

Oil Depletion and Adjusted Net Savings in Sudan and South Sudan

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Abstract. *Secession of South Sudan has imposed challenges on the economies of Sudan and South Sudan. The economy of Sudan lost sizeable portion of revenues from oil resources by the secession in July 2011 as the North inherited only a quarter of oil reserves. The economy of South Sudan critically depends on exhaustible oil resources which deplete wealth of the country. Effective management of oil revenues is important not only because of reduction of oil revenues especially for the North but because of promotion of long-term sustainable development. The Hartwick-Solow rule requires transformation of non-renewable, exhaustible oil resources into alternative human, physical, social and renewable natural capital through public investment to accommodate for less oil dependent economy. This paper reviews oil depletion and adjusted net savings in the two countries, which are developed to measure sustainability of economic growth. It further provides policy implications for sustainable development with reference to successful international experience in public investment financed by rents from non-renewable natural resources.*

I. INTRODUCTION

1. **National income and economic welfare depend on wealth of a nation, namely physical, human, social and natural capital.** Recent commodity boom enabled resource rich countries to achieve high rates of GDP growth by extracting exhaustible natural resources. However, GDP, dominant measure of economic performance, does not take it into consideration whether natural capital depletion will affect sustainability of economic development. In natural resource rich countries, natural capital, in often cases the largest component of wealth, has been extracted without compensating it with alternative forms of capital. Hartwick (1977) and Solow (1974, 1986) claim that an economic development would be on a sustainable path if total wealth of a nation is non-declining. Hartwick urges that rents from natural resource extraction should be invested in alternative forms of capital to sustain economic development instead of being used as public current expenditures.

2. **There has been growing interest in international policy circle for accounting depletion of non-renewable natural resources to analyze sustainability of economic growth of nations, which has been ignored by the traditional national accounting.**¹ Non-consideration of natural resource depletion may overestimate sustainability of natural resource-driven economic growth. It also could

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¹ World Bank constructed a global database for comprehensive wealth accounts to help countries to assess sustainability of their economic development (World Bank, 2006, 2011). United Nations Statistical Commission approved, as an international standard, the System of Environmental and Economic Accounting (SEEA), as satellite accounts to the System of National Accounts (SNA), and the SEEA includes the measure of depletion used in this paper in February 2012.

cloud sight for necessary offsetting measures to replace depleted non-renewable natural resources by alternative physical, human, social and renewable natural capital through effective investment. Transformation of wealth of a nation is critically important to prepare long-term sustainable economic development especially after exhaustion of natural resources. This paper suggests that adjusted net saving, defined as national net saving adjusted for the value of resource depletion and environmental degradation, can illustrate sustainability of economic development, complementing conventional measure of economic performance.

3. **Over the past decade, pre-secession Sudan developed into the third largest oil producer in Sub-Saharan Africa.** The oil-driven high rates of GDP growth, however, have not benefited the people in Sudan (the North) and South Sudan (the South). The capital-intensive oil sector provides employment to only fraction of people as the majority of households engage in agriculture and animal husbandry. In 2009, 46.5% and 50.6% of total population in the North and the South, respectively, are living below the national poverty line. Poverty is concentrated in the rural area as 57.6% and 55.4% of the rural population in the North and the South, respectively, are living below the poverty line. To achieve inclusive economic growth and insulate the economies from oil price volatility, political risk of oil production and exhaustion of oil reserves, both countries need to develop and diversify new industrial sector and modernize agricultural sector. To achieve such a goal, the two countries must effectively invest rents from oil revenues into alternative capital to replace depleted, exhaustible oil resources.

4. **Pre-secession Sudan was estimated to have five billion barrels of reserves.** Upon secession of the South in July 2011, oil reserves in pre-secession Sudan are unevenly distributed between the two. The North inherited only a quarter whereas the South inherited remaining three quarters of oil reserves. The oil sectors in the two, nonetheless, are closely intertwined. As the South relies on pipelines, refineries, and Port Sudan's facilities in the North, the South accepted 50-50 split of oil revenues since the signing of the Comprehensive Peace Agreement (CPA) in January 2005. The oil sector in the North, therefore, still is significant part of the economy not only because of non-negligible size of inherited oil reserves but also because of sizeable amount of transit fee from the South.

5. **The CPA did not set provisions on post-independence oil sharing mechanism or transit fees.** Following the secession, the North asked for transit fees of \$32-36 per barrel, while the South countered with less than \$1 per barrel, which is more in line with international standards. As they failed to agree on the transit fee negotiations, the North began to confiscate oil from the South by diverting Nile Blend crude to Khartoum and el-Obeid refineries in December 2011. In retaliation, on January 20 2012, the South announced that it would suspend oil production until a fair deal was reached on transit fees, or an alternative pipeline was built.

6. **The secession and sudden halt of oil production in the South have deteriorated economic situation in the North.** Post-secession Sudan is expected to produce 42 million barrels of oil in 2012, declining from 169 million barrels in 2010 by pre-secession Sudan.² The oil sector accounts for 5.2%

² 2011 data includes both unified Sudan data up to July 8, 2011 and post-secession Sudan data since July 9, 2011. To avoid confusion, data are compared between 2010 which includes only unified Sudan and 2012 which includes only post-secession Sudan.

of GDP in 2012, falling from 15.5% in 2010.³ The oil sector accounts for 27.1% of total revenues in 2012, declining from 60.8% in 2010, and 32.3% of total exports, falling from 86.7% in 2010. Non-oil GDP growth is expected to decelerate from 5.1% in 2010 to -5.1% in 2012. Budget deficit is projected to widen from -0.4% in 2010 to -3.7% in 2012. Inflation is expected to increase from 13.1% in 2010 to 28.6% in 2012. In June 2012, the government approved comprehensive reform program to devalue exchange rate by 66%, reduce fuel subsidies, cut non-priority spending and strengthen social safety nets.

7. **The suspension has hit more severely the South, imposing pressures on budget, exchange rate and inflation as the economy of the South is extremely dependent on the oil sector.** The South produced 122 million barrels of oil in 2011. The oil sector accounted for 27.4% of GDP (SSP13.8 billion) and dominated 98.1% of total revenues and 99.8% of total exports. As export receipts from the oil sector reached to 69.3% of GDP (SSP34.5 billion or equivalently US\$12.2 billion), the government expects that GDP will decline significantly by more than 70% in 2012. In February 2012, the South Sudanese government approved austerity measures to cut non-salary expenditure by 50% and reduce monthly transfer from the central government to local states. Even though it claimed that the country has enough foreign reserves to sustain the economy over a year, the South Sudanese pound has dropped sharply since oil revenues dried up. The black market exchange rate depreciated by more than 50% between December 2011 and August 2012. As the South imports most of its food, the depreciation caused spike in annual inflation, registering record high of 79.5% in May 2012.

8. **On August 6 2012, the two parties finally reached an agreement on the oil transit fee and compensatory financing from the South to the North.**⁴ The resolution, however, does not lead to immediate resumption of oil production and oil revenues in the South. South Sudanese government official says that it will six months at Upper Nile and one year in Unity State to resume oil production by repairing damaged oil facilities. In June 2012, the government proposed austerity 2012/13 budget at SSP6.6 billion, substantially dropped from SSP8.9 billion for 2011/12. To compensate the revenue loss, the government tries to boost non-oil revenues from SSP300 million in 2011/12 to SSP867 million in 2012/13. SSP1 billion will be drawn from foreign reserves and another SSP1 billion is borrowed from domestic commercial banks. In addition to the sales of petroleum and mining concessions, the government estimates additional SSP1.9 billion must be financed externally.

9. **Resumption does not necessarily improve current situation the two countries face.** Oil revenues in the North will never revert to pre-secession level. The South remains critically dependent on oil production and highly vulnerable to political risk of oil production. Furthermore, World Bank (2009) estimates that oil production will decline from 2015 and oil reserves will be halved by 2020 if no new finds are made. Therefore, the North urges to accommodate to less oil dependent economy whereas the South needs to reduce reliance on the oil sector by developing and diversifying new industrial sector and modernizing agricultural sector. In this regard, oil rents should be efficiently

³ Medium-term outlook by IMF (2012) forecasts that the oil sector GDP will remain at 8.0% of GDP for 2013-2017 period.

⁴ The two countries agreed to pay \$9.10 per barrel for oil produced at Upper Nile (blocks 3 and 7) and \$11 per barrel for oil produced in Unity state (block 5A), and cash transfer of US\$3.03 billion from the South as a transitional financial assistance to the North for three and half years.

collected and effectively invested in alternative forms of capital to transform the economies especially through public investment.

10. **The rest of this note presents oil resource depletion and adjusted net savings to analyze sustainability of economic growth in Sudan and South Sudan.** The note also provides international comparison of oil resource depletion, adjusted net savings, replacing public investment to counter oil depletion and its policy implications for the two countries.

II. METHODOLOGY⁵

11. **Adjusted net savings (ANS) provides insight into sustainability of an economy, aiming to give an account of the net creation or destruction of wealth of a nation.** It is defined as national net saving adjusted for the value of resource depletion and environmental degradation can illustrate sustainability of economic development, complementing conventional measure of economic performance.

12. **Gross national savings (GNS) measures the national capacity to finance domestic investment.** It is computed as gross national disposable income (GNDI, i.e., the sum of gross national income plus net transfers from abroad) minus consumption (CONS, including both public and private). Total domestic investment is financed by the sum of gross national savings and foreign savings:

$$GNS = GNDI - CONS.$$

13. **Net national savings (NNS) subtracts from GNS the consumption of fixed capital (CFC), to account for the fact that past domestic investments lose value over time.** To maintain wealth of a nation unchanged, new investments need to be made every year to offset depletion and obsolescence:

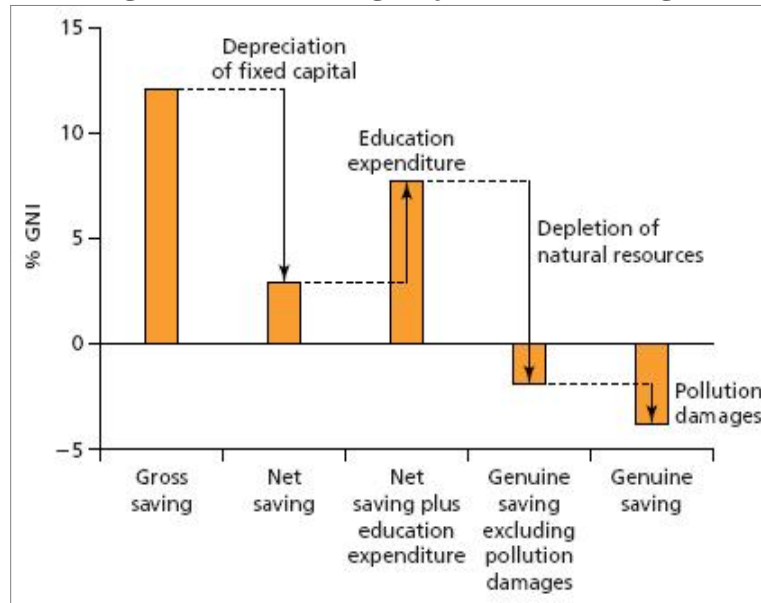
$$NNS = GNS - CFC.$$

14. **ANS accounts for several other factors (Figure 1).** It adds to NNS education expenditures (EDU), not considered in national accounting as investment (as almost entirely taking the form of teachers' salaries), even if it can be considered as an investment to build human capital. It subtracts to NNS the economic cost of environmental degradation (ENV) including carbon dioxide and particulate emission damage, as well as the amount of natural resource depletion (NRD), including oil depletion:

$$ANS = NNS + EDU - ENV - NRD.$$

⁵ This section relies on World Bank (2011) and Boakye *et al.* (2012).

Figure 1: Calculating Adjusted Net Savings



Source: World Bank (2011).

15. **Quantitative methodologies have been established to compute and compare across countries the economic costs of environmental degradation, as well as the value of natural capital depleted.** NRD, on which this paper focuses, is computed as the present value of the future rents, divided by the number of remaining years of extraction, T , (also known as the real wealth valuation method).⁶ World Development Indicators retain a discount rate of 4 percent across countries for present value calculation:

$$NRD_t = 1/T \sum_{i=0}^T \frac{\pi_i q_i}{(1 + 0.04)^i}.$$

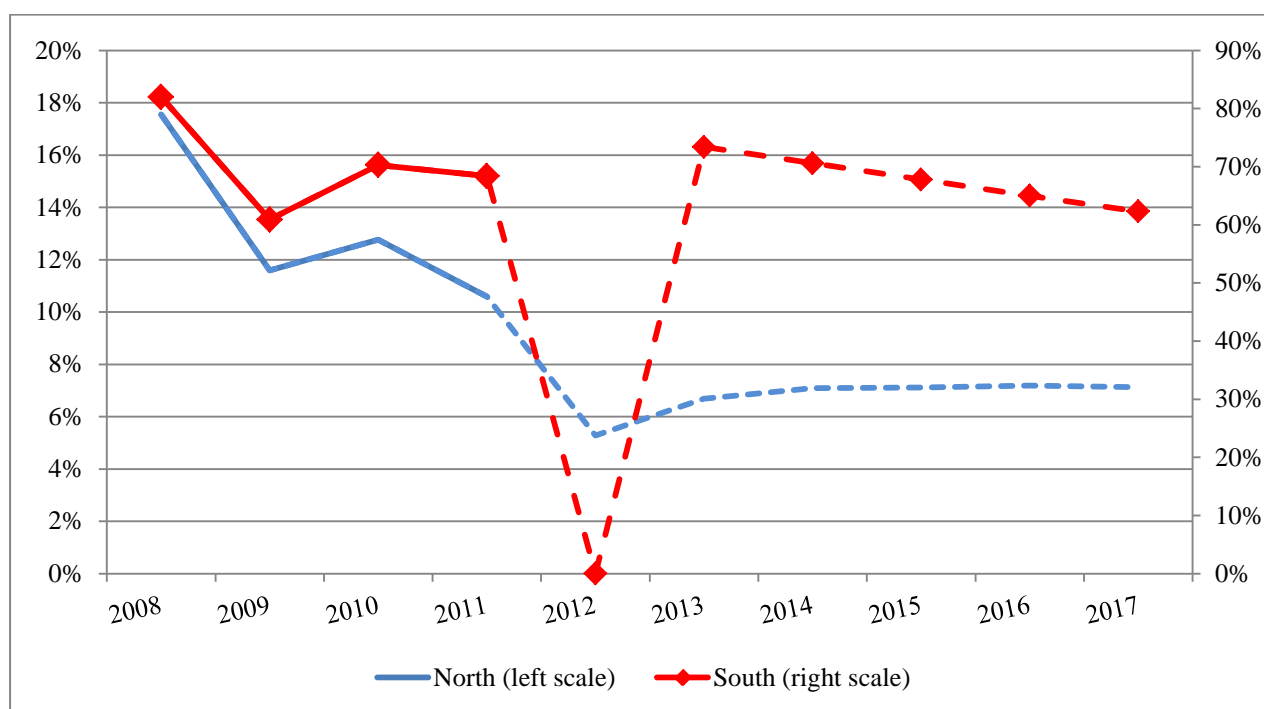
16. **The rent at the period t , $\pi_t q_t$, is measured as the unit rent, the difference between the world price of oil minus region-average cost of production, multiplied with quantities produced.** The present value computation of energy depletion for a given period assumes that the rent (i.e. prices, quantities produced and costs) will be similar every year until exhaustion. Our computation of energy depletion, however, accounts for evolving world prices and costs (per World Bank forecasts, see Appendix, Table A.1) over time, while production volume remains on sustainable path, which is assumed as average production volume in 2008-11.

III. OIL DEPLETION AND ADJUSTED NET SAVINGS IN SUDAN AND SOUTH SUDAN

⁶ Exhaustion time is assumed to be 20 years from 2013 based on forecast by the Ministry of Petroleum and Mining, Republic of South Sudan (2012).

17. **Oil rents come from depleting non-renewable natural resources, thus reducing the total wealth of the countries.** Cumulatively, the equivalent of US\$83 billion (SDG252 billion in 2010 price) worth of oil rents was extracted between 1999 and 2011 in pre-secession Sudan whereas US\$37.0 billion (SSP89.5 billion) worth of oil rents was extracted between 2008 and 2011 in the South. Oil depletion in pre-secession Sudan was on average 13.1% of gross national income (GNI) in 2008-11 period.⁷ Oil depletion in the South has been high at more than 60% of GNI. Given projections on oil price and cost of production, oil depletion in the post-secession North will fall to 6.8% of GNI while it will remain high at over 50% of GNI in the South after resumption of oil production in 2013-17 period (Figure 2).⁸

Figure 2: Projections on Oil Depletion (% of GNI)



Source: Author's calculations based on IMF (2012).

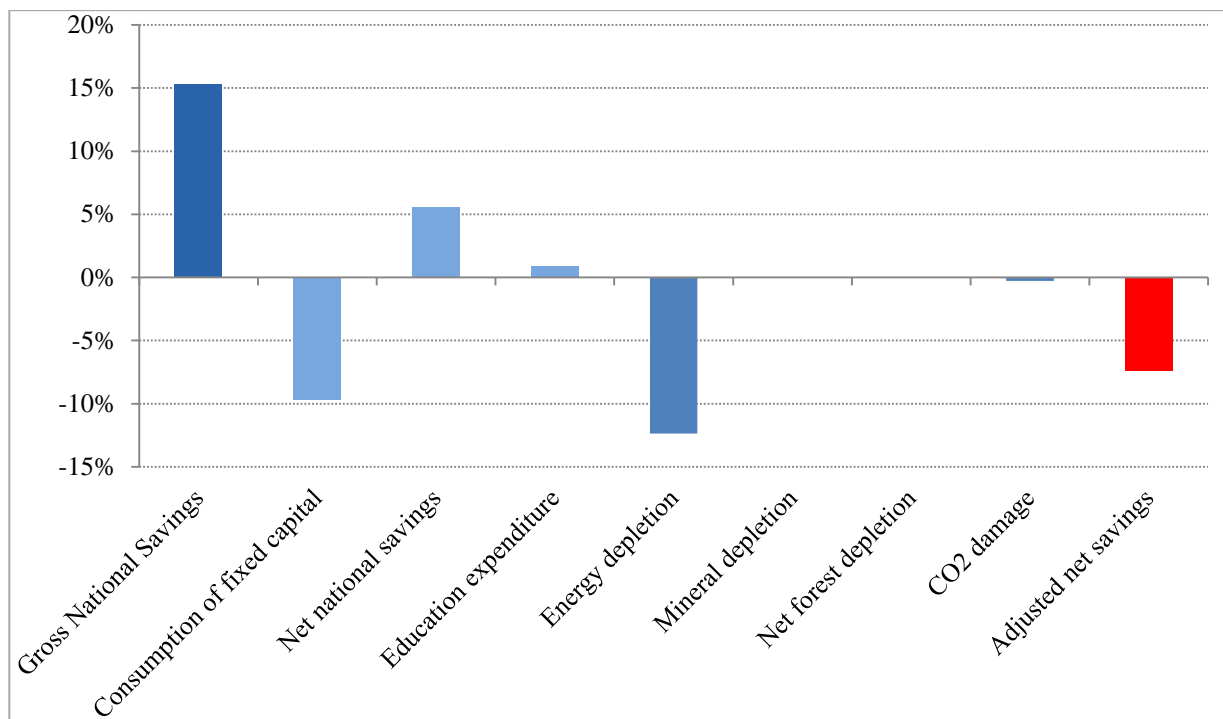
18. **Depletion of oil resources in the two countries has not been met with equivalent public investment in alternative human, public, social and renewable natural capital.** With increasing oil production, the two have enjoyed higher GDP growth. Public investment, however, has not grown fast enough to offset the depleted oil resources. While gross national savings (GNS) is high at 15.3% of GNI in 2000-10 period in the North and 27.3% of GNI in 2008-10 period in the South, adjusted net saving (ANS) is negative at -7.4% of GNI for 2000-10 period in the North and -52.5% in the South

⁷ Other oil-producing countries in Sub-Saharan Africa (SSA), Angola and Congo, Rep., have depleted oil resources by 60% while Nigeria has depleted oil resources only by 23% of GNI over the decade.

⁸ Projected data for the North on GDP, GNI and oil production for 2012-2017 period are obtained from IMF (2012). Following assumptions are imposed for the South: (i) from 2013 real GNI grows at average growth rate of GDP in 2008-11 at 4.8% from 2011 level, (ii) oil production stays at constant level of 2008-11 average after resumption of oil production. Price and cost are projected by World Bank DECPG and the author (Appendix Table A.1).

2008-10 period (Figures 3, 4 and 5 and Tables 1 and 2).⁹ Figure 5 indicates that negative ANS in the North is attributed to consistently low public savings.¹⁰ ANS in other oil-producing SSA countries is negative and worse than the average SSA countries. ANS in South Sudan is further lower than other oil-producing SSA countries (Table 2). Negative ANS indicates that the two countries are depleting their non-renewable natural capital without replacing it by alternative capital. This, in turn, means the economies are not on a sustainable path and will not be able to maintain the same standard of living and become poorer over time.

Figure 3: Adjusted Net Savings (% of GNI) in Sudan in 2000-10

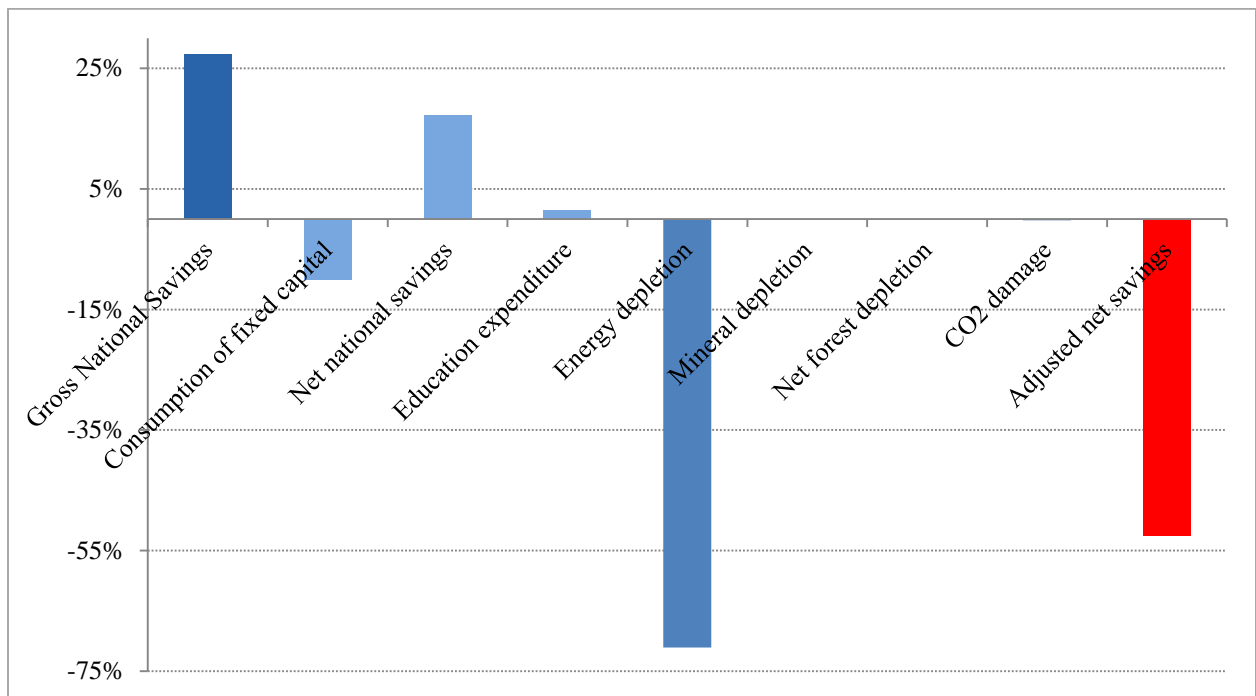


Source: World Bank.

⁹ANS is tentative because consumption of fixed capital, carbon sequestration (all % of GNI) data rely on pre-secession Sudan data. South Sudan specific data is available only for oil depletion, education spending (excl. capital expenditure) and GNS. However, big picture won't change as oil depletion is dominant for calculating ANS.

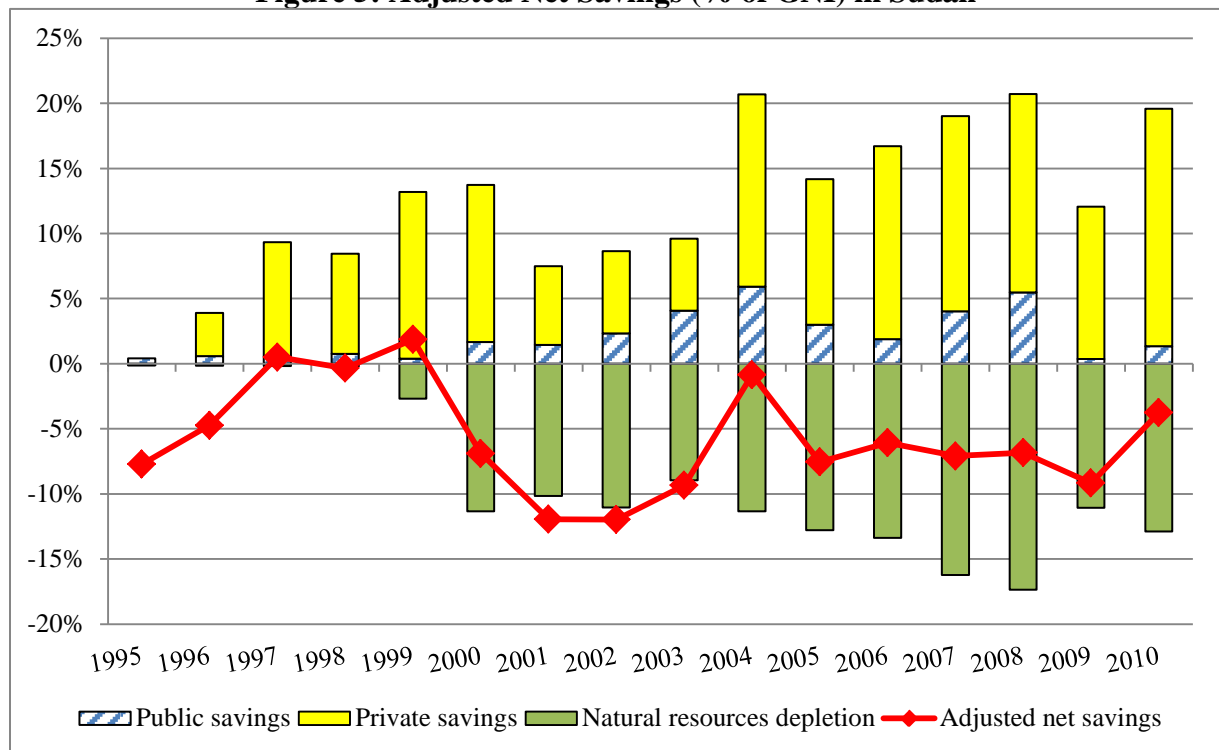
¹⁰ Disaggregated savings data into public and private savings for the South are not available at this moment.

Figure 4: Adjusted Net Savings (% of GNI) in South Sudan in 2008-10



Source: Author's calculations.

Figure 5: Adjusted Net Savings (% of GNI) in Sudan



Source: World Bank and IMF.

Table 1: Adjusted Net Savings, 2000-10 Average (% of GNI)

	Sudan	Nigeria	Oil-producing SSA ¹	SSA
Gross National Savings	15.3%	35.0%	18.5%	16.9%
Of which, Public Savings	2.9%	13.8%	5.9%	n.a.
Consumption of Fixed Capital	-9.7%	-9.9%	-10.7%	-9.5%
Education Expenditure	0.9%	0.9%	2.3%	3.6%
Natural Resource Depletion	-12.4%	-24.0%	-28.1%	-9.6%
Of which, Energy Depletion	-12.4%	-24.0%	-28.1%	-0.9%
Environmental Degradation	-1.0%	-1.6%	-1.4%	-1.8%
Adjusted Net Savings	-7.4%	0.3%	-19.3%	-0.7%
Gross Fixed Capital Formation	20.5%	27.0%	22.9%	n.a.
Of which, Public Investment	5.6%	9.0%	8.4%	n.a.

Source: World Bank and IMF.

Note: 1. Oil-producing SSA includes Angola, Chad, Congo, Rep., Côte d'Ivoire, Nigeria and Sudan.

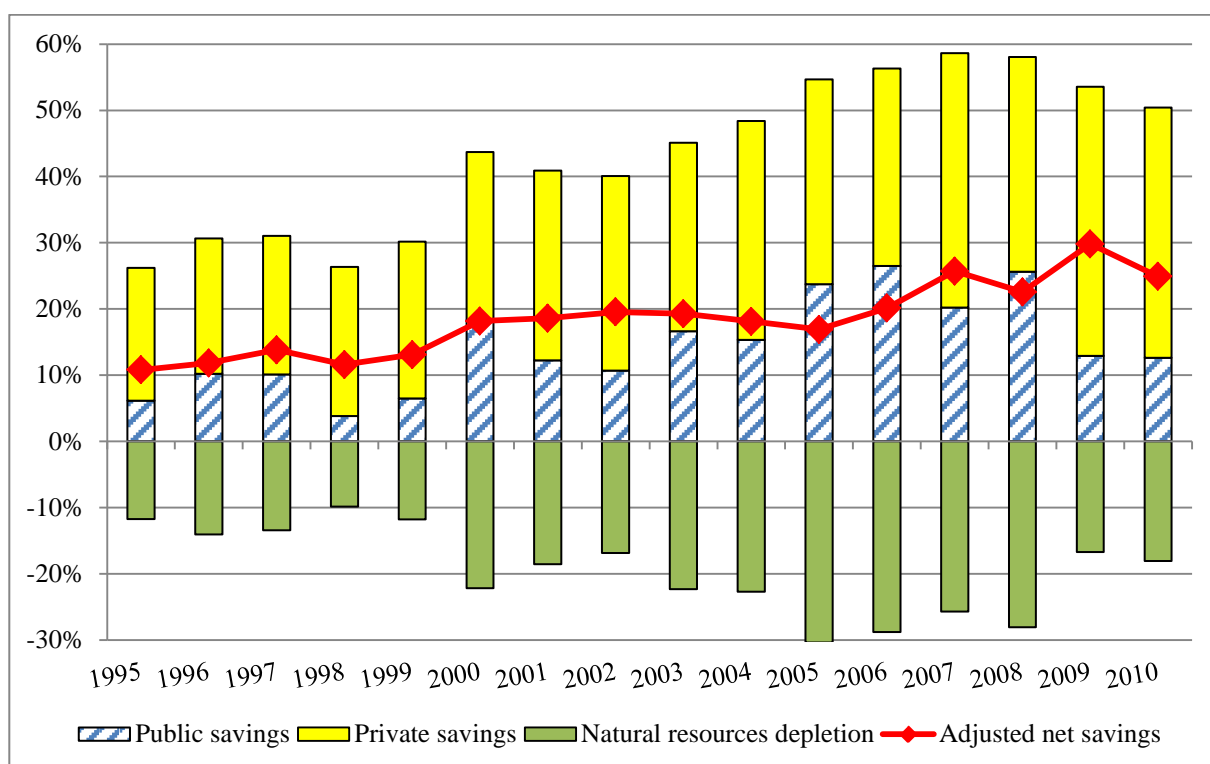
Table 2: Adjusted Net Savings, 2008-10 Average (% of GNI)

	South Sudan	Nigeria	Oil-producing SSA ¹	SSA
Gross National Savings	27.3%	36.3%	25.3%	17.0%
Of which, Public Savings	n.a.	4.7%	4.0%	n.a.
Consumption of Fixed Capital	-10.1%	-9.9%	-10.9%	-9.8%
Education Expenditure	1.5%	0.9%	2.2%	3.5%
Natural Resource Depletion	-71.1%	-20.7%	-27.6%	-11.9%
Of which, Energy Depletion	-71.1%	-20.7%	-27.5%	-10.3%
Environmental Degradation	-0.2%	-1.5%	-1.2%	-1.5%
Adjusted Net Savings	-52.5%	5.2%	-11.4%	-3.1%
Gross Fixed Capital Formation	22.7%	27.5%	23.4%	n.a.
Of which, Public Sector	8.5%	7.0%	9.2%	n.a.

Source: World Bank, various issues of MoFEP budget books and author's calculations.

19. **The most important policy tool to offset depletion in natural resources is public savings as government captures revenues from natural resources.** Algeria is one of a few natural resource rich countries which successfully maintain positive, double-digit ANS over two decades.¹¹ Unlike oil-producing SSA countries, public savings in Algeria offset negative impact by oil depletion because most of oil rents are saved by the government while stimulating private savings. As private savings exceed consumption of fixed capital, ANS turns to be positive and double-digit (Figure 6). Oil rents are transformed into public savings, which, in turn, are invested in alternative forms of capital to replace depleted oil resources. Congo, Rep., on the other hand, neither counteracted to oil depletion by public savings nor stimulated private savings, resulting in huge negative ANS as the South (Figure 7).

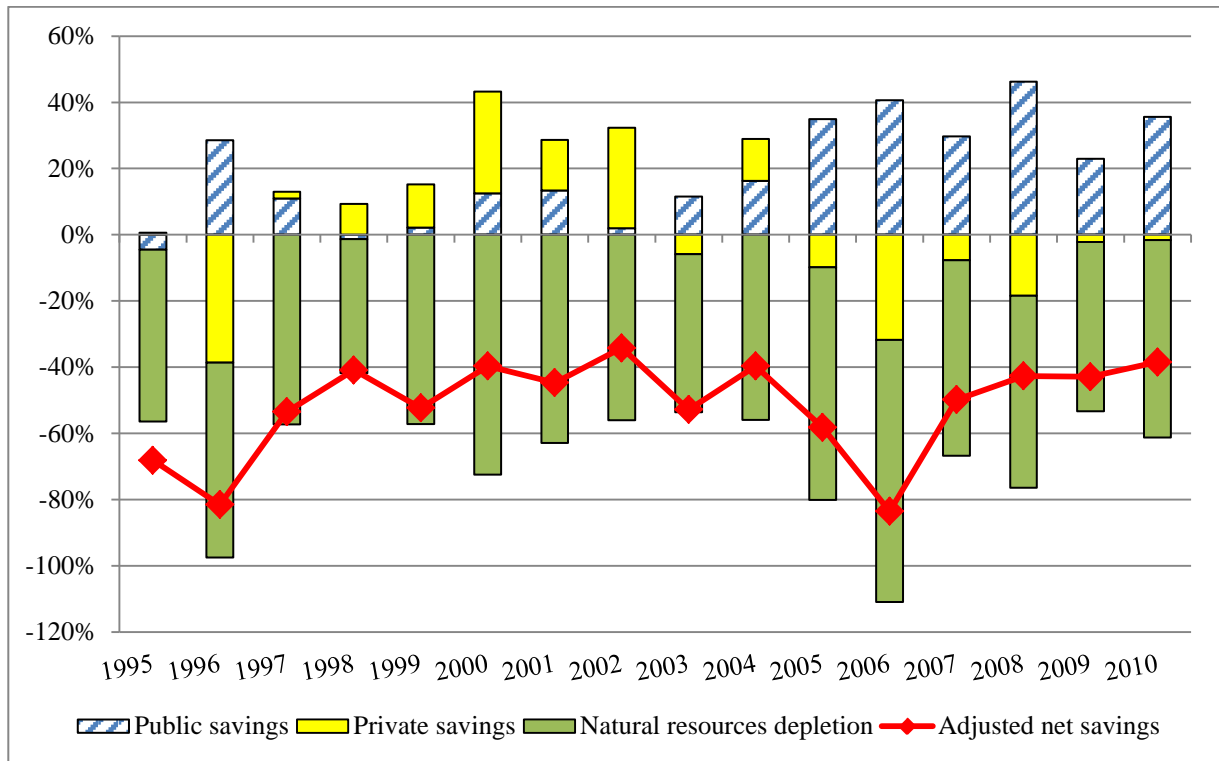
Figure 6: Adjusted Net Savings (% of GNI) in Algeria



Source: World Bank and IMF.

¹¹ Algeria is also highly oil-dependent economy where the oil sector accounts for roughly 60% of budget revenues, 30% of GDP, and over 95% of export earnings.

Figure 7: Adjusted Net Savings (% of GNI) in Congo, Rep.

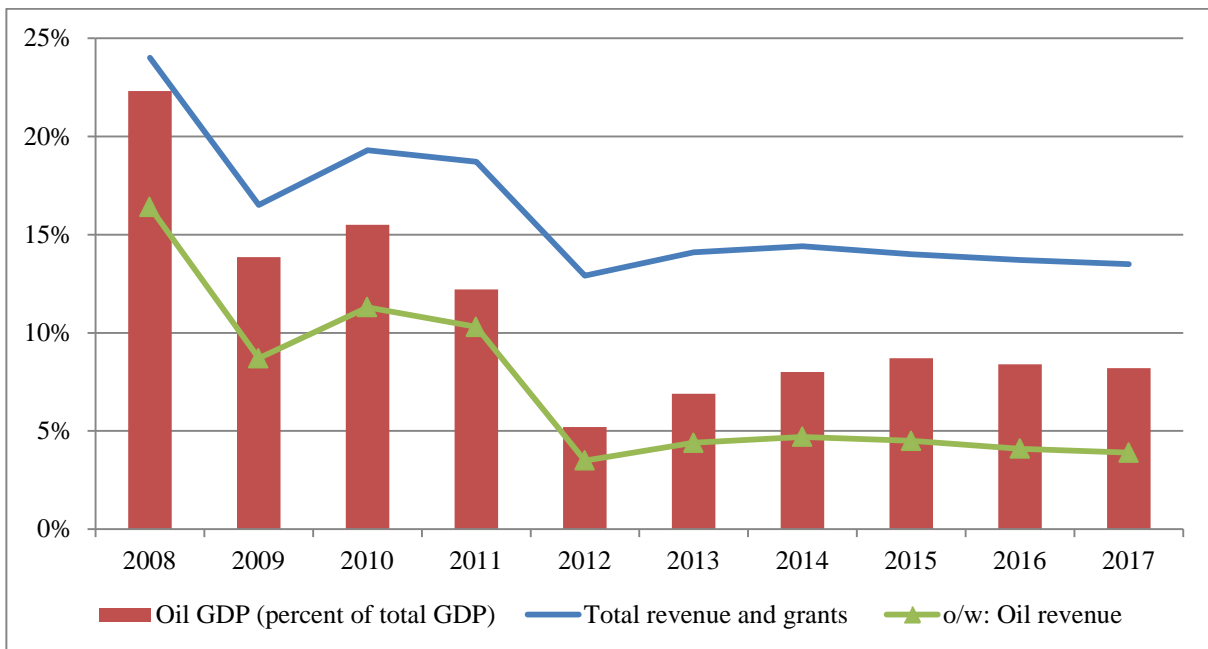


Source: World Bank and IMF.

IV. POLICY CHALLENGES

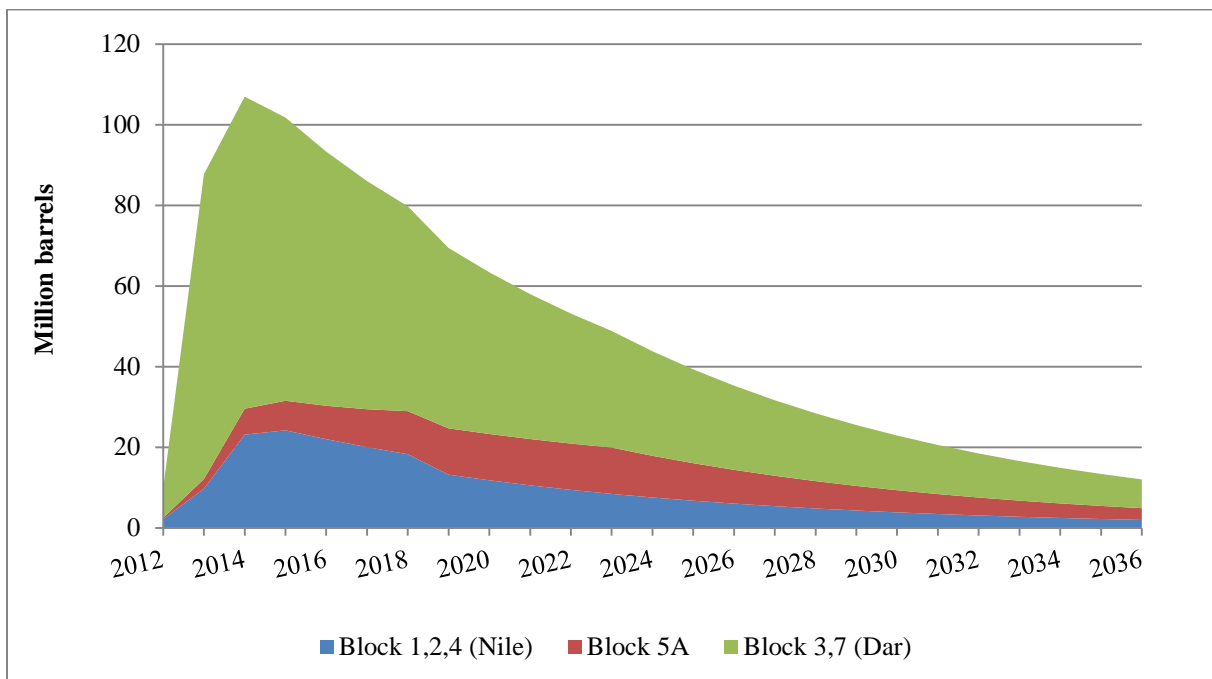
20. **Loss of sizeable portions of oil resources in the North and extreme reliance of the economy on oil in the South reveal critical challenges for long-term sustainable development in both countries.** The North needs to urgently transform from oil resource rich country to less oil dependent economy to accommodate for decline in oil revenues (Figure 8). Declining reliance on oil sector in the North raises scarcity value of oil rents and importance of effective investment of oil rents for sustainable economic development. Even though the South inherited three quarters of oil reserves, the Ministry of Petroleum and Mining, Republic of South Sudan (2012) forecasts that oil reserves will be exhausted in 20 years if no new finds are made (Figure 9).

Figure 8: Projections on Oil GDP and Revenues (% of GDP) in Sudan



Source: IMF (2012).

Figure 9: Projections on Oil Production in South Sudan (million barrels per year)



Source: World Bank staff's projection.

21. **As oil rents are mostly captured by the government, the government can play critical role for sustainable, inclusive growth by efficiently collecting the oil rents and by effectively investing public savings into alternative human, public, social and renewable natural capital.** It should be clearer which policies they should implement if natural resource rich countries shift their focus on economic performances from GDP to adjusted savings or ratio of public investment to natural resource depletion. When adjusted savings rate is negative, it signals that the country is depleting its natural capital without replacing it by alternative capital. Alternatively, if the ratio of public investment to natural resource depletion is far below 100%, rents from natural resources are not transformed into alternative capital but used as public current expenditure. This, in turn, means that, assuming natural resources will be exhausted in the long run, the economy is not on a sustainable path and will not be able to maintain the same standard of living. Because oil reserves in Sudan and South Sudan are expected to be halved by 2020, immediate steps are required to diversify the economy.

22. **The first policy challenges to raise ANS is to maximize oil rents from existing oil fields and to extend life of oil sector by exploiting new finds.** Oil in pre-secession Sudan was extracted by foreign companies which financed extraction of oil fields and built the network of pipelines, refineries and export facilities.¹² Under the CPA, the two governments established the National Petroleum Commission (NPC) to allocate new contracts, distribute oil revenues, disclose and share full information. In practice, the NPC did not function as planned because of a lack of transparency about oil revenues. This, in turn, left governments of two Sudans with limited knowledge of the industry, incapable of managing the oil sectors. The South, especially, has had limited contact with oil companies as foreign oil companies' primary relationships were with the North.

23. **Pre-secession Sudanese government made long term contracts, Profit Sharing Agreements (PSAs), with foreign oil companies.** Under PSAs, which last twenty to thirty years, companies are responsible for financing oil exploration and field development. If a company discovers profitable amounts of oil, the company and the government share the profits of oil sales under a predetermined formula after all the company's exploration and development costs have been recovered over an agreed cost-recovery period. Sudanese governments lacked detailed knowledge on concession contracts which may leave rooms to review government's share of oil profits. The challenge for the new states to maximize the government share of oil rents is to grasp tight control over the costs that oil companies claim to deduct and renegotiate these initial conditions in order to realize the development and diversification it needs.¹³

24. **Two Sudans need to attract new investment by oil companies not only for new exploration but also for enhancing recovery of dated and damaged oil infrastructure at existing fields.** Two countries have acquired poor reputation as oil investment destination, notably the U.S. sanctions which were renewed for the North in November 2012 (Table 5). They need to demonstrate for oil companies that the post-secession Sudans are viable option for oil exploration. To encourage foreign oil investors for new exploration, they need to offer lucrative incentives such as favorable fiscal terms, secured

¹² These foreign firms include China National Petroleum Corporation (CNPC), the Malaysia-owned Petronas and the India-owned Oil and natural Gas Corporation (ONGC).

¹³ Shankleman (2011) provides detailed analysis on PSAs in South Sudan.

property rights, sustained peace and guaranteed access to pipelines agreed in August 2012. They also need to combat local corruption which incurs additional costs and uncertainty to oil companies.¹⁴

Table 5: Doing Business Rankings for Sudan (out of 183 countries)

	2012	2011
Starting a Business	126	123
Dealing with Construction Permits	130	127
Getting Electricity	107	104
Registering Property	41	40
Getting Credit	166	152
Protecting Investors	155	153
Enforcing Contracts	148	146
Overall Ranking	135	135

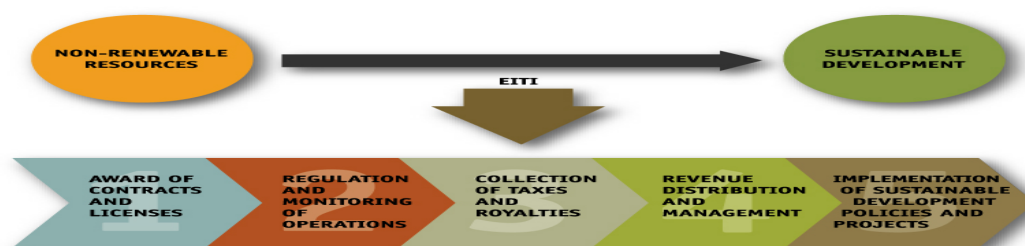
Source: World Bank.

25. **South Sudan has stepped forward to commit transparency and accountability in the oil sector management.** The National Legislative Assembly passed the Petroleum Act in July 2012 and tabled draft Petroleum Revenue Management Law. The Petroleum Act includes commitments to publish contracts and production and revenue data, and requires that all oil contracts should be awarded on a competitive, publicly open basis. The draft Petroleum Revenue Management Law includes rigorous public report, accounting and auditing requirements. The laws, nonetheless, will not necessarily ensure transparent oil sector if the government and the public lack capacity to comply with the above requirements and scrutinize publicized data.

26. **In this regard, to strength governance for the oil sector and to attract new oil exploration, two governments should participate to the Extractive Industry Transparency Initiative (EITI).** The EITI is a multi-stakeholder initiative comprised of governments, companies, civil society groups, investors and international organizations, aimed for increasing transparency and accountability of oil and mining revenues and for improving governance of extractive industry sector. The EITI standard ensures that all payments from oil and mining extractions are published in an annual report for all citizens to observe revenues from natural resources that companies pay and a government receives. Increased transparency and improved governance will help government to build public trust and to attract foreign investors, leading to economic and political stability (Figure 10).

¹⁴ President Salva Kiir reported in May 2012 that US\$4 billion over the last six years was unaccounted (Global Witness, 2012).

Figure 10: The Extractive Industries Value Chain



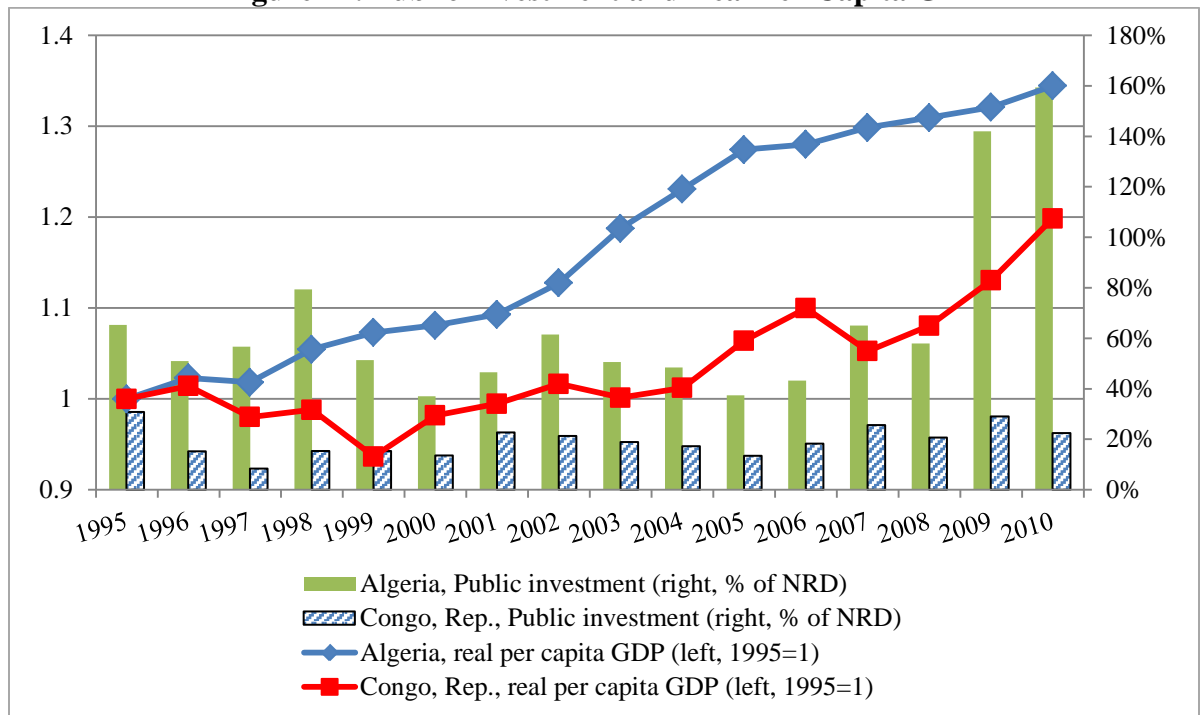
27. **In December 2011, President Salva Kiir of the South announced a commitment to seeking a membership in the EITI.**¹⁵ Beyond the announcement, the South must move forward to gain membership and the North should follow a similar path. Upon resumption of oil production, the South should include the commitment in the final version of new petroleum policy and issue an unequivocal public statement of its intention to implement the EITI. Then the government should start to collaborate with civil society, oil companies and multi-stakeholder group to set targets and timeframe for implementation of the EITI. Such efforts will help two Sudans improve business environment for foreign mining companies to ease their business, leading to lifting of the U.S. sanctions on the North.

28. **The second challenge is how to transform oil revues to alternative forms of capital.** International comparison in relationship between public investment and real per capita GDP discloses that public investment, financed by rents from non-renewable natural resources, leads to sustainable economic development (Figure 11). Algeria has counteracted to oil depletion by public investment, which, on average, accounted for 68.1% of oil depletion whereas Congo, Rep., has recovered only 20% of natural resource depletion. Algeria remained moderately dependent on oil sector even in the decade of commodity boom thanks to successful public investment from oil revenues into alternative form of capital, leading to less volatile, smoothly increasing per capita GDP (Figure 12).¹⁶ Contrarily, low ratio of public investment to oil depletion in Congo, Rep. has made its economy highly dependent on oil sector over time. Share of oil sector GDP to total GDP in Congo, Rep., increased from 33.8% in 1995 to 67.9% in 2010, resulting in highly volatile, slowly growing per capita GDP.

¹⁵ As of December 2012, among 18 compliant members, 5 countries are oil producers in Sub-Saharan Africa: Ghana, Mali, Mauritania, Niger and Nigeria. Among 19 candidate countries, 5 countries are oil producers in Sub-Saharan Africa: Cameroon, Chad, Congo, Rep., Côte d'Ivoire and Gabon.

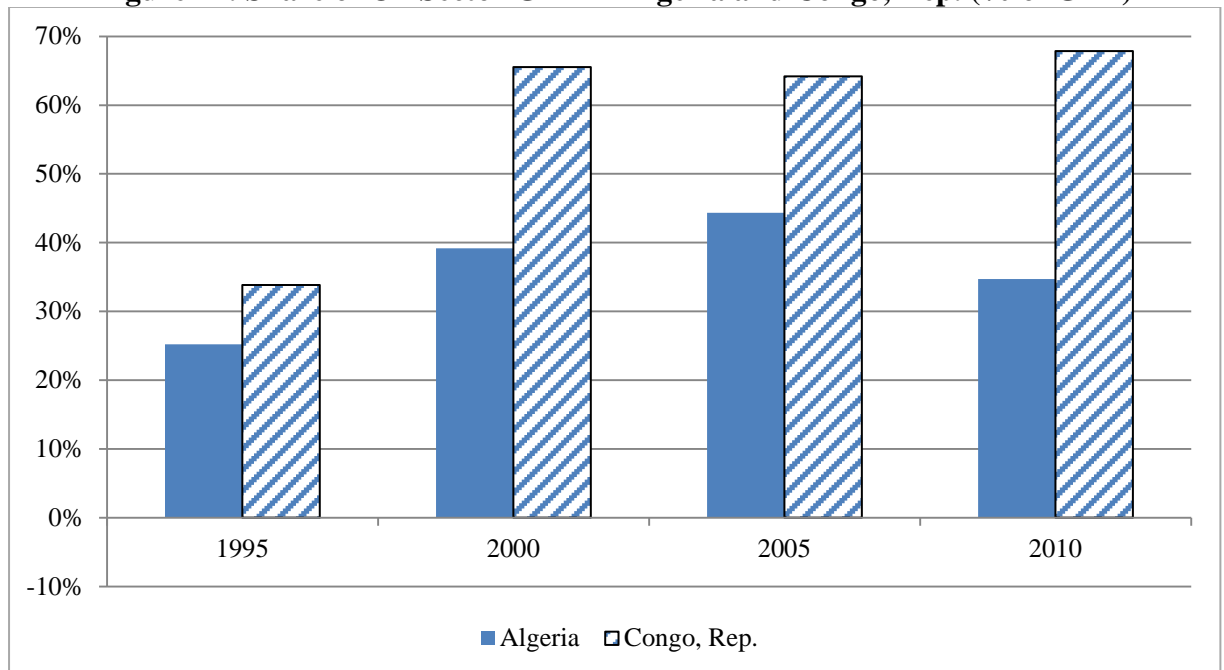
¹⁶ Share of oil sector GDP to total GDP in Algeria moderately increased from 25.2% in 1995 to 34.7% in 2010.

Figure 11: Public Investment and Real Per Capita GDP



Source: World Bank and author's calculations.

Figure 12: Share of Oil Sector GDP in Algeria and Congo, Rep. (% of GDP)



Source: IMF.

29. **Algeria's public investment ratio is among the highest in the world.**¹⁷ Algeria has made use of enlarged fiscal space created by oil windfall to finance a massive public investment program, Programme Complémentaire de Soutien à la Croissance (PCSC), to expand public services and to deal with a backlog of infrastructure rehabilitation. With the incorporation of its predecessor pipeline, Programme de Soutien à la Relance Economique (PSRE), and inclusion of new programs, the initial PCSC allocation grew to roughly US\$114 billion projected for 2005–09. This represents above 115 percent of GDP in 2005. Algeria's public investment ratio increased from 10.7% of GDP in 2005 to 27.7% of GDP in 2010. This level is among the highest in the world, dramatic especially when compared with the average of less than 4% of GDP in OECD countries, less than 5% of GDP in Latin America, and less than 8% of GDP in Asian countries.

30. **The PCSC contributed to consolidate and improve key social outcomes.** Algeria has achieved significant successes in universalizing primary education and increasing access to other levels of education. Geographic access to health facilities is at 98%, and the entire population has financial coverage for at least public-sector health-care services. Indeed, with the exception of maternal mortality, all Millennium Development Goals (MDGs) are likely to be met by 2015.

31. **Post-secession Sudan must follow similar path as Algeria because Sudan has no choice of being oil dependent by raising both public and private savings rate and replacement ratio of oil depletion covered by public investment (Table 6).** Sudan had insufficient public funds to replace depleted oil resources by public investment as it amounts to, on average, less than 40% of oil resource depletion in 2000-10 period. Such a low replacing ratio of public investment will delay transformation of post-secession Sudan to less oil dependent economy and decelerate economic growth that oil sector had driven since it began exporting oil in 1999.

Table 6: Savings and Investment in Sudan in 2000-10

	Sudan	Algeria	Congo, Rep.
Gross National Savings (% of GNI)	15.3%	50.0%	25.2%
Of which, Public Savings (% of GNI)	2.9%	17.7%	24.2%
Natural Resource Depletion (% of GNI)	-12.4%	-22.7%	-61.1%
Adjusted Net Savings (% of GNI)	-7.4%	21.2%	-47.9%
Public Investment (% of GNI)	4.8%	14.4%	12.2%
Public Investment (% of NRD)	39.1%	68.1%	20.3%

Source: World Bank and author's calculations.

32. **South Sudan has followed similar path as Congo, Rep., such that huge oil depletion is not covered by gross national savings, leading to negative adjusted net savings and low ratio of public investment to natural resource depletion (Table 7).** South Sudan has insufficient public funds to replace depleted oil resources by public investment as it amounts to, on average, less than 20% of oil

¹⁷ World Bank (2007) provides detailed analysis on public investment in Algeria.

resource depletion in 2008-10 period. Such a low replacing ratio of public capital will leave South Sudan highly oil dependent and fragile to oil price volatility and political risk of oil production.

Table 7: Savings and Investment in South Sudan

	2008	2009	2010
Gross National Savings (% of GNI)	33.4%	25.1%	23.5%
Natural Resource Depletion (% of GNI)	-82.0%	-60.9%	-70.3%
Adjusted Net Savings (% of GNI)	-57.4%	-44.3%	-55.5%
Public Investment (% of NRD)	12.5%	13.0%	20.2%
Per capita GDP (current US\$)	\$1,650	\$1,285	\$1,546

Source: World Bank and author's calculations.

33. **To diversify their economies, the two countries face the policy challenge of developing a strategy to efficiently collect oil rents and effectively invest public funds in alternative forms of capital to achieve sustainable long-term economic development.** As most of rents from natural resources are captured by governments, public savings and public investment using oil rents play critical role for sustainable economic development. Wealth analysis suggests a range of policies needed to ensure that oil wealth is translated into sustainable economic development. These policies include macroeconomic policies that encourage both public and private savings, reform in tax administration to effectively capture oil revenues, public resource funds for diversification and stabilization that transform oil resources into alternative forms of capitals for education, health, public infrastructure, non-oil natural resource exploitation and agricultural modernization. The resource funds can also insulate the country from oil price volatility by implementing counter-cyclical fiscal policies.

34. **Botswana can be an excellent model for resource-rich countries like Sudans, escaping “resource curse” through prudent macroeconomic management.**¹⁸ The economy of Botswana highly depends on natural resources, mainly diamonds, which forms the largest single component of its national wealth, and accounts for one-third of GDP, half of total revenue, and most of its exports. Botswana is the notable exception which achieved transformation of its economy from one of the poorest countries in the world to upper middle class by using mineral wealth. The Ministry of Finance and Development Planning devised its own rule, the Sustainable Budget Index, to reinvest all mineral revenues to public infrastructure and human capital to offset mineral depletion.

35. **The key of success is, however, attributed not only to investments to intangible capital but also to management of resource funds which transformed mineral rents not into investment to intangible capital but to financial assets when competitive investment to intangible capital was not available.** The resource funds also helped to buffer Dutch disease effects and provided the basis for government to run counter-cyclical policies to smooth out booms and busts. As a result of its sound management of mineral revenues, Botswana has witnessed rapid growth in its real wealth and per

¹⁸ Interested readers may refer to Lange and Wright (2004) and Hamilton and Ley (2010) for detailed analysis on wealth management in Botswana.

capita GDP. Effective management of natural resource fund, however, requires transparency and accountability that two Sudans have been lacking. In this regard, participation to the EITI will help reinforce their capacity to effectively collect and invest oil rents.

36. Agricultural modernization is particularly important for inclusive growth in both countries because the agricultural sector employs majority of total population whereas both countries heavily rely on food imports. A third of the total land in the North is arable but only 20% of the arable land is cultivated. 90% of total land in the South is arable but only 4% of land is used for agriculture although the South Sudanese government has taken initiative to boost food production for lowering food dependence and also promote commercial farming. The reliance on food imports hurt the vulnerable especially in the rural area when import prices of staple foods kept rising since 2009 and further boosted by depreciation of Sudanese pound against US dollars after secession of the South and depreciation of South Sudanese pound since the sudden suspension of oil production.

37. In October 2012, the North started to export refined gold for the first time with hope that revenues from gold exports would compensate revenue loss from oil by secession of the South. The government expects to produce gold worth up to US\$3 billion this year, which is still below expected loss from oil revenues of US\$4.8 billion in 2011-12 period. The gold mining industry is one of the few promising industries in Sudan for earning foreign exchange. The government plans to process gold not only in Sudan but in neighboring countries such as Egypt, Eritrea, Chad and the Central African Republic. Gold exports, however, do not mean that Sudan does not need to raise public savings. Sudan needs to invest rents from gold to diversify its economy and achieve sustainable inclusive economic growth. To attract foreign investment, Sudan must improve business environment in gold industry. Sudan should actively pursue membership to the EITI. Strong commitment to the EITI, covering both oil and gold industries, would send a strong signal to the international community about the country's dedication to improved investment climate.

38. Mining sector in the South has untapped reserves of iron ore, gold, diamond, uranium and limestone. It started to attract foreign investors since independence as security situation relaxed. Unlike the capital-intensive oil sector, mining sector can contribute to inclusive growth by creating employment opportunities and stimulating rural development as most of the mines are located towards the southern boundaries which are away from the border conflict with the North. South Sudan made first step to diversify the economy from oil. Following the Petroleum Act, President Salva Kiir signed the Mining Act in March 2013. The Mining Act provides legal framework consistent with international standards regarding transparency, accountability and environmental protection.

39. The two governments should seek promotion of local content in order to create opportunities for local businesses to provide goods and services for extractive industries. Limited supply capacity, however, may entail some difficulty to impose local content obligation especially for capital-intensive oil sector. They can start from supplying domestic inputs, such as catering and furniture, to identify local employment opportunities in oil and mining fields. Further, they should make continuing efforts to build capacity to supply more advanced domestic inputs, such as skilled labor, to meet demand from foreign oil and mining companies. In this regard, they have to effectively invest revenues from natural resources to human capital to develop capacity of local labor force.

IV. REFERENCES

- Boakye, D., S. Dessus, Y. Foday, and G. Oppong. 2012. *Investing the Mineral Wealth in Development Assets: Ghana, Liberia and Sierra Leone*, mimeo, World Bank, Washington, D.C.
- Gelb, A., K. Kaiser and L. Vinuela. 2012. *How Much Does Natural Resource Extraction Really Diminish National Wealth?* Center for Global Development, Washington D.C.
- Global Witness. 2012. *Blueprint for Prosperity: How South Sudan's New Laws Hold the Key to a Transparent and Accountable Oil Sector*, Global Witness, London and Washington D.C.
- Hamilton, K. and E. Ley. 2010. *Measuring National Income and Growth in Resource-Rich, Income-Poor Countries*, Economic Premise, August 2010 No. 28, World Bank, Washington, D.C.
- Hartwick, J.M. 1977. *Intergenerational equity and the investing of rents from exhaustible resources*, American Economic Review 67, 972–974.
- IMF. 2012. *Staff Report for the 2012 Article IV Consultation*, Washington, D.C.
- Lange, G.-M., and M. Wright. 2004. *Sustainable Development in Mineral Economies: the Example of Botswana*, Environment and Development Economics 9, 485-505, Cambridge University Press.
- Ministry of Petroleum and Mining, Republic of South Sudan. 2012. *MPM Marketing Report July, 2011-January 2012 Seven Months Results*, Juba.
- Shankleman, J. 2011. *Oil and State Building in South Sudan*, United States Institute of Peace, Special Report 282, Washington, D.C.
- Solow, R. 1974. *Intergenerational equity and exhaustible resources*, Review of Economic Studies 41, 29–45.
- Solow, R. 1986. *On the intergenerational allocation of natural resources*, Scandinavian Journal of Economics 88, 141–149.
- World Bank. 2006. *Where is the Wealth of Nations? Measuring Capital for the 21st Century*, Washington, D.C.
- World Bank. 2007. *Peoples' Democratic Republic of Algeria a Public Expenditure Review: Assuring High Quality Public Investment*, Washington, D.C.
- World Bank. 2009. *Sudan: the Road toward Sustainable and Broad-based Growth*, Washington, D.C.
- World Bank. 2011. *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*, Washington, D.C.

APPENDIX: TABLE

Table A.1: Projections and Assumptions for Oil Depletion 2010-20

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Price (US\$ per barrel)	79.0	104.0	105.7	105.8	106.5	106.9	107.2	107.4	107.7	107.9	108.2
Cost (US\$ per barrel)	12.5	14.0	15.5	16.8	18.3	19.8	21.2	22.6	24.1	25.5	27.0
Years of extraction	20	20	19	18	17	16	15	14	13	12	11

Source: World Bank and Author's calculations.