intercept and trend	with intercept	with intercept and trend
gexp_r	-1.51	-1.60	-4.03***	-3.96**
cpub_r	-1.80	-1.83	-4.71***	-4.63***
kpub_r	-3.13**	-2.90	-3.63**	-3.56**
oilrev_r	-1.64	-1.55	-5.08***	-3.53**

*: reject unit root at 10% level
**: reject unit root at 5% level
***: reject unit root at 1% level

To avoid spurious regressions, we first checked the order of integration of the individual time series, used in the empirical analysis of the sources of volatility. All the series are integrated of order one, which means that their first differences are stationary (see table A.6). However, since there were indications for structural break at around 1984 in the three estimated equations, we would like to check the order of integration of the individual time series for the latter period; once again, we get the same results for the shorter period, 1984-2005 - the results in Table A.6a suggest that all variables are integrated of order one (see). Because all the variables are integrated of the same order, there is an indication that they are co-integrated and that a long-run relation between them exists.

Table A.6a.   Nigeria: Unit Root Tests, 1984 - 2005

	Level		First Difference	
	with intercept	With intercept and trend	with intercept	with intercept and trend
gexp_r	0.07	-1.61	-4.41***	-4.79***
cpub_r	-0.03	-1.32	-3.79***	-5.01***
kpub_r	-1.69	-3.98**	-4.27***	-4.28**
oilrev_r	1.33	0.02	-3.18**	-3.70**

*: reject unit root at 10% level
**: reject unit root at 5% level
***: reject unit root at 1% level

To test for co-integration, we have performed ADF test on residual series from all three equations, as estimated above and shown in table A.3. Table A.7 shows the ADF results for the residual series from the equation on total GG real expenditure, current GG real expenditure and capital GG real expenditure. As seen from the table, the ADF tests decisively reject the null hypothesis that the residuals contain unit root, which is evidence that these series are co-integrated and that the OLS regression will not produce spurious results.

Table A.7. Nigeria: ADF Tests on the residuals of the three equations, 1970 - 2005

	Level	
	with intercept	With intercept and trend
Residual from eq. 1 (total GG expenditure)	-5.31***	-5.22***
Residual from eq. 2 (current GG expenditure)	-6.60***	-6.50***
Residual from eq. 3 (capital GG expenditure)	-5.20**	-5.14***

*: reject unit root at 10% level
**: reject unit root at 5% level
***: reject unit root at 1% level

Data Sources and Variable Definitions

Table A.8 Data Sources and Variable Definitions

Variable	Definition
Total government expenditure	General government, total expenditure and net lending, current LCU
Current expenditure	Public consumption expenditure, current LCU
Capital expenditure	Gross public capital formation, current LCU
Oil revenue	Oil fiscal revenue, current LCU
Oil exports	Value of oil exports, current US Dollars
Deflator	Gross domestic product deflator
Exchange rate	Exchange rate, National Currency per US Dollar

Source

IMF World Economic Outlook, Article IV consultations and staff estimates

Variables used in the regressions	
Real total government expenditure	= total government expenditure/exchange rate / US deflator
Real Current expenditure	= current expenditure /exchange rate / US deflator
Real Capital expenditure	= capital expenditure /exchange rate / US deflator
Real Oil revenue	= fiscal oil revenue /exchange rate / US deflator
Real Oil exports	= oil exports / US deflator
Dum	= 1 if real oil revenue in year t is smaller than in t-1, zero otherwise
Overhang variable	= dum*real oil revenue
Dum84	= 1 if year >=1984, zero otherwise
Dum84*Oil revenue	= Dum84*real oil revenue

Note: the oil fiscal revenue is used as the independent variable for Nigeria regressions, and oil exports are used to proxy oil revenues for oil-rich countries due to data shortage.