



WP/09/56

IMF Working Paper

A Primer on Fiscal Analysis in Oil-Producing Countries

Paulo Medas and Daria Zakharova

IMF Working Paper

Fiscal Affairs Department

A Primer on Fiscal Analysis in Oil-Producing Countries

Prepared by Paulo Medas and Daria Zakharova

Authorized for distribution by Mark Horton

March 2009

Abstract

This Working Paper should not be reported as representing the views of the IMF.

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

This paper proposes an integrated approach to fiscal policy analysis in oil producing countries (OPCs) geared towards addressing their unique and complex policy challenges. First, an accurate assessment of the fiscal stance in OPCs can be obscured by large and volatile oil revenue flows. Second, uncertain and volatile oil revenue flows can complicate the management of macroeconomic policies in these countries. Third, given the exhaustibility of oil reserves, OPCs need to address longer-term sustainability and intergenerational equity issues. The use of non-oil fiscal indicators, stress tests, medium-term frameworks, and permanent oil income models can greatly aid in addressing these challenges.

JEL Classification Numbers: E02, E62, H11, H50, H60, E62

Keywords: fiscal policy, oil producing countries, resource revenue

Author's E-Mail Address: PMedas@imf.org; DZakharova@imf.org

Contents	Page
I. Introduction	3
II. Assessing The Macro-Fiscal Stance.....	4
A. A Multiple Indicator Approach.....	4
B. Using the Non-Oil Balance Concept in Practice.....	9
III. Managing Revenue Volatility and Ensuring Macro-Stability	13
A. Macro-Fiscal Consequences of Oil Revenue Volatility.....	13
B. Managing Oil Revenue Volatility	16
IV. Long-Term Sustainability and Uncertainty	21
A. The Permanent Oil Income Model.....	22
B. Addressing Uncertainty.....	27
V. Conclusion	29
 Table	
1. Nigeria: Federal Government Operations.....	6
 Figures	
1. Primary/Non-Oil Primary Balance and Oil Price	7
2. Oil Producing Countries: Selected Fiscal Indicators	8
3. Oil Producing Countries: Oil Vs. Non-Oil Revenue	12
4. Inflation and Asset Prices in OPCs.....	14
5. Nigeria, Saudi Arabia, and the UAE: Selected Economic Indicators.....	19
6. Coverage of Fiscal Statistics in Oil and Non-Oil Producing Countries of the Middle East and Central Asia	20
7. An Example of a Permanent Oil Income Model versus Bird-in-Hand.....	26
 Boxes	
1. Assessing the Direction of Fiscal Policy by Changes in the Non-Oil Primary Balance.....	6
2. Non-oil fiscal indicators in Nigeria and Yemen	11
3. Impact of Past Oil Booms and Busts on the Economies of Nigeria, Saudi Arabia, and the UAE.....	16
4. Petroleum Product Subsidies in OPC	18
5. Application of POIM to OPC	24
6. The Role of MTFs in Managing Oil Revenue Uncertainty	29
 Appendices	
I: Approaches to Defining the Non-Oil Balance.....	31
II: Special Fiscal Institutions	33
 References.....	38

I. INTRODUCTION

Oil producing countries (OPCs) face unique challenges to macro-fiscal management due to the special characteristics of oil revenue.¹ In practice, oil exploration and production tend to be a separate “enclave” that is mostly isolated from the domestic economy, with its effects mainly felt via government use of its share of oil resources and revenues.² As such, fiscal policy plays a key role in managing the macroeconomic impact of oil revenue. Oil revenue tends to show high volatility and uncertainty compared with other fiscal revenues (due to oil prices and reserves) and is exhaustible—as a result, today’s choices (e.g., investment, rate of extraction, use of oil revenue) are likely to have significant long-term implications. Finally, oil revenue largely originates from abroad (exports) and can have significant impacts on the real exchange rate depending on how the inflows of foreign currency are managed.

Given these characteristics, OPCs face a number of critical questions and choices regarding fiscal policy and management. These include:

- *How to accurately assess the macro-fiscal stance in order to better inform policy decisions?* The special nature of oil revenue complicates the evaluation of the macro-fiscal stance in OPCs. Conventional fiscal indicators and tools, such as the overall and primary balances and debt sustainability analysis (DSA) are not sufficient to make a full assessment of the short-term fiscal stance or longer-term fiscal sustainability. These indicators should be complemented by non-oil indicators and specialized stress tests.
- *How to shield public expenditures and the non-oil economy from the high volatility in oil revenue?* In OPCs, it may be difficult to avoid costly “boom and bust” cycles. In boom periods, rapidly rising expenditures can lead to unsustainable spending levels and inflationary pressures (the so called “voracity effect”). In addition, OPCs may accelerate spending beyond their capacity to manage well, leading to wasteful spending. A sudden fall in oil revenue could require a drastic reduction in expenditure with subsequent negative effects on economic growth and the provision of crucial public services, or alternatively a burst of borrowing. Good planning and management during boom times can reduce the need for large and potentially poor quality spending cuts during periods of declining oil revenue.

¹ For the purpose of the paper, *oil* includes all hydrocarbon revenue, while policy recommendations mainly focus on oil exporters. The charts in this paper are based on data from the following OPCs: Algeria, Angola, Azerbaijan, Bahrain, Brunei, Cameroon, Chad, Congo, Ecuador, Equatorial Guinea, Gabon, Indonesia, Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, Sudan, Syria, Timor Leste, Trinidad and Tobago, UAE, Venezuela, Vietnam, and Yemen.

² In many countries, the receipts from the oil sector tend to be shared by the state (via the fiscal regime and/or national oil companies) and international oil companies.

- *How to address sustainability and intergenerational equity issues?* Given the exhaustibility of oil reserves, countries should consider how to allocate oil wealth across generations. Should a country save part of its current oil receipts for future years when reserves are depleted? How much should be saved? These considerations have implications not only for intergenerational equity, but also for long-term fiscal sustainability. The choices (e.g., how much to consume today, how much to invest in infrastructure and human capital, and how much to save in financial assets) will depend on the particular country circumstances, but it will be important that present day policies take into account long-term consequences.

The rest of the paper considers these challenges and presents a comprehensive fiscal analysis framework for OPCs. Section II discusses a multiple indicator approach to assessing a macro-fiscal stance in OPCs. Section III discusses policies that can be used to ensure that management of oil revenues is consistent with macroeconomic stability. Section IV focuses on longer-term fiscal sustainability issues, including how to manage uncertainty. Section V concludes.

II. ASSESSING THE MACRO-FISCAL STANCE

A. A Multiple Indicator Approach

In light of unique policy challenges faced by OPCs, a full and accurate assessment of the fiscal stance in these countries requires the use of additional fiscal indicators. Focusing exclusively on conventional indicators, such as the overall and primary balances, could result in incomplete and potentially misleading conclusions about the direction and sustainability of fiscal policy, as well as the impact of fiscal policy on the economy. For example, when oil prices are rising, changes in the primary fiscal balance may be a poor measure of changes in the fiscal position. An OPC may be running higher overall surpluses, while at the same time increasing expenditure financed by higher (external) oil revenues. They could result in an acceleration of domestic demand, at a time when the economy could already be overheating. Contrary to non-oil exporters, a rising primary balance in an OPC could be associated with a fiscal impulse and deterioration in the fiscal position if the increase in oil revenue is temporary. Although the fiscal position may be seen as improving, a sharp reversal of oil prices may prompt painful expenditure cuts.

Conventional debt sustainability analysis (DSA) may not be adequate to assess long-term fiscal sustainability in OPCs. Traditional debt sustainability analysis mainly focuses on the level of gross debt and achieving a sustainable primary fiscal balance—usually defined as the balance that maintains a constant ratio of debt-to-GDP over the medium term. A crucial challenge for fiscal policy in OPCs is the allocation of government wealth (including oil in the ground) across generations in the context of uncertain and exhaustible oil reserves.

Depending on the country and its oil reserves and production horizon, this could imply some borrowing before oil production starts, and accumulating sufficient assets during the period of oil production to sustain government consumption in the post-oil period. As such, strategies aimed at stabilizing a positive net debt-to-GDP ratio will not generally be optimal or even consistent with fiscal sustainability, since they could result in explosive debt dynamics when oil is exhausted, if the underlying fiscal deficit is large and non-oil growth is weak.

Non-oil fiscal indicators, such as the non-oil balance, should play an important role in guiding fiscal policy in OPCs. The non-oil primary balance (NOPB) is generally defined as non-oil revenue (NOR)³ minus non-oil expenditure (NOE),⁴ excluding net interest payments (interest payments minus interest receipts; I):⁵

$$\text{NOPB} = \text{NOR} - \text{NOE} + \text{I}$$

Table 1 illustrates the calculation of the non-oil balance for Nigeria. The non-oil primary balance therefore excludes oil revenue that originates from abroad and is therefore a better measure of the impact of fiscal policy on the domestic demand than the overall primary balance. For example, Figures 1 and 2 illustrate how the primary balance is highly correlated with oil prices in oil producing countries, so that an improvement in the primary balance as a result of an increase in oil prices can mask an underlying relaxation in the fiscal stance captured by a deterioration in the non-oil balance (see also Box 1).

The use of other non-oil indicators can further improve fiscal policy analysis. For example, changes in non-oil expenditure may be a useful measure of injection of oil revenue into the economy, capacity constraints, and future spending needs (e.g., for maintenance). Non-oil revenue relative to non-oil GDP is a useful measure of tax effort vis-à-vis non-oil revenue sources and facilitates cross-country comparisons. Finally, non-oil indicators should be key inputs into long-term fiscal sustainability and intertemporal analysis, where fiscal policy targets the level of net government wealth consistent with a sustainable non-oil deficit.

³ Oil revenue should include royalties, oil income taxes, oil-related profit transfers, income from state equity in the oil sector (including national oil company dividends), oil export taxes, receipts from granting exploration rights, and signature bonuses. In countries with broad or consolidated public sector coverage, national oil company oil revenue should be included. Taxes from the consumption of fuel should be excluded (i.e., counted with non-oil revenues), as these would arise whether the country produces oil or not.

⁴ Oil expenditures should include government investment in the oil sector and any associated recurrent spending, other current oil spending, and transfers to national oil companies. In countries with public sector coverage, expenses of national oil companies should be included.

⁵ The non-oil primary balance is usually analyzed relative to GDP excluding value-added from oil (“non-oil GDP”), where such an estimate is available (see discussion in Section B).

Table 1. Nigeria: Federal Government Operations, 2004–08
(in percent of GDP)

	2004	2005	2006	2007	2008
Total revenue	12.7	13.9	13.0	11.0	14.4
Oil	10.6	12.2	11.6	8.4	12.1
Non-oil	2.1	1.8	1.4	2.6	2.4
Total expenditure	9.2	9.8	8.9	11.2	12.7
Wages	3.8	3.6	3.6	4.4	5.2
Other non-interest current expenditures	1.5	1.9	1.7	2.2	3.0
Interest	2.0	2.6	1.0	1.0	1.5
Capital	2.0	1.7	2.6	3.7	3.0
Primary balance	5.5	6.7	5.0	0.8	3.2
Overall balance	3.5	4.1	4.0	(0.2)	1.7
Non-oil primary balance	(5.1)	(5.4)	(6.5)	(7.7)	(8.9)
Memorandum items:					
Non-oil revenue (in percent of non-oil GDP)	3.5	2.9	2.2	4.1	3.7
Non-oil primary balance (in percent of non-oil GDP)	(8.3)	(9.0)	(10.6)	(12.1)	(14.1)
Inflation (end of period)	10.1	11.6	8.5	6.6	15.1

Sources: Nigerian authorities and Fund staff estimates

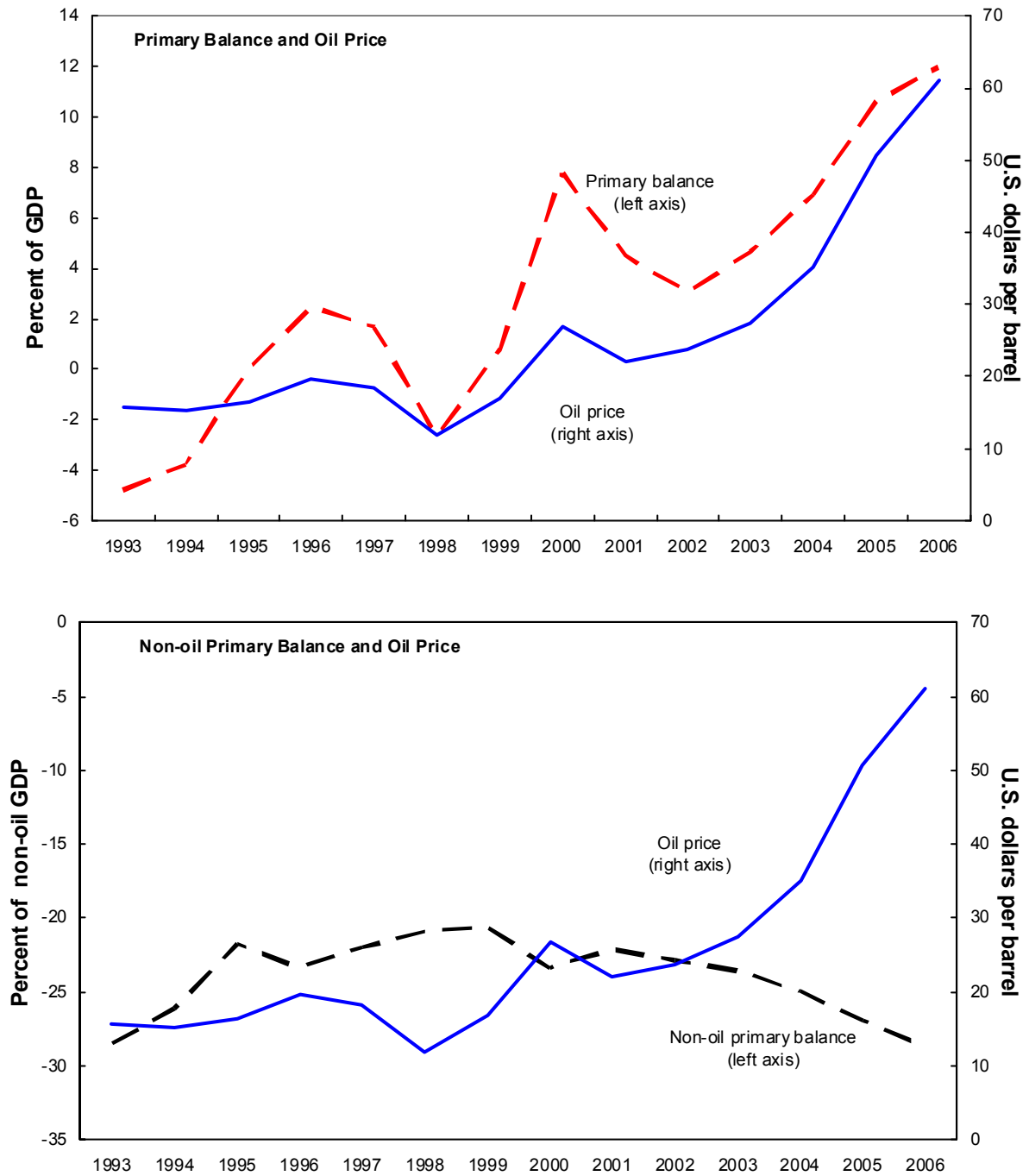
Box 1. Assessing the Direction of Fiscal Policy by Changes in the Non-Oil Primary Balance

An increase in the non-oil primary deficit would indicate an expansionary fiscal policy affected either through higher expenditure or a relaxation of non-oil revenue collection. The short-run macroeconomic impact of a loosening in the non-oil primary balance in an OPC is similar to externally-financed increase in the overall deficit in a conventional economy. This is because oil revenues largely originate abroad and have similar macroeconomic effects as borrowing from abroad. Thus if oil revenues are spent and absorbed, the non-oil primary deficit and the non-oil current account will widen, with marginal impact on inflation. On the other hand, if oil revenue is spent, but not fully absorbed (i.e., the non-oil current account does not widen), inflationary pressures may arise, accompanied by Dutch disease effects,⁶ unless the reserve accumulation by the central bank is sterilized. However, sterilization can be costly and can result in crowding out of the private sector.

A reduction in the non-oil primary deficit would signal fiscal consolidation. The authorities may choose to substitute oil revenues for domestic or external financing of the non-oil primary deficit, thus reducing public debt. Repaying external debt with oil revenue can help achieve the desired sterilization of oil-related foreign exchange inflows. Repaying domestic debt may crowd in private investment, but may also create inflationary pressures from increased liquidity, possibly calling for a tighter monetary policy stance.

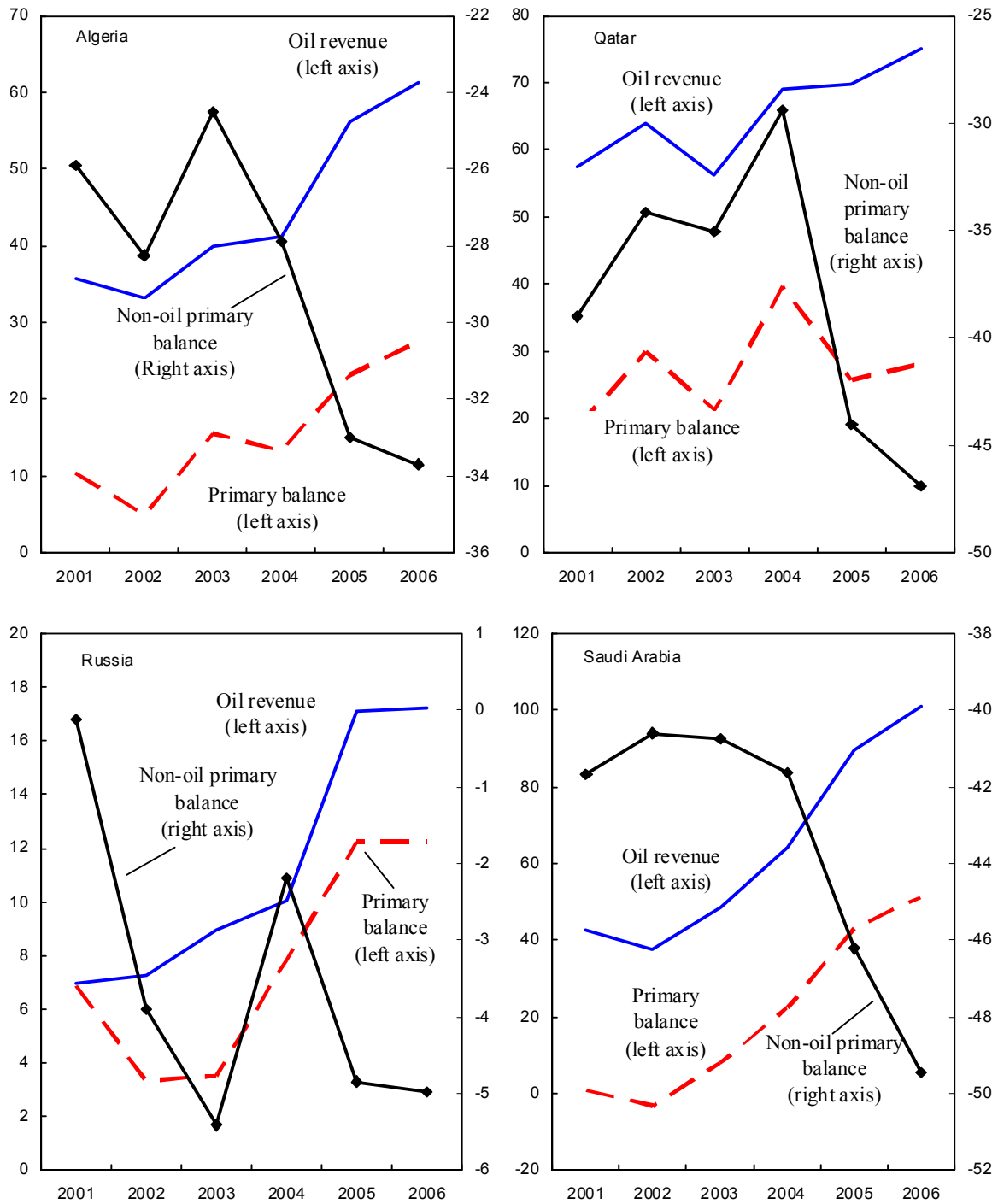
⁶ “Dutch disease” generally refers to the consequences on the nonresource economy of real effective exchange rate appreciation associated with foreign exchange inflows (usually from resource revenues).

Figure 1. Primary/Non-Oil Primary Balance and Oil price, 1993-2006 1/



Source: World Economic Outlook and IMF country documents.
1/ Simple averages.

Figure 2. Oil Producing Countries: Selected Fiscal Indicators, 2001-06
(In percent of non-oil GDP)



Source: IMF country documents.

Non-oil fiscal indicators should complement and not replace the use of conventional indicators. While a non-oil balance is useful in measuring the government's adjustment effort or the impact of fiscal policy on domestic demand, the overall balance is important to assess net financing needs and aspects of fiscal vulnerability. The financing of the overall balance (and its main domestic and external components) is a key input in analyzing liquidity constraints and the impact of government demand on private sector credit. For example, external financing may be costly or unavailable, while rapidly rising domestic financing can be inflationary or may crowd out private investment. In countries with short-run liquidity concerns, the gross borrowing requirement⁷ is a useful measure of liquidity needs.

Subjecting conventional fiscal indicators to sensitivity analysis based on alternative oil price scenarios is another useful tool of fiscal analysis in OPCs. Medium-term financing vulnerabilities can be assessed by projecting the overall balance under current policies, but considering different oil price scenarios and identifying concerns with the corresponding paths of net government debt. Short-term fiscal vulnerabilities can be gauged by undertaking sensitivity analysis for the gross borrowing requirement with respect to oil price and volume fluctuations.

Based on these considerations, a multiple-indicator approach to analyzing fiscal policy in OPCs is desirable, with conventional fiscal indicators complemented by non-oil fiscal measures and sensitivity analysis. The next section briefly discusses operational definitions of the non-oil balance, depending on the analytical purposes for which it is used.

B. Using the Non-Oil Balance Concept in Practice

Over the past few years, the non-oil balance has become a central indicator in fiscal analysis in OPCs. As discussed above, the non-oil balance is a key measure of the direction and long-term sustainability of fiscal policy.

Operational definitions of the non-oil balance depend on the purposes for which the indicator is used. If the goal is to assess fiscal sustainability, a definition of the non-oil primary balance that excludes all oil-related revenues and expenditures, as well as net interest payments should be used. If fiscal sustainability is not an immediate concern, for example because of a very long projected horizon for the use of sizable oil reserves, adjusted versions of a non-oil balance (e.g., the domestic non-oil balance, as discussed below) can be used to complement the analysis.⁸

⁷ The gross borrowing requirement is usually defined as the sum of the projected deficit, short-term debt, and medium- and long-term amortization coming due in the course of a year.

⁸ Appendix I discusses the treatment of specific oil-related revenue and expenditure items in the non-oil balance, depending on the objectives of fiscal policy.

When the short-term impact of fiscal policy on domestic demand needs to be assessed, for example due to concerns with inflation, a non-oil domestic balance can be a useful additional indicator. The non-oil domestic balance can be broadly defined as the overall balance excluding oil export revenue, public expenditures on imports (including oil-related imports), and net interest payments on foreign debt. The concept of the non-oil domestic balance is similar to the conventional domestic balance that is widely used to assess the impact of fiscal policy on aggregate demand in non-oil economies.

Care should be taken to ensure consistency between short- and long-term fiscal policy objectives when using these indicators. Basing fiscal policy exclusively on developments in the domestic balance could result in an excessive bias toward import-intensive projects, encourage creative accounting, and weaken spending quality standards. This underscores the importance of coordinating near- and longer-term fiscal policy, placing due emphasis on supporting structural fiscal reform (including the building of sound fiscal institutions), and employing multiple fiscal indicators to guide policy decisions. Box 2 discusses the use of the non-oil balances in assessing fiscal policies in Nigeria and Yemen.

Some countries use the concept of the cyclically-adjusted non-oil balance (CANOB) to set macro-fiscal policy. By excluding the effect of automatic stabilizers and other nondiscretionary factors on the non-oil balance, this allows the portion of the fiscal balance that could be directly affected by discretionary fiscal policies to be revealed. For example, the CANOB targeted by Norway's fiscal guidelines excludes the budget's oil-related revenues and expenditures, and adjustments are made for cyclical fluctuations in mainland economic activity; deviations of Norges Bank's transfers from estimated normal transfer levels; deviations of net interest payments from trend; and technical accounting changes and extraordinary items that do not influence underlying budget balance developments.

The non-oil balance should be expressed in percent of non-oil GDP. This is because total GDP in OPCs with large oil sectors tends to fluctuate together with oil prices and production, causing the ratios of non-oil fiscal variables to vary significantly over time. Using total GDP to scale the non-oil balance may thus cloud the assessment of fiscal position, if movements in the ratio are largely due to the changes in the denominator. For example, exchange rate depreciation can increase the share of oil GDP in total GDP and may result in a lower non-oil deficit ratio in percent of total GDP without any substantive changes in the underlying fiscal policy stance.⁹ Where estimates of the non-oil GDP are not available, changes in the NOPB or in non-oil expenditures in real terms could be used to gauge the direction of fiscal policy.

⁹ Non-oil GDP could also be affected by movements in oil prices through their impact on domestic demand and exchange rate, but this impact will be less than the direct impact of oil prices on total GDP.

Box 2. Non-Oil Fiscal Indicators in Nigeria and Yemen

Nigeria and Yemen face important challenges in managing the impact on the non-oil economy of recent significant terms-of-trade gains associated with increasing oil prices. However, whereas Nigeria enjoys large proven oil reserves, estimated to last at least for the next 40 years, Yemen could run out of oil in about 10 years, barring new discoveries. Given that oil revenue accounts for three quarters of government revenue in Yemen (22 percent of GDP), fiscal and external sustainability would be at risk in the absence of a large fiscal adjustment. In view of these important challenges, policy discussions in Yemen have largely centered on fiscal sustainability. In Nigeria, with debt relief completed and a desire by the authorities to increase infrastructure spending, policy focus shifted in 2007–08 to managing the impact of the fiscal stance on short-term economic stability.

Given that fiscal sustainability is a pressing concern in Yemen, the non-oil primary balance is a central indicator guiding the fiscal policy. With the projected depletion of the oil wealth, the non-oil balance will converge to the overall balance in less than a decade. Under unchanged policies, net public debt would increase from 29 percent of GDP to 75 percent by 2012, putting Yemen at a high risk of debt distress. In order to contain public debt at a sustainable level, Yemen would need to increase its non-oil revenue by broadening the tax base and improving compliance, and to reduce unproductive spending, including the ballooning fuel subsidy that in 2006 was larger than the entire budget for social spending and was barely covered by the non-oil revenue.

Yemen: Selected Fiscal Indicators, 2007 1/

	In percent of GDP	In percent of non-oil GDP
I. Total revenue and grants	30.9	42.2
a. Oil and gas revenue	22.3	30.3
II. Non-oil revenue and grants	8.6	11.9
III. Total expenditure and net lending	35.6	48.5
b. Petroleum subsidies	7.5	10.2
c. Interest	2.0	2.8
IV. Non-oil primary balance (II-III+c)	-25.0	-33.9

Source: IMF country documents.

1/ IMF staff projections.

Fiscal sustainability is less of a concern in Nigeria, where following the completion of Paris Club debt relief, external debt was just 2 percent of GDP at end-2007. The government is now focused on achieving sustained high rates of economic growth, including through increased infrastructure spending. The fiscal authorities currently still monitor the non-oil primary balance to ensure the consistency of short-term fiscal policy with longer-term sustainability objectives. However, with policy focus shifting toward containing domestic demand pressures and keeping inflation in single digits, consideration is being given to anchor the near-term fiscal framework by the domestic balance. Due to data limitations, the domestic balance is approximated by the non-oil balance less foreign interest payments and the foreign content of large infrastructure projects.

Nigeria: Selected Fiscal Indicators (cash basis), 2007

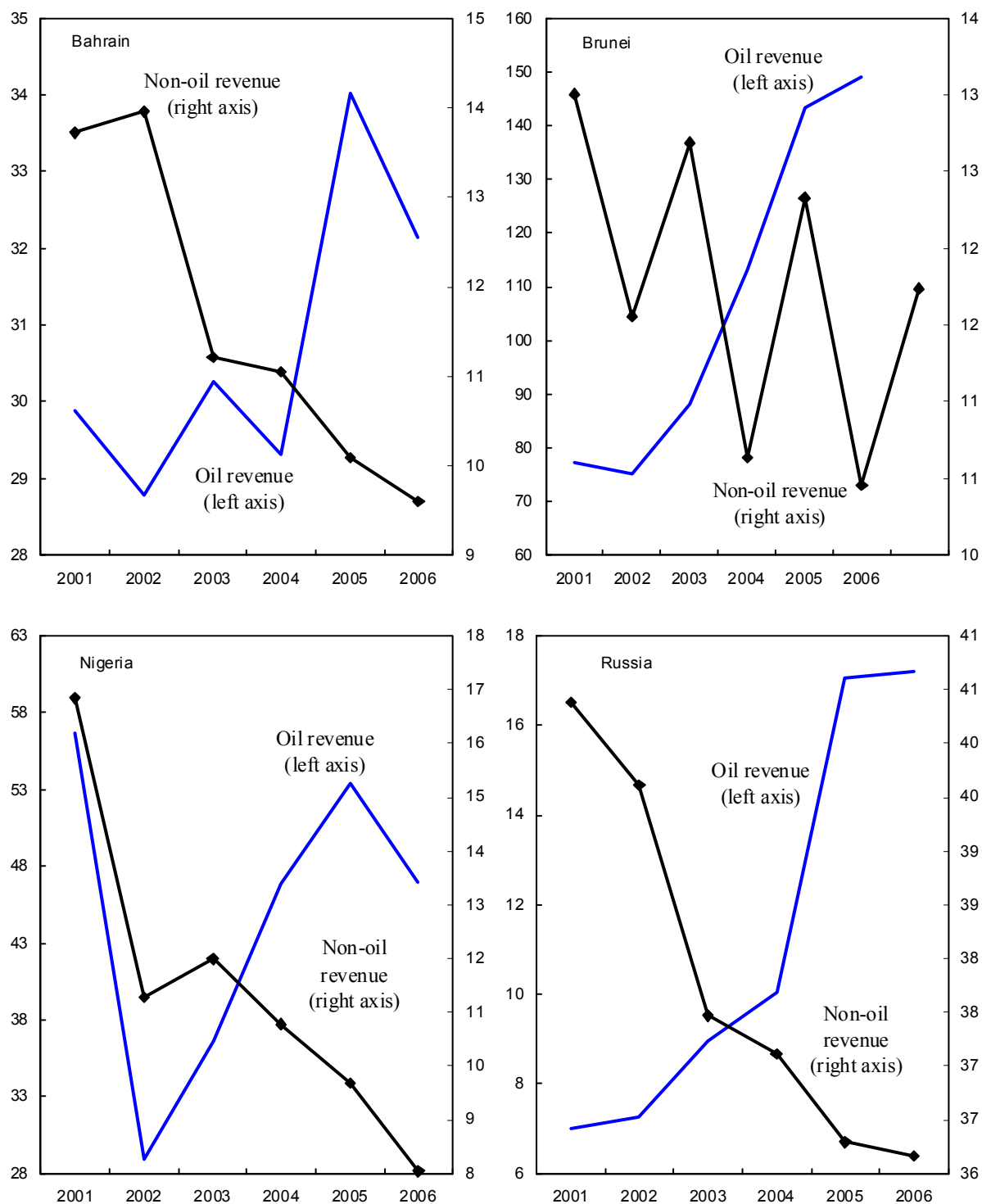
	In percent of GDP	In percent of non-oil GDP
I. Total revenue	28.5	44.0
a. Oil and gas revenue	21.9	33.9
II. Non-oil revenue	6.5	10.1
III. Total consolidated expenditure	28.7	44.5
b. Oil expenditure 1/	2.6	4.1
c. Cash interest payments	1.0	1.5
d. of which: foreign interest	0.1	0.2
e. Foreign content of large infrastructure projects	0.8	1.2
f. Explicit fuel subsidy	0.2	0.4
IV. Non-oil primary balance (II-III+b+c)	-18.6	-28.7
V. Domestic balance (II-III+b+d+e)	-18.7	-28.9

Source: IMF country documents.

1/ Cash call payments.

While the non-oil and domestic balances are central to fiscal analysis in the two countries, other non-oil fiscal indicators should continue to be closely monitored. For example, both countries have recently experienced a notable decline in non-oil revenue, indicating a weakening of tax effort as oil prices increased (Figure 3). Expenditure quality issues, including explicit and implicit fuel subsidies, continue to raise concerns (Box 4).

Figure 3. Oil Producing Countries: Oil Vs. Non-Oil Revenue, 2001-06
(In percent of non-oil GDP)



Source: IMF country documents.

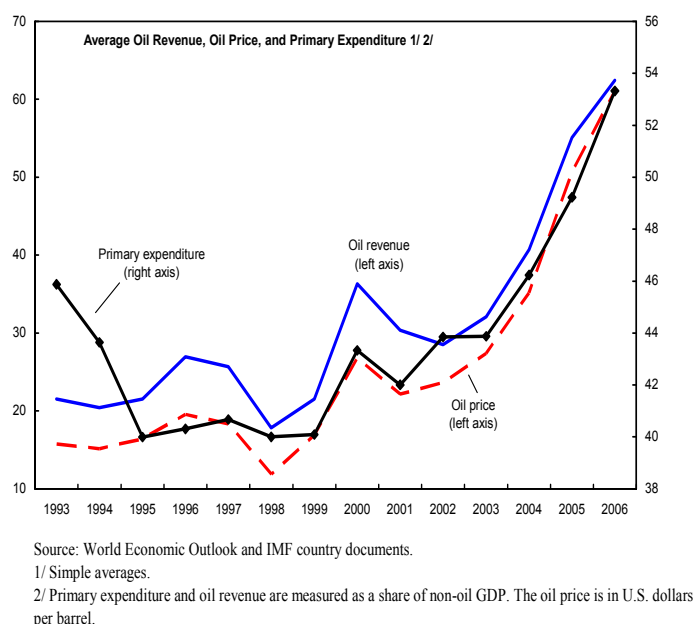
Finally, use of non-oil GDP to assess non-oil revenues gives an accurate assessment of revenue performance—facilitating international comparisons and policy actions—while helping to provide an indication of how much adjustment (or borrowing) would be needed in the absence of oil.

III. MANAGING REVENUE VOLATILITY AND ENSURING MACRO-STABILITY¹⁰

A. Macro-Fiscal Consequences of Oil Revenue Volatility

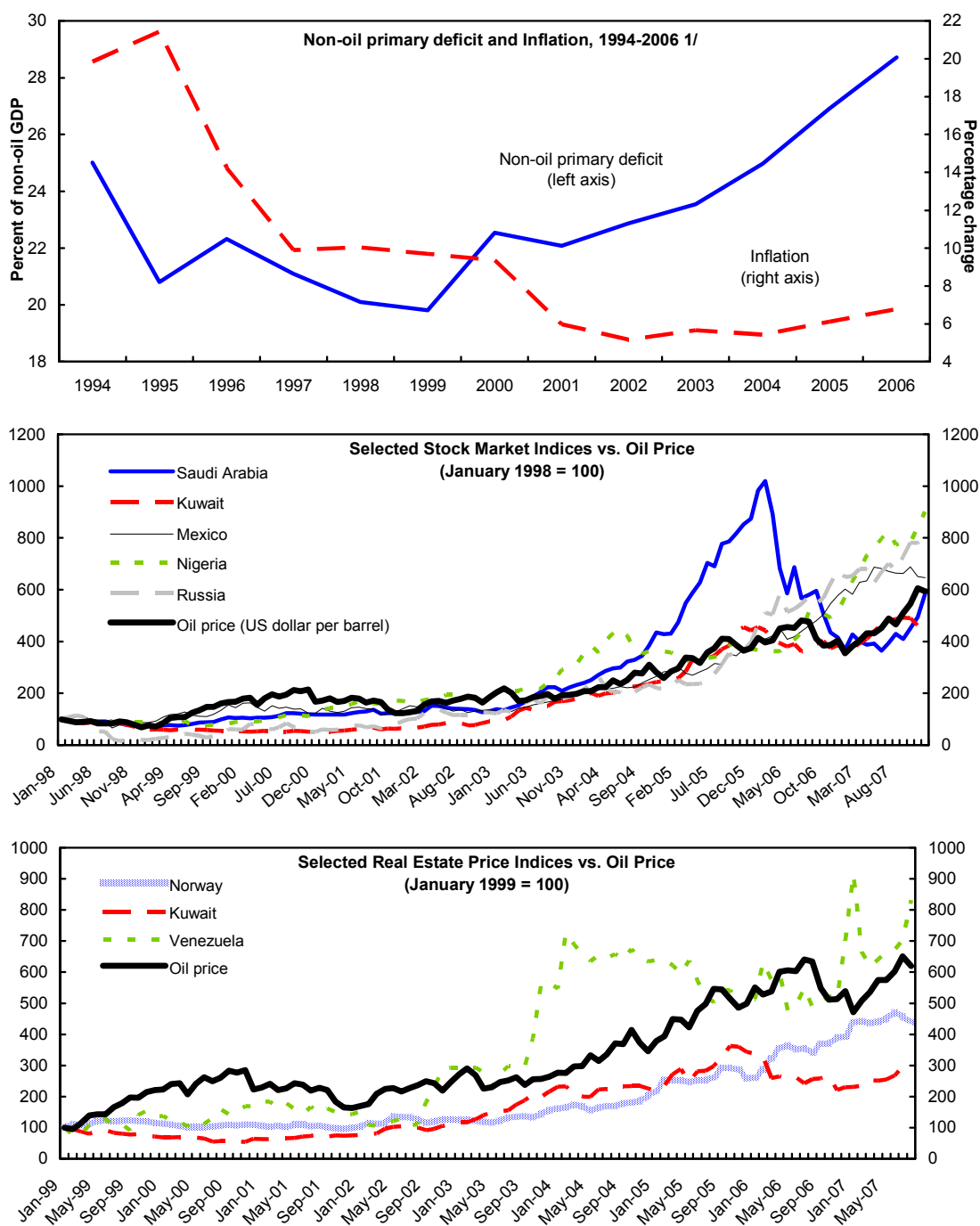
Oil revenue volatility poses particular challenges for macroeconomic management in OPCs. Foreign exchange inflows associated with oil revenue often result in real exchange rate appreciation through nominal appreciation or higher inflation, depending on the exchange rate regime. Exchange rate appreciation may in turn undermine other tradable goods sectors by reducing their competitiveness (Dutch disease), leaving the economy vulnerable to a sudden drop in oil prices. This loss of competitiveness, combined with higher inflation, could have potentially serious negative consequences for the non-oil economy. These problems may be further aggravated by asset price bubbles on the back of positive wealth effects of oil revenues, increasing financial sector vulnerability (Figure 4).

Due to the strong fiscal dominance in OPCs, fiscal policy tends to be the main channel for propagating external shocks associated with oil price fluctuations into the non-oil economy. Empirical evidence points to a strong correlation between oil revenue and fiscal expenditure in OPCs (see text figure); some studies show that higher oil revenue induces higher spending (Fasano and Wang, 2001). As discussed above, higher spending exerts pressure on aggregate demand, prices, and the real exchange rate, undermining the non-oil economy.



¹⁰ These issues are also discussed in Barnett and Ossowski (2002).

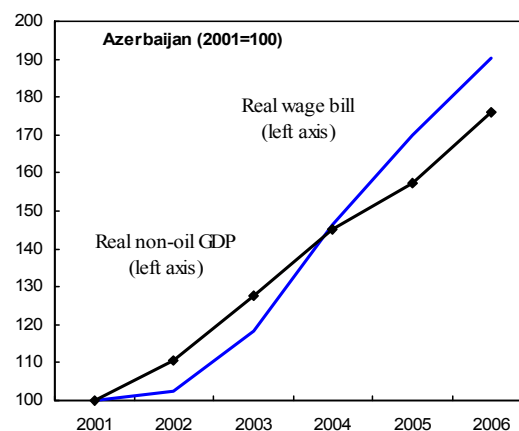
Figure 4. Inflation and Asset Prices in OPCs



Source: World Economic Outlook, Thomson Datastream, and Bloomberg; IMF country documents.
 1/ CPI-based; simple averages.

Moreover, oil price volatility transmitted to public expenditure through oil revenue has other undesirable consequences for the non-oil economy:

- Macroeconomic volatility.** Sharp changes in government spending add to volatility in aggregate demand and prices, abrupt swings in the exchange rate, and increased risks faced by investors in the non-oil sector. Macroeconomic volatility has been shown to have adverse impact on investment and economic growth (Aizemann and Marion, 1993; and Gavin, 1997). Expenditure volatility associated with fluctuations in oil revenue was found to be a key factor explaining slower growth in OPCs compared to resource-poor countries (Gelb, 1988; Auty and Gelb, 2001; and Bjerkholt, 2002). Box 3 illustrates the impact of past oil booms and busts on three OPCs: Nigeria, Saudi Arabia, and the UAE.
- Expenditure quality.** The tendency for the quality of public spending to deteriorate during oil booms has been well documented. Introduction of large-scale new spending programs during an oil boom can result in overstretched administrative capacity, a weakening of standards in project selection and evaluation, and even a circumvention of public financial management procedures. The result may be a rapid deterioration in the quality, efficiency, and productivity of public spending. During previous oil booms, some countries undertook ambitious investment projects with low rates of return, politically attractive payoffs, and inadequate screening and execution (e.g., Algeria, Côte d'Ivoire, Nigeria, Trinidad and Tobago).¹¹ Expenditure quality has also been weakened in a number of countries by proliferation of energy subsidies (Box 4).
- Budget flexibility.** Expenditure increases during “good times” tend to benefit politically influential groups (e.g., civil servants, military, farmers). For example, a number of countries used the recent oil windfall to increase public sector wages (Algeria, Azerbaijan, Iraq, Nigeria, Trinidad and Tobago, Venezuela, and Yemen). As these new spending programs become entrenched, it may become difficult to curtail them when oil revenues drop sharply or dry out. In countries with high levels of statutory outlays, fiscal consolidation is often effected by cutting more productive spending categories, such as infrastructure investment and maintenance, with a possible adverse impact on growth. Another possible budget flexibility concern relates to the weakening of the non-oil revenue effort during the oil booms, which makes the budget more vulnerable to the oil downturns.



Box 3. Impact of Past Oil Booms and Busts on the Economies of Nigeria, Saudi Arabia, and the UAE¹

The experiences of Nigeria, Saudi Arabia, and the UAE illustrate the costs of macroeconomic volatility brought on by sharp changes in oil prices. In response to a substantial increase in oil prices in the mid-1970s and then again in the late 1970s, these countries significantly increased their expenditures. In Saudi Arabia, annual changes in primary spending peaked at 133 percent during the first oil boom, while in Nigeria and the UAE primary spending went up by 114 and 102 percent respectively (Figure 5). These spending increases fueled inflation that reached 36 percent during the oil peak in Nigeria and Saudi Arabia, and over 20 percent in the UAE. While in Saudi Arabia and the UAE, inflation gradually came down as spending increases were unwound, in Nigeria high inflation persisted reflecting continued loose fiscal policy.

The quality of spending made a difference for growth outcomes. While both the UAE and Saudi Arabia enjoyed very high real non-oil GDP growth rates during the oil boom partly owing to an effective expenditure management, Nigeria saw more modest non-oil GDP growth, as poor management of its investment program and a ballooning wage bill intensified the negative impact of Dutch disease on agriculture. But as oil prices declined in the early 1980s, both Saudi Arabia and the UAE experienced a prolonged period of low growth as public expenditure increases were reversed following a drop in oil revenues.

¹ This discussion draws on IMF 2007 (2).

B. Managing Oil Revenue Volatility

A number of measures can be taken to reduce the macro-fiscal costs associated with oil revenue volatility:

- **Gradually de-linking expenditure decisions from oil revenue volatility.** Since fiscal policy is in most cases the primary conduit for transmitting oil price shocks into the non-oil economy, a strong case can be made for reducing the volatility of public spending by de-linking the annual budget from the short-term volatility in oil revenue. This would require saving some of the oil revenue during an oil boom, but would enable the government to draw on savings to continue offering the same level of public services in a (temporary) downturn, contributing to a more stable macroeconomic environment, while preserving fiscal sustainability. Even countries heavily dependent on oil revenue and with high spending needs could benefit from such a buffer to reduce the link between the budget and contemporaneous changes in oil prices. Spending decisions would be preferably based on a longer-term perspective. In this context, a sustainable level of the non-oil balance discussed in Section IV could serve as a useful anchor for fiscal policy, for example as a sustainability benchmark embedded in the medium-term fiscal framework.

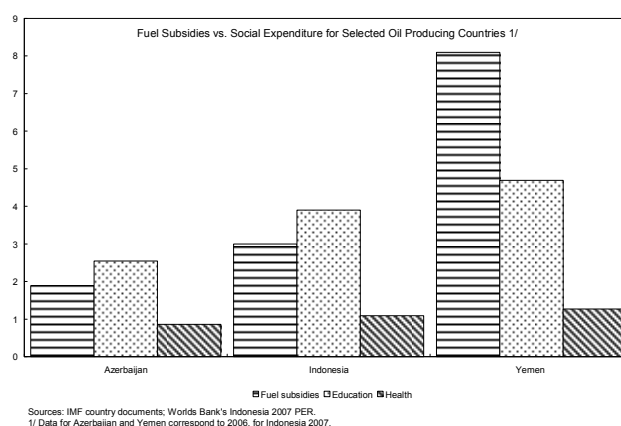
¹¹ See Box 3 in IMF (2005) for a more detailed discussion.

- **Safeguarding expenditure quality.** Spending decisions should be based on quality and cost-benefit analysis—particularly in periods of high prices and liquidity, when there may be pressures to reduce quality standards. Sound public financial management (PFM) systems are key for safeguarding productivity and efficiency of public expenditure. Likewise, during periods of declining oil prices, OPCs may face difficulty in accessing financial markets and asserting strict expenditure controls. Under these circumstances, effective cash management becomes critical. In addition, having in place effective project selection, implementation, monitoring, and evaluation procedures is fundamental for ensuring that the government is getting value for its money.
- **Improving budget flexibility.** An appropriate expenditure policy response to oil revenue volatility can be enhanced by complementary non-oil revenue policy. It may be worthwhile, for example, to maintain non-oil taxation as an effective fiscal policy tool even when there is little need for non-oil revenue to finance the budget. For example, fiscal consolidation can often be effected faster through changes in revenue policy, rather than expenditure policy.
- **Broadening fiscal coverage and reducing quasi-fiscal activity.** In countries where a sizable portion of oil revenue is spent by state oil companies, or where such companies carry out significant quasi-fiscal activities, a broad coverage of fiscal institutions and statistics for macroeconomic purposes is desirable. Best practice is to cover all public sector operations that may have a measurable impact on the macro-fiscal stance. Public enterprises that pose significant fiscal risks should be closely monitored and their operating balances should be included in fiscal targets and indicators. A recent survey of OPCs in the Middle East and Central Asia region highlights a need for improving their fiscal coverage, especially in the area of public enterprises (Figure 6, reproduced from Zakharova, 2008). Better coverage and monitoring of the extended public sector could also help curtail quasi-fiscal activity and better coordinate macro-fiscal policy across various subsectors of the public sector.
- **Improving fiscal institutions.** Recent empirical literature finds that countries with good institutions, particularly strong governance, are less affected by the resource curse (Collier, 2007). Some OPCs have opted to set up special fiscal institutions (e.g., oil funds, fiscal rules, fiscal responsibility laws) to manage oil revenue and the associated macro-fiscal risks. However, these institutions have had mixed results in tackling macro-fiscal challenges faced by OPCs (see Appendix II for further discussion of these institutions). Strong PFM systems and sound overall macro-fiscal policies appear to be more determinant in ensuring an effective use of oil resources.
- **Coordinating fiscal and monetary policies.** Managing oil revenue impacts on the non-oil economy requires a strong coordination between fiscal and monetary policy. For example, a tightening of monetary policy to reign in inflation could result in a private sector credit squeeze and further exchange rate appreciation, undermining the non-oil private sector growth and possibly having negative knock-on effects on the stock

Box 4. Petroleum Product Subsidies in OPCs

Some OPCs choose to subsidize domestic consumption of petroleum products by setting domestic retail prices below international levels. In some cases, these subsidies are explicitly recorded in the budget (Indonesia, Iran, and Yemen); in other countries they are financed by a draw-down of domestic oil revenues or profits of state-owned oil companies (Algeria, Azerbaijan, Bolivia, and Nigeria).

With a lack of adjustment in retail prices of fuels and the dramatic increase in world oil prices over the past few years, the cost of these subsidies has increased considerably. For example, in 2006 implicit energy subsidies in Algeria were comparable in size to the overall budget surplus; in Iran they were more than double the size of capital outlays; and in Yemen explicit fuel subsidies were higher than the central government budget allocations for health and education in 2007. Baig et al (2007) estimate an average pass-through from international to domestic gasoline prices in net oil exporters for the period 2003–06 of only 46 percent.¹



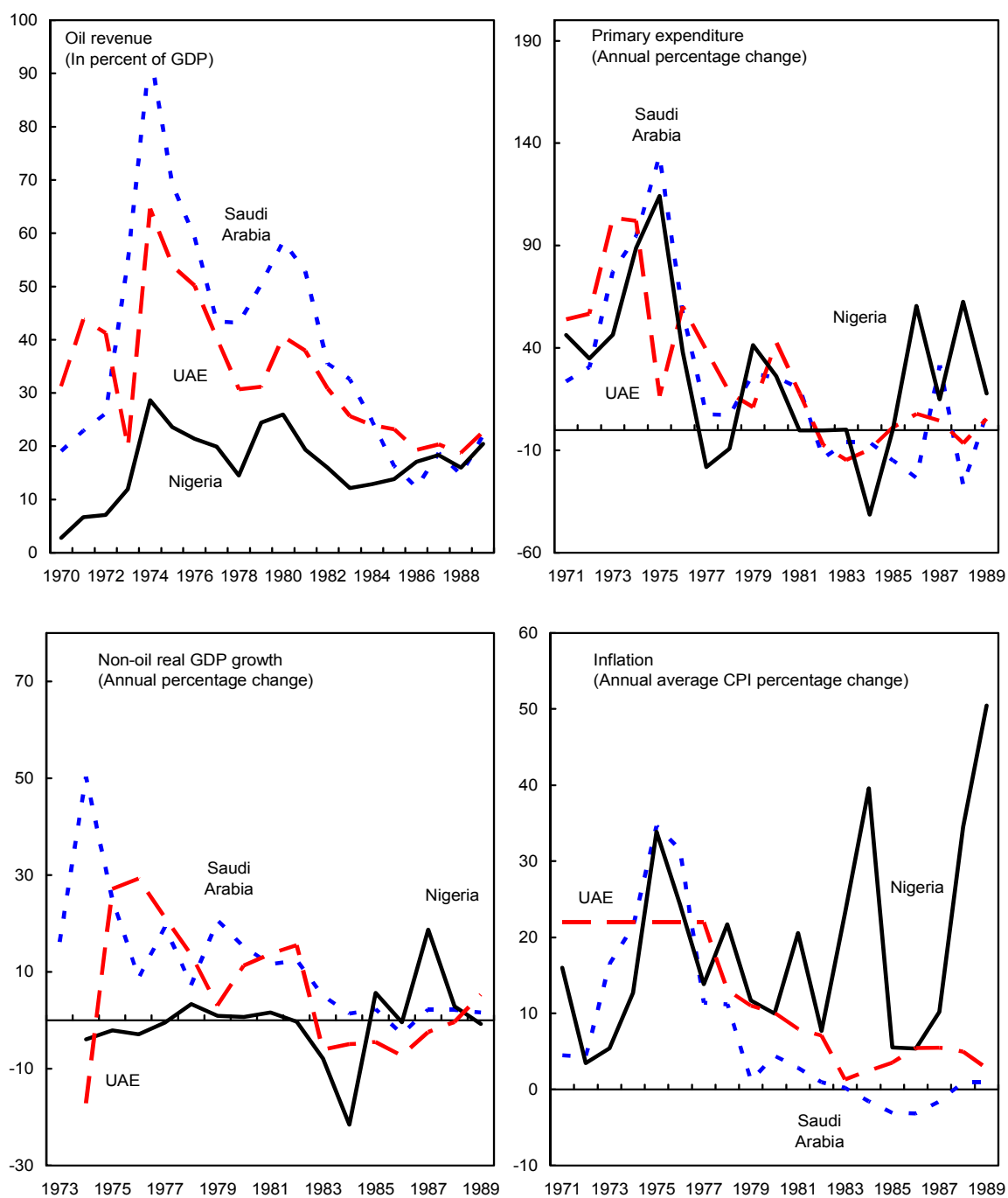
In an environment of high oil prices, OPCs have little incentive to reduce fuel subsidies, despite their increasing magnitude. Yet, in some cases, these subsidies may threaten fiscal sustainability, especially because they would be difficult to finance once the country runs out of oil (Yemen). This may lead to a difficult period of adjustment to higher prices. Even when fiscal sustainability is not an immediate concern, a number of arguments can be put forward for their reduction.

- Energy subsidies undermine an efficient allocation of resources by favoring energy-intensive sectors. These sectors tend to have low labor intensity and therefore are unlikely to generate much additional employment. Also, energy intensive goods and services may be difficult to export.
- Since most petroleum products, with a notable exception of kerosene, are disproportionately consumed by high-income households, energy subsidies are poorly targeted and tend to benefit the better off (Coady, 2006).
- Maintaining domestic fuel prices below regional levels may lead to subsidizing fuel consumption in neighboring countries through smuggling (Bolivia, Iran, Yemen).
- Subsidies are costly to the budget and may prevent other, potentially higher priority spending. The cost of open-ended subsidies is difficult to predict and budget for.
- Energy subsidies and the resulting elevated consumption levels may exacerbate environmental problems.

A government's social objectives can be more effectively achieved through alternative instruments than fuel subsidies. In countries where sufficient capacity exists to target the poor, a means-tested social safety net could deliver a much better targeted and a more efficient mechanism to reach the poor. In other countries, selected subsidies for products that are largely consumed by the poor (such as LPG for cooking or unprocessed rice) could be an effective interim solution.

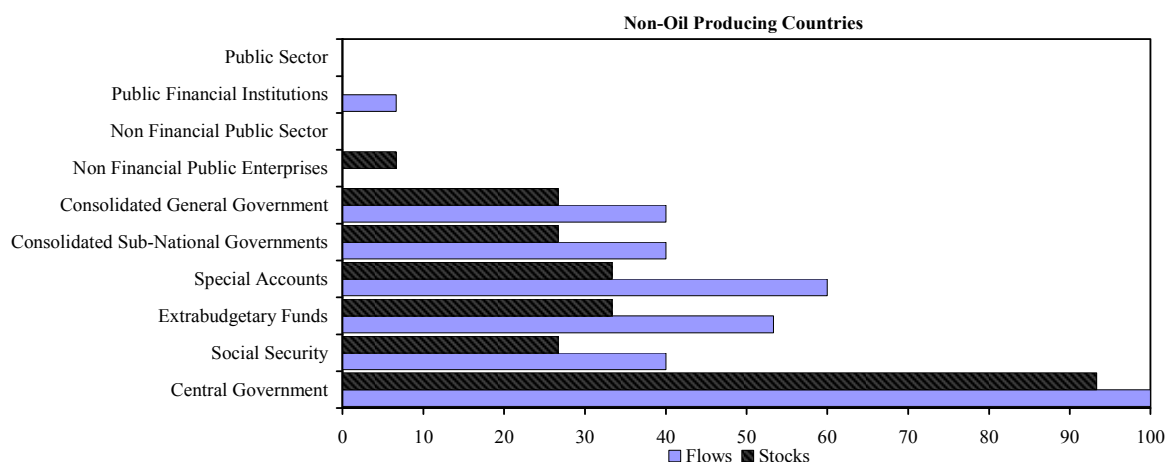
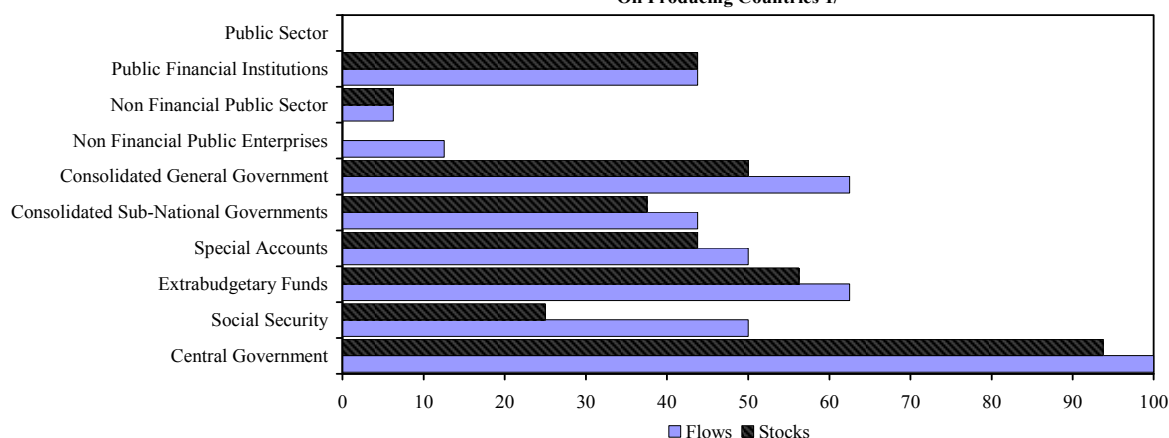
¹ The pass-through is defined as the ratio of absolute changes since December 2003 in the retail price of gasoline and the local currency price of imported gasoline.

Figure 5. Nigeria, Saudi Arabia, and UAE: Selected Economic Indicators, 1970-1989



Sources: IMF country documents; IMF, International Financial Statistics.

Figure 6. Coverage of Fiscal Statistics in Oil and Non-Oil Producing Countries of the Middle East and Central Asia
(In percent of relative country groupings)
Oil Producing Countries 1/



Source: Information provided by IMF country desks.

1/ Middle East and Central Asian oil producing countries are: Algeria, Azerbaijan, Bahrain, Iran, Iraq, Kazakhstan, Kuwait, Libya, Qatar, Saudi Arabia, Sudan, Syria, Turkmenistan, United Arab Emirates, and Yemen.

market. Partial sterilization of foreign exchange inflows through external debt reduction, investment of oil revenue abroad, or redirection of government purchases towards imports could help alleviate the upward pressure on domestic demand and the exchange rate. However, such policies may be politically difficult to implement in developing countries where pressures are high to spend to alleviate poverty and improve the investment climate. High spending needs in these countries would need to be carefully weighed against absorption capacity and the strength of institutions to ensure macroeconomic stability and fiscal sustainability and to safeguard expenditure quality.

For countries with strong net wealth positions, well-functioning fiscal institutions, and supportive monetary stances, running higher non-oil deficits may be an appropriate response to higher oil revenues.

IV. LONG-TERM SUSTAINABILITY AND UNCERTAINTY

Assessing the sustainability of macro-fiscal policy in OPCs is both crucial and highly complex, given the long-term consequences of current policies and the high degree of uncertainty, particularly relating to the economic value of oil reserves. As discussed above, traditional debt sustainability analysis is not likely to be an adequate tool for assessing fiscal sustainability in OPCs. This section discusses key factors that should be considered when assessing whether present policies are sustainable in OPCs, including the challenges posed by the high degree of uncertainty when using long-term projections and the policy implications. In particular, it discusses the benefits and limitations of the increasingly-used permanent income models to assess fiscal sustainability.

A central policy consideration is how conservative should countries be when managing oil wealth, given the uncertainty and long-term considerations. Broadly, the possible approaches to long-term management of the oil wealth fall into three main groups:

- Under the “bird-in-hand” rule, countries would save all oil revenue as financial assets, with only the yield from the accumulated financial assets spent. This is usually seen as the most conservative approach. This rule tends to be restrictive, particularly in the first years, and is better suited for countries where there is a strong preference for transferring a substantial share of the oil wealth to future generations (e.g., due to aging of the population) or where there are substantial sustainability concerns.¹² Norway follows a similar approach.
- Countries may target a level of spending guided by the return on overall net government wealth—net financial assets plus oil wealth. Under this approach, governments *consume* a constant share (according to some criteria) of the net government wealth every year.¹³ In this case, a country with net government wealth substantially higher than its present financial assets could potentially *afford* a higher non-oil deficit than based on a “bird-in-hand” approach. When governments have large social and infrastructure needs and sound institutions, spending more of the net wealth than the return on financial wealth

¹² The “bird-in-hand” rule also substantially reduces the impact of oil price movements in the annual budgets. The non-oil deficit is linked to the size of returns from the accumulated financial assets. However, the rule can inject another kind of volatility to the budget, as the returns on the assets could have a high degree of volatility (depending on the investment strategy and size of the assets).

¹³ This is explored below when discussing the permanent oil income model.

would likely be more appropriate and politically feasible. The level of spending would also need to be consistent with maintaining macro-stability.

- Under another alternative, countries would not be constrained and would spend all current period oil revenue. However, this approach would pose significant risks and lead to highly volatile spending—the budget would become heavily dependent on annual variations in the oil revenue. Contrary to the previous approaches, this one ignores the size of net government wealth, which is a key indicator to assess the long-term sustainability of the policies. This approach is more likely to be followed by liquidity-constrained governments with no (or very limited) access to financing sources or when oil reserves and revenue are relatively small.

A. The Permanent Oil Income Model

An increasingly used approach to assessing fiscal sustainability in OPCs is based on the permanent oil income model (POIM). Under this approach, the key premise is that government net wealth—oil wealth plus net financial assets—is *spent* at a gradual pace that ensures a constant share for each generation according to some social welfare criteria.¹⁴ The POIM can be used to construct a sustainability benchmark to guide fiscal policy over the medium term.¹⁵ This in turn can be translated into a *sustainable path* for the non-oil primary deficit, which can be used to assess how present policies compare with the benchmark and to consider alternative policy scenarios that are consistent with fiscal sustainability. For example, as Figure 7 shows, the POIM would tend to allow for larger non-oil deficits in the short-to-medium term than the one based on the “bird-in-hand” rule, but lower non-oil deficits in the longer term—and a higher fiscal adjustment as oil wealth is depleted.

The design of a sustainability benchmark based on the POIM needs to take into account the specific circumstances of the country. The benchmark can be used in the formulation of a medium-term fiscal framework; however, the design of a sustainable benchmark in OPCs will be dependent on the social welfare criteria used, which in turn depend on the country’s preferences and circumstances. In practice, some of the main welfare criteria that have been presented for the distribution (spending) of government net wealth across generations are:

- Constant distribution as a share of non-oil GDP—that is, the rate at which the government’s net wealth is spent is equal to the (financial) rate of return on the wealth

¹⁴ The concept of spending wealth includes not only actual government spending but also the reduction of (non-oil) taxes.

¹⁵ The POIM approach is based on the permanent income hypothesis developed by Friedman (1957). The main idea is that $G = rW$, where G represents government consumption, r is a rate of return on financial assets (which could be adjusted for factors such as GDP and population growth), and W is the present value of (net) oil wealth. There are different specifications taking into account different social welfare criteria and other considerations as discussed in the text.

adjusted for non-oil GDP growth. This criterion implies a stable non-oil deficit on average over time.¹⁶ However, it also implies that wealthier future generations (assuming non-oil GDP grows over time) will receive a larger share of the oil wealth in real terms.

- Constant distribution in real terms. In this case the objective is to maintain the purchasing power of the wealth distributed every year, with the government using a constant amount in real terms (adjusted by a deflator). This will imply a declining annuity over the years as a share of non-oil GDP, as long as non-oil real GDP is growing. Other alternatives involve variations on the previous two criteria but taking into account population growth.

While any of the welfare criteria can be justified on different grounds (including initial conditions), they can also lead to very different conclusions regarding sustainability. As such, some judgment is needed to adjust the analysis to the specific country circumstances.¹⁷ For example, the criterion based on the level of non-oil GDP tends to be more restrictive for the initial years of oil exploration and implies that future generations would benefit more from the oil wealth than under the criteria based on a constant real share. Box 5 discusses how the model can be adjusted by presenting country examples.

Countries may deviate for some time from the sustainability benchmark, for example due to unexpected shocks. A fiscal framework based on the benchmark would facilitate the evaluation of risks and alternatives for returning to the sustainable path with a view to avoiding a sharp and painful adjustment. The speed of adjustment would depend on the circumstances of each country (e.g., macro-fiscal situation, level of reserves, and adjustment costs).¹⁸ In addition, the use of the sustainability benchmark based on the POIM involves additional critical assumptions regarding how the use of oil wealth will impact the non-oil economy—which would then affect the underlying fiscal stance. For example, transferal of oil wealth into infrastructure and human capital would lead to higher non-oil growth (and a higher sustainable non-oil primary deficit). Finally, the sustainable path can also change over time, as countries face exogenous shocks, such as discovery of new oil reserves. As such, the level of the non-oil deficit should be reassessed periodically. For example, a new oil discovery or a positive shock to all prices, whether temporary or permanent, would increase net government wealth, allowing for a higher sustainable NOPB level and shifting the entire NOPB path up and out.¹⁹

¹⁶ In practice, the model uses a long-term average for long-term growth, which could imply that over some periods the non-oil deficit could be below/above the sustainable benchmark.

¹⁷ These criteria do not necessarily give an “optimal” use of oil wealth, but can provide a framework for assessing the sustainability of present policies based on alternative social criteria. They can also help identify and clarify country preferences.

¹⁸ For an example see Carcillo, Leigh, and Villafuerte (2007).

¹⁹ This is demonstrated, for example, in the appendix figures for Yemen, Azerbaijan, and Norway, which show sustainable paths for each country at two different long-term price assumptions.

Box 5. Application of POIM to OPCs

While the POIM and the non-oil deficit, as a key indicator, are useful in assessing sustainability, they should take into account country circumstances and preferences. Otherwise, mechanical use of the POIM may result in an unrealistic sustainability benchmark. Here we discuss the application of the POIM to three countries: Yemen, Azerbaijan, and Norway.

In Yemen, the sustainability benchmark indicates a high degree of vulnerability, independently of the social welfare criteria, and a need for a large fiscal adjustment in the next few years absent new oil discoveries. In spite of the relatively low overall deficit in recent years (an average of 1 percent of GDP in 2004–06), the large non-oil deficit and limited government new wealth indicate an unsustainable fiscal position (Appendix Figure A.1). The benchmark estimates indicate the non-oil primary deficit should be adjusted to well below its present level (around 40 percent of non-oil GDP in recent years), given the projected depletion of oil reserves over the next decade. Even under an alternative scenario of relatively high prices (constant real prices at the IMF WEO oil price in 2008), Yemen would need to undergo a significant adjustment over time.

The focus needs to be on developing a fiscal adjustment path over the medium term that ensures macro-stability and is consistent with financing constraints, while taking into account adjustment costs (for example, see Carcillo, Leigh, and Villafuerte (2007) for the Republic of Congo). The design of the fiscal adjustment will necessarily have to take into account the specific challenges faced by Yemen, including promoting accelerated and sustained non-oil growth and addressing the large fuel subsidy and wage bills.

Azerbaijan has experienced a revenue boom due to rising oil prices and a large (temporary) increase in oil production. Azerbaijan has been undertaking very large expenditure increases in recent years, with the non-oil deficit increasing substantially. The assessment of fiscal sustainability is very sensitive to the different welfare criteria (Appendix Figure A.2) and, to a lesser degree, the assumption on oil prices. The benchmark based on spending a constant share in terms of non-oil GDP, indicates that present policies (primary non-oil deficit around 30 percent of non-oil GDP) are unsustainable. On the other hand, the benchmark using real consumption of the net government wealth would allow for a much larger non-oil deficit in the medium term. However, this criterion would also imply a massive and unrealistic adjustment in the non-oil deficit over time.

While the present fiscal policy in Azerbaijan may be considered sustainable under some scenarios, it raises serious concerns, particularly relating to macroeconomic stability and quality of spending. Sustaining the present levels of the non-oil deficit over the medium term, while feasible, would require a significant adjustment in the future to avoid unsustainable debt dynamics in the long term (Appendix Figure A.2). While such a strategy may be justified (e.g., raising spending to address large social/infrastructure needs), it also involves significant risks. A massive increase in spending can also jeopardize macroeconomic stability (e.g., high inflation, and boom and bust cycles), undermine the private non-oil sector, and constrain the authorities' ability to manage the high volatility/uncertainty that OPCs tend to face. In addition, capacity constraints are likely to limit the effectiveness of the large expenditure increases.

In Norway, a key concern is the use of oil reserves to cover future non-oil deficits not only due to the depletion of oil reserves but also pension liabilities. The authorities' fiscal policy is based on a fiscal guideline—over the cycle the non-oil deficit should average 4 percent of the financial wealth accumulated in the oil fund (approximately equal to the average real rate of return on financial investments). This rule implies limited use of oil wealth in the short term, but increasing over time. In this case, the usual sustainability benchmarks indicate that the present fiscal stance is broadly sustainable, while implying some gradual decline in the non-oil deficit in the long term (Appendix Figure A.3). However, Jafarov and Leigh (2007) argue that when future pension liabilities are accounted for, the present fiscal rule would not be sustainable without further fiscal adjustment (or a pension reform). The Norwegian fiscal guideline is also particular as it isolates the annual budget from oil price volatility, but it makes it sensitive to variations in the value of the financial wealth accumulated in the oil fund, for example due to changes in the stock market.

One issue that frequently arises in deciding how to distribute oil wealth across generations is equitability. As future generations will likely have higher non-oil incomes, should the oil wealth be used upfront (with the poorer generations)? While the decision depends on country preferences, the framework needs to be sustainable over time. For example, if the answer is yes (spend more early on), then the fiscal framework would implicitly or explicitly need to assume a fiscal adjustment in the non-oil balance over time—either rising non-oil taxes and/or declining expenditures as share of non-oil GDP over time. This is partially reflected in the POIM based on constant spending in real terms (Figure 7).²⁰

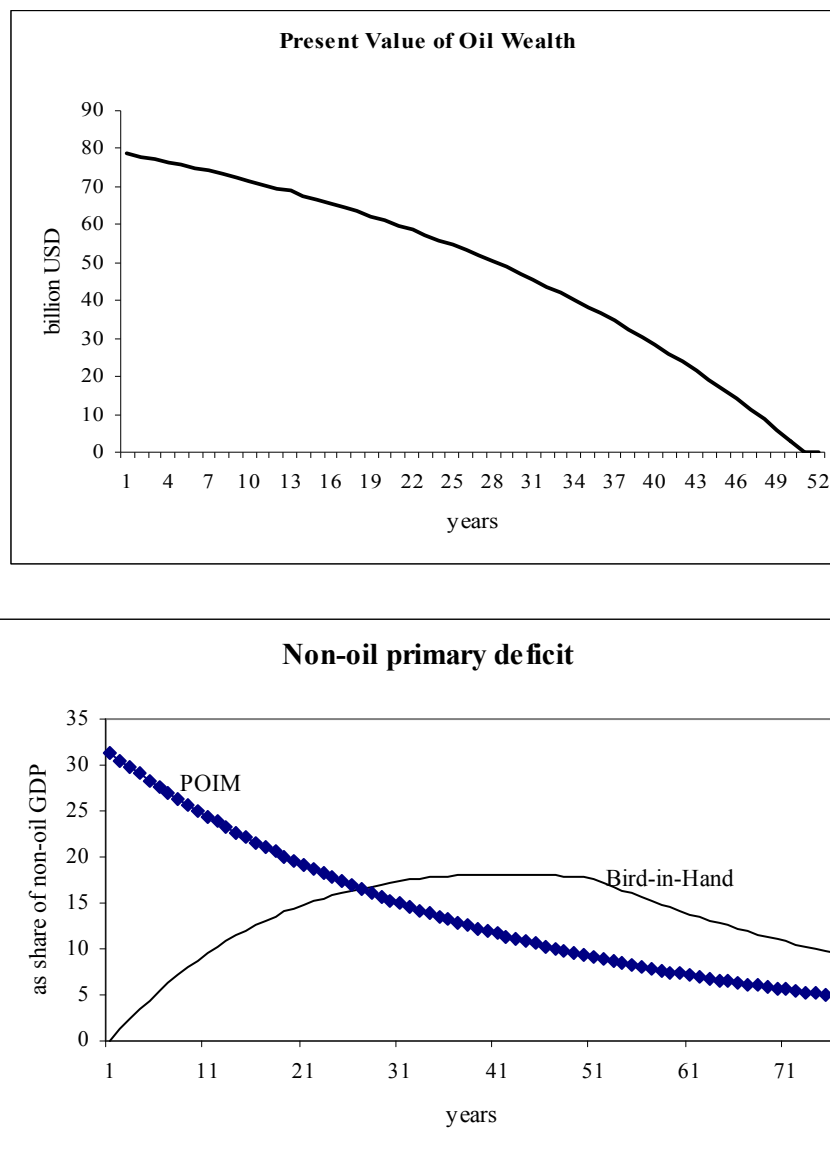
Another issue usually raised is how to take into account returns on productive spending. For example, public investment should contribute to increasing the stock of (physical and human) capital and potentially contribute to future higher non-oil growth. As discussed above, this could justify having higher non-oil deficits in the short term. However, such analysis depends on estimating the impact of public investment on growth, which will depend on many factors (e.g., the quality of capital investment and the degree that it crowds out private investment).²¹ In addition, the extra economic growth will only partially be translated into higher non-oil tax revenue, depending on the fiscal regime. This will require accounting for the specific country characteristics.

Several approaches can be considered to address these issues. One approach is to gradually adjust the sustainable non-oil deficit benchmark as the impact of investment on non-oil growth becomes clearer. This is a relatively conservative solution. Another approach is advocated by Van der Ploeg and Venables (2008) for highly-indebted countries facing a temporary oil windfall. This approach argues for both increasing current consumption to raise incomes of the relatively poor current generation and accumulating capital to accelerate future economic development, while reducing debt. The higher level of investment financed by the oil wealth builds up domestic capital stock and increases future economic growth. In this second approach, incremental consumption from the oil wealth is initially lower than the one dictated by the POIM as some of the resources are used to increase government investment and repay debt. Higher investment boosts growth allowing the incremental consumption to increase above the POIM level in subsequent years. Over the longer term, as country runs out of oil reserves, the

²⁰ However this analysis is complicated by several considerations. When considering intergenerational transfers, it is important to differentiate oil from non-oil. It is less common to observe large transfers among generations in non-oil countries. This is more likely to happen with oil wealth, partially because this is seen as a resource of the country and not a product of the effort of any given generation. In addition, such intergenerational considerations also involve assessing what is the appropriate size of the government in the economy over time. In this regard, it is not straightforward, when designing the rules on sharing oil wealth, how to account for the potential (non-oil) income levels of future generations.

²¹ At any rate, any such estimates should be interpreted with care. A recent survey of empirical literature finds that the evidence on the impact of higher infrastructure on long-term economic growth is inconclusive (see Appendix I in IMF 2004).

Figure 7. An Example of a Permanent Oil Income Model Versus Bird-in-Hand 1/



1/ Simulation based on depletion of oil reserves over 50 years. The POIM is based on a sustainable level for the non-oil primary deficit in constant U.S. dollars.

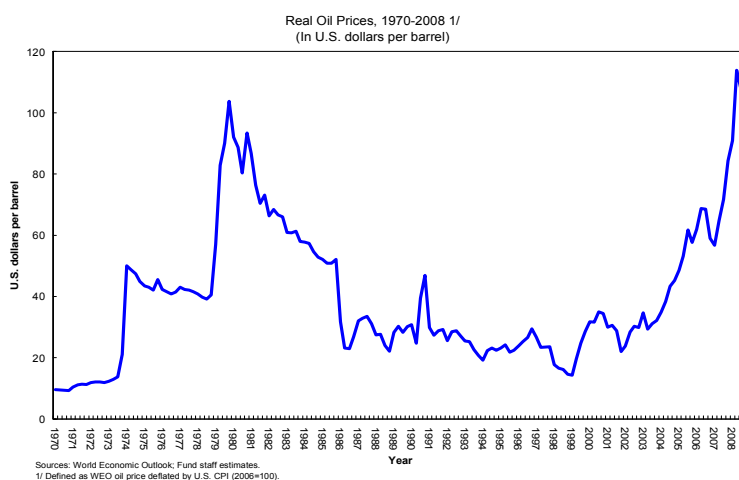
incremental consumption drops below the POIM-mandated consumption, but higher capital stock accumulated during the oil-windfall years, allows the country to sustain an adequate level of *total* consumption going forward.

The sustainability analysis should also take into consideration, when relevant, other long-term risks and the high degree of uncertainty that OPCs face. For example, for countries where large pension liabilities are expected in the future, it may be prudent to save a greater share of net wealth (this is an argument used in Norway). Another key element in assessing the fiscal stance

and the long-term sustainability prospects is the high degree of uncertainty that OPCs face. For example, while the POIM could indicate the country has space to borrow today (e.g., due to a large discovery of oil reserves), the uncertainty regarding the economic value of the oil in the future could make it prudent to delay some spending/borrowing at present, until there is more certainty (and improved capacity to spend). This would be particularly relevant for countries that start with high debt levels and financing costs. The issues raised by uncertainty are discussed in the next section.

B. Addressing Uncertainty

As mentioned above, fiscal authorities in OPCs face substantial uncertainty when designing fiscal policy and assessing the fiscal position over the medium term. This derives from several factors (e.g., the size of economically viable reserves and the likely production path), but in particular from the oil price. The high degree of uncertainty regarding the statistical properties of the oil



price significantly complicates fiscal management over the medium term. In addition to short-term volatility, it is difficult to assess whether an oil price shock is mostly permanent or temporary—a critical issue when deciding on the appropriate policy response.²²

There are some approaches that can be used to help fiscal management under a high degree of uncertainty. The key objective is to reduce the need for sudden, large, and costly fiscal adjustments, including following the build-up of debt.²³ The evidence shows that most countries tend to have high correlation between spending and contemporaneous oil revenue (Ossowski et al, 2007), suggesting that the risks of disruptions from large movements in the oil prices are significant. A medium-term fiscal framework (MTFF) could help develop strategies to deal with the volatility and uncertainty in oil prices. An MTFF, linked to a strategy for long-term

²² There is some evidence that (real) oil prices converge to a mean, but only over a long period of time. Other studies find evidence of strong persistence in oil price shocks. Barnett and Vivanco (2003) argued that most oil price movements are transitory, that is, oil price is mean reverting. However, they also acknowledge some shocks are permanent.

²³ The adjustment could also involve other tools, such as the exchange rate or monetary policy. The objective, however, remains the same: avoid policies that will require a costly adjustment for the domestic economy.

sustainability and with risk analysis (Box 6), would help assess risks and identify longer-term implications of present policies.

Countries can also build financial buffers during periods of rising oil prices (e.g., by building financial assets or repaying debt). These buffers can be used to shield the budget from transitory shocks from oil prices or other factors (e.g., disruption in oil production). Such a strategy is prudent even if the shock has some permanent component, as it provides the possibility of a more gradual adjustment during periods of negative shocks. A well designed MTFF would include risk analysis to help define the appropriate size of the buffer and consistent policies.

There are several approaches to risk analysis and assessing an appropriate level for the financial buffer.

- One possibility, would involve scenarios and traditional stress test analysis, similar to debt sustainability analysis (DSA) carried out by the IMF. The main advantages of these tests are that they have limited data requirements and are relatively simple. They can provide a measure of potential financing needs (or fiscal adjustment) in case of a negative oil price shock.
- Other tools include Value-at-Risk analysis and fan charts, which can be useful to more explicitly assess the probabilities associated with a range of possible shocks and expected policy responses.²⁴ These tools can also help identify the size of the financial buffer (or reduction in public debt) depending on the degree and type of risks and specific country circumstances. However, they also tend to be more demanding on data.
- While most of the tools mentioned assume that the key variables (e.g., oil price) vary around a mean, mostly within a limited range, it would also be useful to have a strategy to manage very large shocks.²⁵ For example, if oil prices rise well beyond the historical mean, it would be prudent to save some (or most) of the additional revenue beyond the “normal” financial buffer, until there is greater clarity to the nature and size of the shock. This will shield the country from sudden and large reversions in the oil price.²⁶

²⁴ Fan charts have an advantage over the traditional (deterministic) stress tests, as they take into account co-movements of key variables and estimate policy reaction functions based on past data. See Rother (2008) for an example of applying the Value-at-Risk approach to Ecuador.

²⁵ The tools mentioned to compute the financial buffer are mainly useful when assessing variations around a steady state. As such, they may be of limited help in periods of large fluctuations and possible structural breaks in the data—as past correlations between macro-variables and estimated policy reaction functions may no longer be a strong guide.

²⁶ As we have seen in past decades and in more recent episodes, large and sudden rises in oil prices can be followed by also large drops.

Box 6. The Role of MTFFs in Managing Oil Revenue Uncertainty

The need for longer perspective and fiscal risk management in OPCs underscores the importance of MTFFs.²⁷ The focus on annual budgets combined with oil revenue volatility has resulted in a boom-bust expenditure pattern in many OPCs, contributing to increased macroeconomic volatility. Moreover, annual budget plans are not adequate for fiscal management, since they do not provide a clear link to longer-term policies and plans, including the sustainability of current spending decisions and their recurrent costs.

An MTFF can help to link the annual budget to sustainability objectives and to improve risk analysis in OPCs by:

- developing explicit strategies for managing external shocks (particularly oil price and exchange rate shocks) to facilitate a less disruptive adjustment process;
- adequately planning for contingency reserves to smooth spending over the medium term in the face of shocks, including by conducting stress tests;
- ensuring that future generations benefit from the use of a nonrenewable resource by encouraging multi-year planning and focusing on delivering a stable and consistent level of public services.

Anchoring fiscal policies in more conservative long-term sustainability benchmarks can also be an effective strategy to manage uncertainty. OPCs facing vulnerable fiscal positions could adopt more conservative sustainability benchmarks to help manage uncertainty and reduce the probability of the need for large fiscal adjustments. For example, a country with no financial buffers and limited access to financial markets—particularly in periods of declining oil prices—may benefit from adopting initially a more conservative benchmark (e.g., based on the bird-in-hand rule), even though it could afford a looser fiscal policy if there was less uncertainty. Countries that maintain large financial reserves could gradually increase the non-oil deficit consistent with macrostability and sustainability considerations. In all of these cases, it would be important to be transparent and explicit about the tradeoffs and assumptions being made (i.e., in annual budgets, MTFFs discussions, and in other fiscal policy statements). A transparent disclosure and discussion of the policy choices and tradeoffs facing the country could also help to garner political support for a longer-term approach to oil wealth management, including by reducing pressures for hiking government spending during times of high oil prices.

V. CONCLUSION

This paper proposes an integrated approach to fiscal policy analysis in OPCs geared toward addressing their unique and complex policy challenges. First, in order to accurately assess the fiscal stance in these countries, conventional fiscal indicators, such as the overall and primary

²⁷ For a discussion of the various forms of medium-term frameworks and their relative advantages depending on a country's administrative capacity see Box 3 in IMF (2007).

fiscal balances, should be complemented by non-oil indicators. Second, to reduce the macro-fiscal costs associated with revenue volatility, the evolution of government expenditure should be de-linked from the short-term developments in oil revenue, as much as possible. Expenditure quality should be safeguarded by strengthening PFM systems. Maintaining a non-oil revenue base can create greater budgetary flexibility to manage shocks, while expanding the coverage of fiscal indicators and targets and reducing quasi-fiscal activities can help to better identify and manage fiscal risks. Third, a long-term perspective for fiscal policy, including applying sustainability benchmarks, is important to develop sustainable and sound policies. And finally, medium-term fiscal frameworks and risk assessment can help understand the longer-term consequences of current policies and managing the uncertainty associated with oil revenue.

Appendix I: Approaches to Defining the Non-Oil Balance

Depending on the objectives of fiscal policy, different approaches may be considered for treating specific oil-related revenue and expenditure items in the non-oil balance.²⁸

- **Domestic oil revenue.** When assessing the short-term impact of fiscal policy on the macro-economy, a case can be made for including domestic oil revenue in the non-oil balance, since changes in this revenue, like a tax, affect the purchasing power of consumers and domestic demand. However, if the main concern is the sustainability of public expenditure in light of the exhaustibility of oil revenue then all oil revenue, including its domestic component, should be excluded from the definition of the non-oil balance. This is because domestic oil revenue may not be available to finance government expenditure if oil reserves decline substantially.
- **Fuel subsidies.** Fuel subsidies should be included in the non-oil balance on the grounds of fiscal sustainability, their impact on domestic demand, and their contribution to fiscal vulnerabilities and fiscal effort. The sustainability argument considers whether the government's policy of keeping domestic retail prices for petroleum products below their market level can be sustained if oil revenue runs out or drops sharply. Explicit fuel subsidies (involving a budget transfer) have a direct impact on domestic demand.²⁹ Moreover, an explicit subsidy needs to be financed and therefore affects the public sector's gross financing needs. Finally, it should be noted that the choice not to adjust retail prices in line with world oil prices is a discretionary policy action of the government and therefore should be included in a measure of fiscal effort.³⁰
- **Excises and other taxes on refined products.**³¹ Although these revenues are oil-related, they should be included in the definition of the non-oil balance. The main reason for treating these revenues as "non-oil" is because the government would continue collecting these consumption taxes, irrespective of whether the country is an oil producer or importer.

²⁸ Box 2 provides numerical examples of calculating the non-oil balances in Yemen and Nigeria.

²⁹ It can be argued that implicit subsidies could be excluded from the definition of a domestic non-oil balance as they are likely to have at most an indirect impact on the domestic demand. However, these subsidies would need to be included in the definition of a non-oil balance on the grounds of their impact on long-term fiscal sustainability. In either case, the developments in the size and the composition of these subsidies would need to be carefully monitored with a view to containing further deterioration in the quality of spending.

³⁰ This treatment is symmetric, in the sense that when oil prices decline and retail prices remain unchanged, non-oil balance declines and fiscal effort reflects the authorities' choice not to maintain the oil subsidy at a constant level by reducing retail prices in line with world oil prices.

³¹ These include VAT and customs duties on refined petroleum products.

- **Oil-related capital investments.** In countries where the non-oil balance is primarily used to assess the contribution of fiscal policy to short-term macroeconomic stabilization, it could be reasonable to include oil-related capital investment in the definition of the underlying deficit, when such investment has a high domestic component. This is because an increase in such investment can affect aggregate demand or inflation. However, if investment is largely imported or the main concern is sustainability of government spending, then all oil-related spending should be excluded from the definition of the non-oil balance. Domestic spending by state oil companies on non-oil activities, such as infrastructure projects and social spending not related to oil production, should be included in the measure of a non-oil balance both on the grounds of sustainability and its impact on the domestic demand.

Just like other fiscal indicators, non-oil indicators are likely to be more useful and informative if they are: (i) well defined regarding the budget and institutional coverage; (ii) easily monitorable; and (iii) simple and transparent, to serve as an effective instrument of communication of government policy objectives.

Appendix II: Special Fiscal Institutions³²

Some countries have set up special fiscal institutions, such as oil funds and fiscal rules and fiscal responsibility frameworks to help manage oil revenues. As discussed below, these institutions have had mixed results in improving the conduct of fiscal policy. Generally, special fiscal institutions have been most successful where they were subject to rigorous transparency and accountability requirements and when there was broad political support for the pursued fiscal objectives.

Oil funds and asset and liability management

Some countries have introduced oil funds to help macro-fiscal management and improve asset management. Oil funds are usually set up to accumulate assets to be used for stabilization purposes—to reduce the impact of revenue volatility on the budget and the economy—and long-term savings (e.g., for when oil reserves are depleted). In many cases, the creation of the fund has been accompanied by operational rules that aim to constrain fiscal policy, especially to contain spending. For example, in some countries, if oil prices are above a given level, all “excess” oil revenue is deposited in a fund. In other cases, oil funds are seen as a way to better manage accumulated financial assets, particularly when overall institutional capacity is weak.

The international experience, however, has shown that the ability of oil funds to effectively support sound fiscal management has been limited. In particular, the evidence shows that oil funds do not tend to be effective at imposing budget constraints, as countries may simply borrow or bypass the oil fund rules. In addition, oil funds can undermine the budget process and fiscal transparency if they allow for extrabudgetary spending. Rigid rules also complicate cash management and the overall asset-liability strategy. In some cases, rigid rules can exacerbate expenditure volatility.³³ In many cases countries have changed or eliminated the rules of the funds, when they were not consistent with financing needs or as their overall fiscal priorities changed.

Under some circumstances, well designed oil funds might help fiscal management and asset-liability management. Some of the key principles for designing oil funds include: (i) they should be well integrated with the budget to enhance both the coordination of fiscal policy—including asset and liability management—and the efficiency of public spending. Rigid operational rules should be avoided; (ii) funds should preferably not have the authority to spend; any spending should follow the same procedures and be subject to the same transparency requirements as budgetary spending; (iii) financing funds, where fund resources are used to finance the non-oil

³² This appendix draws on IMF 2007.

³³ For example, some countries have had to borrow, run arrears, or cut spending, to cover fiscal deficits even while accumulating assets in the fund. See IMF (2007) and Le Borgne and Medas (2007).

deficit as needed, are preferred; and (iv) transparency, good governance, and accountability provisions should be promoted to limit the misuse of resources.

Fiscal rules and fiscal responsibility frameworks

A number of OPCs have introduced fiscal rules aimed to reduce expenditure volatility and promote long-term savings and sustainability.³⁴ In some countries, these rules have taken the form of numerical targets applied to overall balances (Alberta, Mexico), non-oil balances (Ecuador, Norway), expenditure levels (Equatorial Guinea), expenditure growth (Ecuador, Venezuela), and the ratio of public debt to GDP (Alberta, Ecuador, Venezuela). In other countries, the emphasis has been on strengthening transparency, coverage, and accountability requirements in public financial management (Timor-Leste). Finally, some OPCs rely on setting a conservative budget oil price to control the spending of oil revenue, with the difference saved or used to repay debt.

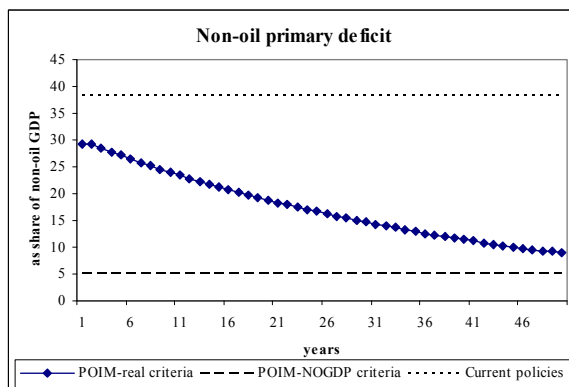
OPCs' experience with implementing fiscal rules has been mixed. The recent upsurge in oil revenue increased spending pressures in OPCs, with numerical fiscal rules often being revised to accommodate higher spending. This experience highlights the need for strong political consensus for fiscal rules to be effective. Similarly, experience has shown that basing the budget on artificially low oil prices is unlikely to deliver lower spending for long, as legislatures and pressure groups quickly adapt. Furthermore, this practice can undermine budget transparency and the quality of spending as oil revenues in excess of budget projections may be used to finance extrabudgetary spending which is often not subject to the same quality control and accountability standards as budgetary spending.

On the other hand, fiscal responsibility legislation (FRL) that is focused on improving budget procedures can strengthen transparency and accountability. Experience with FRL shows that such legislation can be an important factor in strengthening overall institutional quality and fiscal management. However, as pointed out in IMF 2007, political commitment to fiscal discipline and a willingness to adopt key structural reforms are key to the success of FRL.

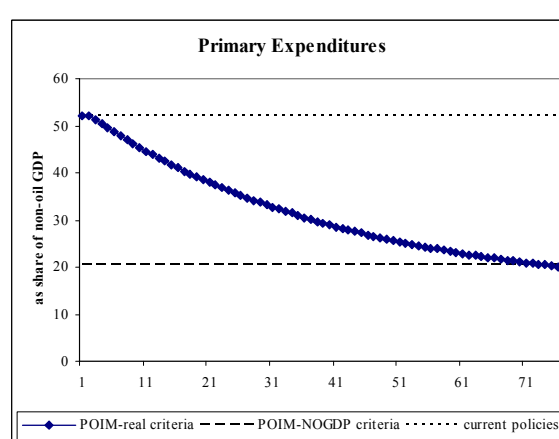
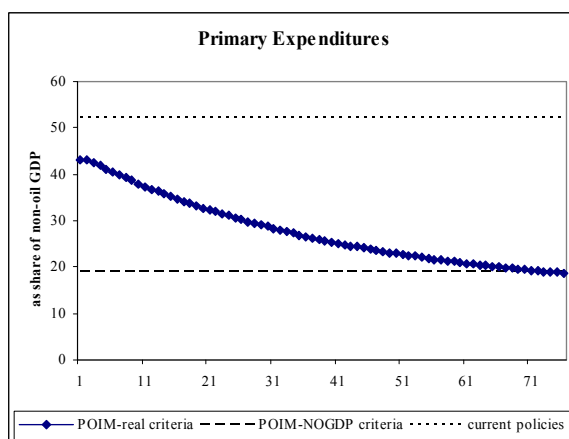
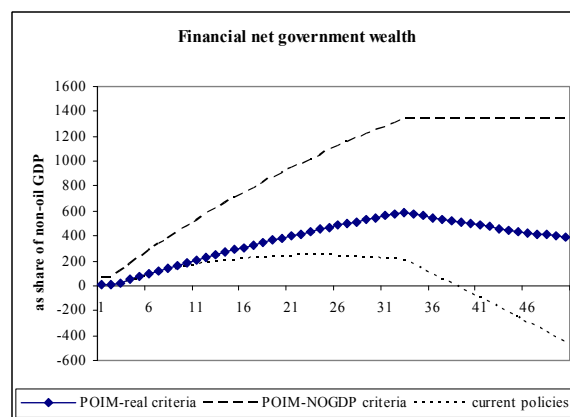
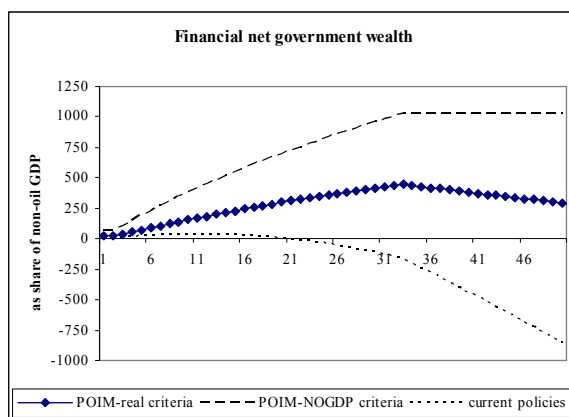
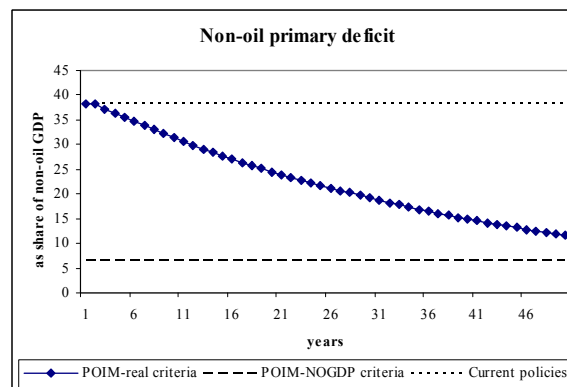
³⁴ IMF 2007 defines fiscal rules as institutional mechanisms that are intended to permanently shape fiscal policy design and implementation.

Appendix Figure A.1. Yemen: Scenarios for key fiscal indicators 1/

WEO oil price projections



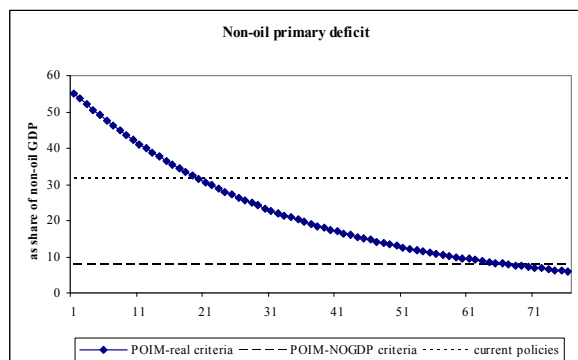
Constant 2008 WEO prices



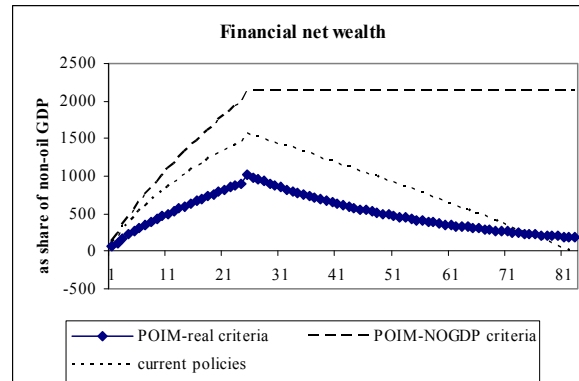
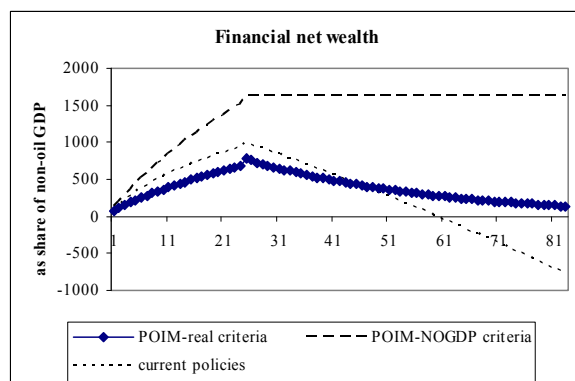
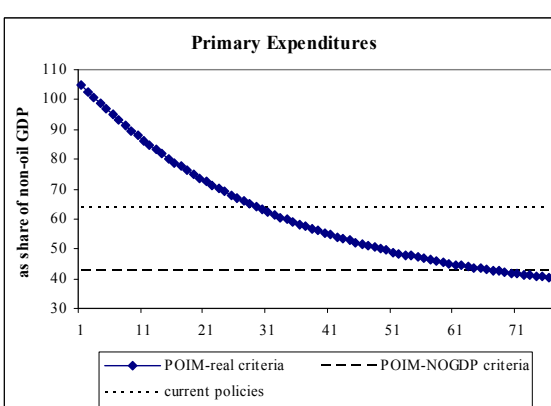
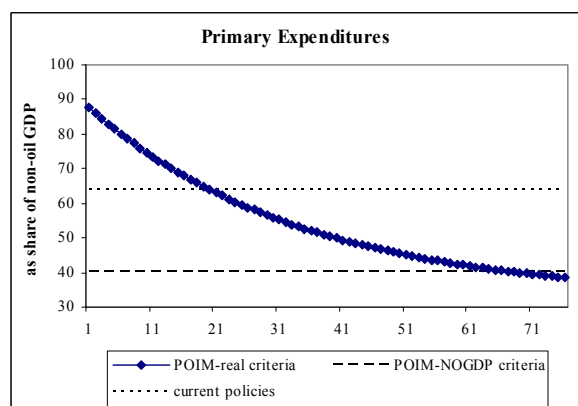
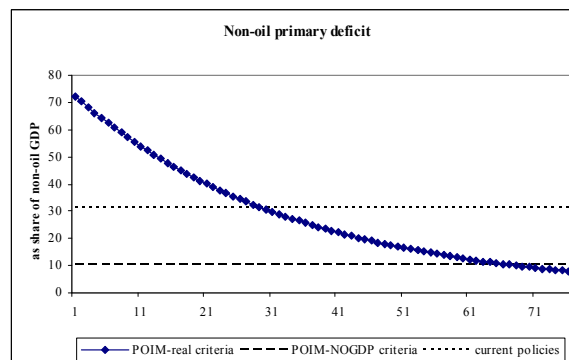
1/ These scenarios are based on November 2008 WEO oil price projections and depend on assumptions on the long-term growth rate and the real financial rate of return. As such they should be seen as indicative of broad long-term tendencies. The reference year is 2006. The 2008 WEO price used for the second scenario is US\$100.

Appendix Figure A.2. Azerbaijan: Scenarios for key fiscal indicators 1/

WEO oil price projections



Constant 2008 WEO prices

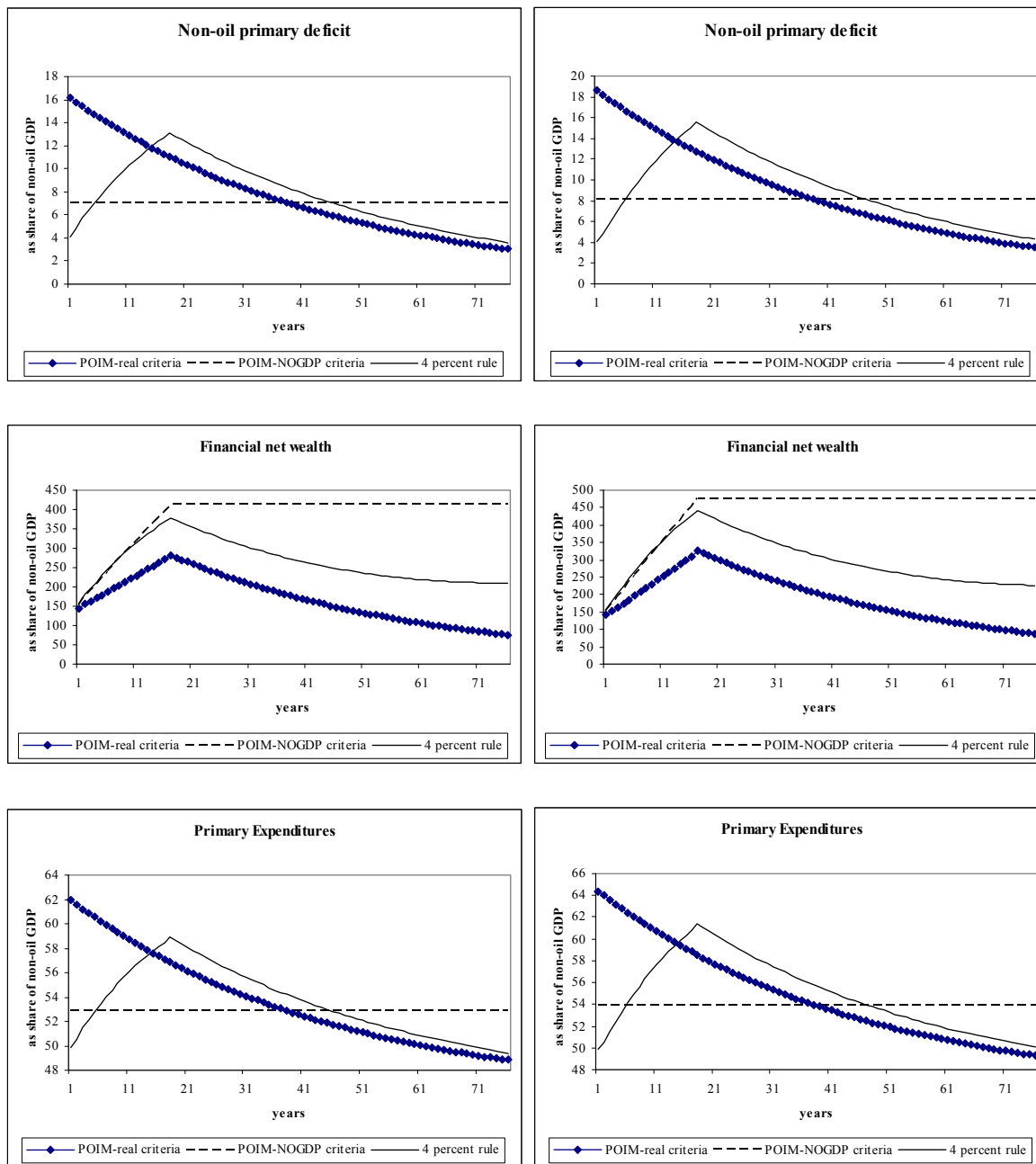


1/ These scenarios are based on November 2008 WEO oil price projections. The reference year is 2007. The 2008 WEO price used for the second scenario is US\$100.

Appendix Figure A.3. Norway: Scenarios for key fiscal indicators 1/

WEO oil price projections

Constant 2008 WEO prices



1/ These scenarios are based on November 2008 WEO oil price projections. The reference year is 2006. The 2008 WEO price used for the second scenario is US\$100.

References

- Aizemann, Josua, and Nancy P. Marion, 1993, "Policy Uncertainty, Persistence, and Growth," *Review of International Economics*, Vol. 1 (June), pp. 145-63
- Auty, Richard M., and Alan H. Gelb, 2001, "Political Economy of Resource-Abundant States," in *Resource Abundance and Economic Development*, ed. by Auty, study prepared for the World Institute for Development Economics Research of the United Nations University (New York: Oxford University Press).
- Baig, Taimur, Amine Mati, David Coady, and Joseph Ntamatungiro, 2007, "Domestic Petroleum Product Prices and Subsidies: Recent Developments and Reform Strategies," IMF Working Paper 07/71, (Washington: International Monetary Fund).
- Barnett, Steven, and Rolando Ossowski, 2002, "Operational Aspects of Fiscal Policy in Oil-Producing Countries," IMF Working Paper 02/177, (Washington: International Monetary Fund).
- Barnett, Steven, and Alvaro Vivanco, 2003, "Statistical Properties of Oil Prices: Implications for Calculating Government Wealth," in *Fiscal Policy and Implementation in Oil-Producing Countries*, ed. By J. M. Davies, R. Ossowski, and A. Fedelino (Washington: International Monetary Fund).
- Bjerkholt, Olav, 2002, "Fiscal Rule Suggestions for Economies with Non-Renewable Resources," paper prepared for the conference "Rules-Based Fiscal Policy in Emerging Market Economies," Oaxaca, Mexico, February
- Carcillo, Stephane, Leigh, Daniel, and Mauricio Villafuerte, 2007, "Catch-Up Growth, Habits, Oil Depletion, and Fiscal Policy: Lessons from the Republic of Congo," IMF Working Paper 07/80, (Washington: International Monetary Fund).
- Coady, David, 2006, "The Distributional Impacts of Indirect Tax and Public Pricing Reforms: A Review of Methods and Empirical Evidence," forthcoming in *Poverty and Social Impact Analysis: A Review of Methods and Past Experience*.
- Collier, Paul and Benedikt Goderis, 2007, "Commodity Prices, Growth, and the Natural Resource Curse: Reconciling a Conundrum," Centre for the Study of African Economies, WPS/2007-15.
- Friedman, M., 1957, "*A Theory of the Consumption Function*" (Princeton, New Jersey: Princeton University Press).

- Gavin, Michael, 1997, “A Decade of Reform in Latin America: Has it Delivered Lower Volatility,” IADB Working Paper Green Series, No. 349 (Washington: Inter-American Development Bank).
- Gelb, Alan and Associates, 1988, *Oil Windfalls: Blessing or Curse?* (New York: Oxford University Press for the World Bank).
- Enders, Klaus, Sherwyn Williams, Nada Choueiri, Yuri Sobolev, and Jan Walliser, 2002, “Yemen in the 1990s: from Unification to Economic Reform,” IMF Occasional Paper 208, (Washington: International Monetary Fund).
- Fasano, Ugo, and Qing Wang, 2002, “Testing the Relationship Between Government Spending and Revenue: Evidence from GCC Countries,” IMF Working Paper 02/201, (Washington: International Monetary Fund).
- International Monetary Fund, 2004, “*Public Investment and Fiscal Policy*,” IMF Board Paper 04/93, (Washington: International Monetary Fund).
- International Monetary Fund, 2005, “*Oil Market Developments and Issues*,” IMF Board Paper 05/75, (Washington: International Monetary Fund).
- International Monetary Fund, 2007 (2) “*Republic of Azerbaijan: 2007 Article IV Consultation—Staff Report*,” IMF Country Report No. 07/191.
- Ossowski, Rolando, Mauricio Villafuerte, Paulo Medas, and Theo Thomas, 2008, “The Role of Fiscal Institutions in Managing the Oil Revenue Boom,” IMF Occasional Paper 260, (Washington: International Monetary Fund).
- Rother, Bjoern, 2008, “Fiscal Issues in Ecuador’s Oil Dependent Economy,” in Ecuador: Selected Issues, IMF Country Report 08/12.
- Van der Ploeg, Frederick, and Anthony J. Venables, 2008, “Harnessing Windfall Revenues in Developing Countries: Sovereign Wealth Funds and Optimal Tradeoffs Between Citizen Dividends, Public Infrastructure, and Debt Reduction,” CEPR Discussion Paper 6954.
- Wakeman-Linn, John, Chonira Aturupane, Stephan Danninger, Koba Gvenetadze, Niko Hobdari, and Eric Le Borgne, 2004, “Managing Oil Wealth: The Case of Azerbaijan,” (Washington: International Monetary Fund).
- Zakharova, Daria, 2008, “Fiscal Coverage in Middle Eastern and Central Asian Countries: Current Situation and Way Forward,” IMF Working Paper 08/111, (Washington: International Monetary Fund).