Fiscal Federalism of Non-Renewable Natural Resources: Principles and Practices of Revenue Sharing and Equalization

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1. Introduction

Countries can benefit considerably from their natural resources. However, cross-country studies have also shown that the resource revenues may pose certain difficulties: Many resource-rich countries have had disappointing growth (Sachs and Warner 1995) and presence of natural resources markedly increases the probability of civil strife (Collier and Hoeffler, 1998).

Key governance issues are related to the geographical distribution of resources and the arrangements around resource revenues. This is of particular relevance in federal counties, which exist under cooperative pacts for shared rule between tiers of governments. In particular, the revenue sharing of natural resources is a critical question for countries where government revenues are highly dependent on natural resources. The fluctuation of resource prices on world markets often results in highly volatile resource revenues. By ensuring that subnational governments can meet their expenditure responsibility, fiscal policy with a federation plays an important role in determining the extent to which a country can benefit from its resources. The effective design of fiscal federalism depends critically on an appropriate balance between centralization and decentralization

While many federations assign certain taxes on natural resources exclusively or jointly to subnational governments, almost all federations stipulate some role for the federal government in taxation of these resources. Federal governments then face the challenge of apportioning these revenues between federal functions and subnational governments: Should federal natural resource revenues be shared equally between regions, irrespective of derivation, or should the resource-rich regions have a preferential share? Broadly, the revenue-sharing arrangement must then balance two potentially competing interests: 1) efficiency and equity within the federation; and 2) political cohesion of the federation and assertion of title to revenues by the resource-rich regions.

As well, many federations provide for some equalization of fiscal capacity between subnational jurisdictions in the interest of the efficiency and stability of the economic union, as well as from some common definition of social citizenship. Where subnational governments possess authority to tax natural resources, these additional revenues enable a resource-rich jurisdiction to provide public services at lower levels of direct and indirect taxation. In the absence of equalization, such differential fiscal capacity may distort the location of labour and motivate inefficient “beggar-thy-neighbour” policies by a subnational government. Whether and to what degree an equalization framework incorporates resource revenues in the calculation of fiscal capacity has significant implications for horizontal equity between subnational units and for allocative efficiency across the federation.

The optimal tax assignment is not discussed here, even though the negotiation of tax authority certainly shapes subsequent sharing of federal revenues from resources. In general, the literature on this issue suggests that revenues from natural resource exploitation should generally flow to the federal/central budget. More specifically, federal government budgets are seen to be less susceptible to volatile resource revenues than those of subnational governments, and a federal role in redistribution between regions ensures horizontal equity and minimizes distortions from fiscal capacity differences. Thus, the uneven distribution of natural resources argues for a federal role in taxing production from hydrocarbon and mineral deposits. Consequently, the central government is assigned responsibility for natural resources in many countries, including India, Indonesia, Russia, China, Brazil, and Nigeria.

The arrangements around resource revenues largely follow from the ownership of resources – whether by the people of the nation or of the particular subnational unit – and thus from the historical and constitutional context by which ownership is determined. Consequently, preferential sharing of natural resource revenues with subnational governments of resource-rich regions is widely practiced (Boadway and Shah 2008, Bahl and Tumennasan 2002) or taxation of natural resources is assigned to subnational governments, such as in Canada and Australia.

Therefore, although each country’s distinct context forbids a single uniform model for fiscal federalism, it is advisable to base federal arrangments around natural resources on some central general principles. In particular, deviation from best practices for revenue-sharing may create various inefficiencies (Boadway and Shah 2008).

Taking the assignment of ownership and taxation as given, this paper is instead concerned with the design of i) revenue-sharing and ii) fiscal equalization with respect to natural resource revenues. We therefore distinguish between revenue-sharing, where some formula is applied to divide federal revenues between subnational governments irrespective of the fiscal capacity differences, and equalization, where inter-governmental transfers specifically address differences in fiscal capacity between regions.

The remainder of the paper is organized as follows: Section 2 discusses considerations for natural resource revenue-sharing and equalization. Section 3 treats revenue-sharing around natural resource revenues by the federal government, addressing:

1) What principles should overlay the design of revenue-sharing of resource revenues?

2) How are these principles reflected in the revenue-sharing practices of current federations?
3) What are the identified best practices across federal systems?

Section 4 treats equalization in federations with regionally-concentrated natural resources and addresses:

1) What principles should overlay the treatment of natural resource revenues in fiscal equalization systems?
2) How are these principles reflected in the equalization practices of current federations?

2. Considerations for Fiscal Federalism around Natural Resources

Natural resources are not mobile. In contrast with other industries, production of natural resources is by definition location-specific and immobile (Boadway and Shah 2008). Taxing natural resource can be regarded as the public sector share of the rents generated from resources. Although special rent taxes could be imposed on other sectors, the argument is strongest for resource industries since those are where economic rents are most likely to reside (Boadway and Flatters, 1993).

Natural resources are distributed unevenly between regions (Shah 1994). Consequently, resource revenues show significant regional inequality for almost all countries. For example, in Indonesia, fiscal capacity among the regions varies widely and much of this variation results from uneven receipt of resource revenues (Hofman and Kai Kaiser 2002). In Russia, natural resource endowments vary greatly across regions, and resource-poor regions would be hard pressed to fund their mandated expenditures without federal sharing of resource revenues (Bosquet 2002).

Non-renewable natural resources will ultimately be depleted. Furthermore, their extraction often damages the local and regional environment. Acid drainage from mine tailings or the large water requirement for steam-extraction of oil from tar sands are prominent examples. Therefore, regional entitlement to resource revenues may include compensation for the negative externalities from resource exploitation (Shah 1994). The negative externalities not only come from the degrading of the environment from resource exploitation, but also may include the cost of economic adjustment when resources are exhausted.

Resource revenues are volatile across time (Shah 1994). Specifically, natural resources are typically traded on international markets, and resource prices fluctuate widely, generating price uncertainties and volatile revenues (Boadway and Shah 2008).

3. <u>Sharing of Natural Resource Revenues within Federal Systems</u>

3.1. Principles for Sharing of Natural Resource Revenues

As argued above, sharing of resource revenues should be tailored to the particular conditions of a given economy. That is, the arrangement for sharing of resource revenues involves a necessarily political formulation of a national consensus, which balances economic efficiency, horizontal equity, and compensation of subnational governments for regional externalities and resource depletion. (Martinez and Boex). However, the economic literature provides a number of key principles for such arrangements:

1. *Ensure efficiency across the economic union:*

Resources are immobile and therefore could be easily taxed by subnational jurisdictions. However, since resources tend to be distributed unevenly across a nation, taxation by subnational jurisdictions perpetuates both regional inequalities and inefficient allocation of resources.

Efficiency of the economic union requires coordination in order to minimize distortions on the location of mobile factors. Unique access to a tax base, such as through taxes on geographically-concentrated natural resources, will provide a subnational government with greater relative fiscal capacity. Where a particular subnational government has greater relative fiscal capacity, it may provide such positive relative net fiscal benefits.

Disparities within fiscal capacity may encourage fiscally induced migration to resource-rich regions. A jurisdiction can provide a higher level of public services at a lower tax rate. Differential net benefits would encourage people to move to a resource-rich area. Thus, their relocation decisions would compare gross income (private income plus net fiscal benefits minus cost of moving) at new locations, whereas an efficient allocation involves comparison of only private income minus moving costs between the "home" and destination regions. For an efficient allocation, consideration of net fiscal benefits should not enter into the individual's decision.

A resource boom will generate higher marginal products for labour and for capital in the resource-rich region. Migration in response to these factor price differences is appropriate and is a beneficial feature of labour mobility within a federation. However, while factor flows on the basis of factor prices is efficient, migration on the basis of net fiscal benefits represents an inefficient distortion. This presents a strong case for the national government should to correct this "fiscal externality" (Boadway and Shah, 1993; Boadway, Roberts, and Shah 1994).

Additionally, a jurisdiction might seek to attract particular factors from another region by providing greater public services with lower taxation. Subnational governments might also target particular factors such as skilled labour with favourable taxation or complementary public services. Coordination must seek to mitigate opportunities for subnational governments to compete for mobile factors through such beggar-thy-neighbour policies.

Competition between subnational governments for efficient service provision and efficient levels of taxation is an attractive feature of a federation. However, the efficiency of competition presumes an equal footing such that a jurisdiction with higher fiscal capacity cannot out-compete others (Boadway and Shah, forthcoming). The availability of taxes on or differential revenues from natural resources by subnational governments creates a differential in fiscal capacity.

Concurrently, some concept of a common social citizenship is intrinsic to membership in a federation. That is, some principle of equity between citizens, irrespective of region of residence or origin, will apply to citizens' fiscal treatment (Boadway and Shah, Forthcoming). The strength of this common citizenship varies by country and, indeed, by individual: in some federations, regional identity supercedes national identity while, in others, constitutions enshrine equal treatment. This underscores the necessarily political character of negotiations around inter-regional equity.

Nonetheless, most federations provide for some equitable fiscal treatment for citizens across regions. To this end, equity considerations require that citizens not be subject to undue differences in public services between regions. While the mix of public services and taxation should be tailored to local preferences, differences in fiscal capacity should not be the determinant.

With prices typically set on international markets, resource revenues are highly volatile. A federation often incorporates regions with different industrial structures, which are then subject to different shocks. Inclusion of natural resources along with other revenues, derived from bases in other regions, in a central revenue fund may then represent a form of regional insurance (Boadway and Shah, forthcoming). That is, the subnational government in the resource-rich region hedges against low resource revenues by central pooling and revenue-sharing with other regions.

As well, to the degree that a subnational government has recourse to excise or benefit taxes on resource production (such as royalties, transit taxes and licenses), a subnational government may be tempted to use these instruments excessively as a "backdoor" to capturing rents from producers. Such taxes will not be as effective at capturing rents as pure cash flow taxes. Furthermore, in the absence of adequate sharing of resource revenues, regions may enact various types of transit taxes, fees, licenses and other nuisance levies (Bahl and Tumennasan 2002). Federal transfers may then be critical to efficient levels of taxation. Moreover, preferential revenue-sharing may then be appropriate to dissuade subnational governments from such inefficient "backdoor" approaches.

2. *Furnish adequate revenues for subnational governments to meet their expenditure responsibilities:*

Decentralization of fiscal responsibilities to subnational governments aims to improve the efficiency of service provision, regional governments being better capable of tailoring provision to regional preferences, as well as to enhance the accountability of government to citizens. Decentralization of expenditure responsibilities then requires adequate subnational revenues, and thus necessitates apportionment of revenue to subnational governments through inter-governmental transfers or assignment of certain taxes. Administration of certain taxes may be exclusively assigned to the federal government for reasons of equity or efficiency. For instance, taxes on mobile factors, such as personal income taxes, are appropriately assigned to federal governments in order to address national redistribution objectives or to mitigate inter-jurisdictional spillovers from race-to-the-bottom tax competition. As above, resource taxes may be assigned to the federal government from efficiency or equity considerations. Subnational governments may therefore have a more narrow set of tax bases. Without adequate transfers from federal revenue for their expenditure responsibilities, subnational governments may be forced to rely too excessively on these bases, imposing higher than optimal rates.

The natural resource sector requires significant investment in exploration and capital-intensive development, especially in regards to hydrocarbon and mineral resources. As well, profitable exploitation of the resource requires complementary infrastructure – particularly transportation. Additionally, development creates a variety of environmental and social externalities, which are inflicted most deeply within the resource-producing region. Primarily, these considerations provide a case for either assignment to subnational governments of adequate tax bases in order to compel resource producers to internalize costs and to fund sector-specific infrastructure. However, to the degree that revenues from such bases are insufficient for the required public services, some preferential revenue-sharing from federal receipts to the resource-rich region may be appropriate.

3. *Provide accountability for expenditures*

As above, decentralization of taxing powers intends to enhance political accountability with revenues and services better matched, and it may also preclude inefficient “backdoor” approaches to revenue-raising. Resource taxation by the federal government and sharing of revenues from a central pool does segregate the locus of taxation from the locus of expenditure. However, as a general rule, lesser forms of decentralization are possible without necessarily compromising accountability (Shah 1994). By sharing according to a widely known and transparent formula, subnational governments remain accountable to their consituents for their expenditures, even where resource revenues accrue in the form of transfers. Additionally, where subnational governments levy additional taxes, these revenue-sharing transfers are only a source of infra-marginal revenues. That is, public expenditures still depend on taxes levied directly by the region’s government. Therefore, the region’s citizens still have an incentive to hold their subnational government to account.

4. *Preserve the federation through an appropriate revenue-sharing bargain with resource-rich regions:*

Subnational governments frequently contend that they should have the right to revenues from natural resources located within their boundaries. Many subnational governments claim a right to convert resource wealth (their "heritage") into financial capital— turn "oil in the ground into money in the bank" (McLure 1994). Indeed, the cohesion of the federation may require preferential sharing of resource revenues on a derivation basis. That is, resource-rich regions may demand a set proportion of resource revenues as a condition of their remaining within the federation.

After McKenzie (2006), the federation can be viewed as generating an additional surplus that can be shared between its federated entities. Seceding from the federation would sacrifice any additional surplus but the subnational government would retain the entirety of its resource revenues. Politics, identity and history will determine the viability of the subnational government seceding from the federation. However, assuming that the subnational government has this credible alternative or some other bargaining power, the outcome is biased in favour of the resource-rich region capturing some greater share of the federal surplus. Allocation of some preferential share of resource revenues may be then viewed as a bargaining solution where the share is the "bribe" required for the region to remain in the federation.

Where sharing is not resistible, the problem becomes to how to share the resource revenue. The shared resource revenue should match a properly-designed assignment of government responsibilities. Resource revenue sharing should be directly related to the roles of the governments in managing, developing (including providing infrastructure) and conserving the resource. In general, revenue means should be matched as closely as possible to revenue needs.

In particular, the arguments for the prevention of secession from the Federation because of fiscal abuse support that the efficiency of centralization of resource revenues in general can be from fiscal management aspect (McLure 1994; McLure *et al.* 1996).

5. *Avoid multiple or "special" agreements with different regions on revenue-sharing*;

Despite the practical need for some bargained revenue-sharing arrangement, special autonomy or region-specific agreements of course lead to an unstable revenue-sharing system with inevitable jockeying by each region for the most-favoured arrangement. Bahl (2002) compares such arrangements with regions to negotiations with professional athletes: "They want to renegotiate their contract when they think their bargaining power is greater."

Where federal governments concede to preferential sharing, it is important that arrangements are consistent across the federation. Preferential sharing may create distortionary differences in fiscal capacity. It is critical that individualized arrangements be avoided so as to not further exacerbate these distortions.

In summary, sharing of resource revenues should be structured to:

- Ensure efficiency within the economic union – that is:
    - Dissuade subnational governments from "backdoor" taxation of resource rents,

  - Accommodate regional expenditures on sector-specific public services,
  - Minimize additional differences in net fiscal benefits between jurisdictions,
  - Provide insurance against volatile resource revenues, and
  - Promote efficient rates of taxation across all tax bases;
- Furnish revenues adequate for subnational governments to meet their expenditure responsibilities;
- Provide accountability of subnational governments for shared revenues;
- Preserve the federation through an appropriate revenue-sharing bargain with resource-rich regions;
- Avoid multiple or "special" agreements with different regions on revenue-sharing; and
- Provide adequate reinvestment for regional adjustment as the resource base is depleted.

These principles imply that the optimal arrangement is one in which resource revenues are primarily collected by the central government and shared with subnational governments on a need or population basis. Where preferential sharing with regions on a derivation basis does occur, it should be a defined percentage of the derived revenues and not by special agreements for different regions.

3.2. Practices for Sharing of Natural Resource Revenues

Practices in resource revenue-sharing differ significantly across countries. Functionally, sharing in federations can take three forms:
1. Full decentralization: The national government has no role in raising revenue from resources.
2. Subnational surcharge: The tax base is assigned to the national government but the subnational government has flexibility over rate schedule.
3. Tax sharing: The national government returns a portion of the revenues to the originating subnational government on a derivation basis.
4. Revenue sharing: The national government disperses revenues on per capita basis without consideration of derivation, according to population share or another formula.

In practice, the latter two forms are most common in federal systems. Few federations can resist some tax sharing in which resource-rich regions secure preferential allocation. Indeed, in many mature federations, the federal government has abdicated any role in taxing resources to the regional government. Even in those cases where federal governments have exclusive title, such as to offshore resources, some degree of preferential sharing with specific subnational governments is typically conceded.

Both Canada and Australia have near fully decentralized revenues from natural resources. Provinces have full ownership and collect all taxes on resource production. The exceptions are for offshore oil resources and resources in federal territories. However, in Canada's case, the federal government has renounced any tax authority in offshore resources through agreements with maritime governments. In Australia's case, the federal government shares royalties from offshore resources with Western Australia, which fronts onto the offshore deposits.

Therefore, in both countries, these historically-founded regional entitlements to resource revenues pose significant challenges for equalization of fiscal capacities across the federation. As is discussed in Section 4, both Canada and Australia have specific provisions in their equalization arrangements to address these resource-related disparities.

Pakistan has a pure tax sharing system in which natural resource revenues are returned to provinces on a derivation basis.

Russia, Nigeria and Brazil collect revenues at the federal level, but engage in some mixture of tax and revenue sharing with a defined proportion of resource revenues returned to the originating region's government. For Russia, the regional share varies by commodity: an originating region receives no oil revenue but 5% of natural gas revenues, 60% of revenues from other minerals and all revenues from diamonds. For Brazil, defined proportions of resource revenues accrue both to originating states and municipalities. The assigned proportions vary between mineral resources and hydrocarbon resources. The shared proportion also differs between onshore and offshore hydrocarbon resources. Nonetheless, the fronting states and municipalities receive a substantial proportion of the latter. Similarly, for Nigeria, the originating states have a constitutional guarantee of a minimum 13% of all derived resource revenues.

In these cases, the degree of tax sharing reflects the relative bargaining power between the federal government and the resource-rich regions: In Russia, the federal government unilaterally reduced the apportionment of revenues to resource-rich regions as commodity prices climbed, threatening to unbalance inter-regional fiscal capacities. In Nigeria, the constitutionally-enshrined entitlement followed a decade of civil strife in the Niger Delta.

Nigeria and Brazil are also similar in having statutory provisions for the reinvestment in regional development or environmental funds of defined proportions of those oil revenues retained by the federal government – for Nigeria, in the Niger Delta region and, for Brazil, in the Amazon. Such provisions appropriately reflect region's legitimate appeals for funds for readdress of the negative externalities from resource exploitation.

Of the retained federal portion of resource revenues, Brazil, Russia and Nigeria make disbursements from a common pool of general funds: In Brazil, 21.5% of all federal revenues must flow to a Participation Fund with dispersions to states on a per capita basis; in Russia, retained federal revenues accrue to a central equalization budget; and, in Nigeria, retained federal revenues must flow to the Federation Account and disbursements are made following from recommendations of a federal committee with regional representation.

South Africa is somewhat unique among federations in having pure revenue-sharing for natural resource revenues. With natural resources ownership vested with the federal government, all revenues from resource taxation flow to a National Revenue Fund from which each province receives an "equitable share" on the recommendation of an arms-length advisory committee. No preferential share is attributed on the basis of derivation.

Iraq is a federal state in transition and its ongoing disputes over constitutional authorities for resource taxation and provisions for revenue-sharing illustrate the contentiousness and unavoidable politicization of the issue. While draft laws around hydrocarbon development and revenue-sharing remain in legislative deadlock, the Kurdistan Regional Government has passed its own oil law, reflecting its assertion of regional title. Nonetheless, the Kurdish law concedes to centralization of revenue collection, provided that Kurdistan is granted representation on the nascent national oil company and receives a preferential share of revenues.

Iraq's options for resource revenue-sharing are discussed in detail in the Annex. Clearly, owing to the particular sectarian and regional divides, arrangements around natural resources will necessarily incorporate some degree of tax sharing on a derivation basis if Iraq's federation is to be sustained.

We present the practices from selected countries as follows.

(1). Centralized arrangement

a. Azerbaijan (Unitary State)

Resource industries stand for a significant part of the economy in Azerbaijan. In particular, Azerbaijan has a substantial endowment of oil and gas deposits, and the energy sector (and, in particular, the oil and gas subsector) represents the most promising source of exports and economic growth. The oil and gas sector count for 30.5 percent and 32 percent of total GDP in 2000 and 2001 respectively (IMF country report, 2003).

Natural resources such as oil and gas are the sole and exclusive property of the government of Azerbaijan. This is defined by the Subsoil Law, which governs the exploration, use, protection and supervision of subsoil reserves located both within Azerbaijan and its sector of the Caspian Sea and serves as the basic legal framework for natural resources in Azerbaijan in joint with the Energy Law. The Energy Law provides a very general framework for use of energy resources.

Practically, Soviet-era oil and gas fields are operated and managed by the State Oil Company. The State Oil Company of Azerbaijan Republic (SOCAR) and its many subsidiaries are responsible for the production of oil and natural gas in Azerbaijan, for operation of the country's two refineries, for running the country's pipeline system, and for managing the country's oil and natural gas imports and exports. While government ministries handle exploration and production agreements with foreign companies, SOCAR is party to all of the international consortia developing new oil and gas projects in Azerbaijan. New fields are operated and managed under the leadership of international partners (PSAs), from which the incomes are shared with government by pre-determined production sharing agreements. Azerbaijan allows investors to work through Production Sharing Contracts (PSCs) as well as traditional joint ventures (JVs) for the development of onshore deposits. In a JV, a foreign company can have a maximum ownership stake of 49% and must pay eight separate taxes, while a PSC allows an investor to hold even a greater interest than SOCAR, and is subject only to the profit tax. Similar to a PSC, The Revenue Sharing Agreement (RSA), created by SOCAR to attract foreign investment would aim to create the unique fixed term legal and fiscal framework for the existence of an alliance and its corporation with Azeri industry. It would be sanctioned by the Azeri Government and incorporated as a national law as an alternate structure to the JV structure. It is modeled after the PSC form with all its benefits and principles that allow an alliance to operate like a foreign subcontractor, avoiding the adverse tax consequences of the joint venture. This is a flexible, robust alliance structure that is familiar to the Azerbaijan authorities and international contracting community.

In 1998-99, oil-related revenue brought in nearly 50% of budget revenues, including 57% of total indirect taxes. Income tax from both State Oil Company and new oil and gas fields goes to State Budget, and the government share of new oil and gas field goes to State Oil Fund. The State Oil Fund of Azerbaijan was established in December 1999 by presidential decree as an extra-budgetary institution, accountable and responsible to the president. The main objective of State Oil Fund is to ensure collection and effective management of foreign currency and other assets generated from the activities in oil and gas exploration and development, and from the Oil Fund's itself. In detail, Assets of the fund are generated from the following sources: the government's profit share of PSAs; rental fees under the contracts with foreign companies; bonus payments starting from year 2000 onward; acreage fees, and income earned on the Oil Fund's assets.

The ultimate authority over all the aspects of the Oil Fund's activities rests with the president, who is empowered to liquidate and reestablish the fund, approve the Fund's regulations, and identify its management structure. An annual budget will be drafted and submitted to the parliament as part of a consolidated annual budget procedure ensuring public scrutiny of the use of the Oil Fund. Consolidation with the state budget is ensured by close coordination with the Ministry of Finance through the joint Budget Coordination Committee co-chaired by the executive director of the Oil Fund and the Minister of Finance, and based on a memorandum of understanding signed between the fund and the ministry. The Oil Fund's spending is carried out through the state's treasury system, and the use of funds is subject to the State Procurement Law (SPL) and the provisions therein, which govern other budgetary expenditures.

b. Norway (Unitary State)

Norway is an advanced, natural resources-rich country. The oil and gas sector comprises a significant portion of the total economy in Norway, accounting for 17 percent of total GDP in 2002. However, the production of oil and gas is anticipated to peak in 2008 and gradually decline thereafter, halving by 2030[1].

[1] IMF, Norway: Selected Issues, 2007

The central government of Norway controls the natural resources. The control mechanisms over petroleum resources are a combination of state ownership in major operators in the Norwegian fields and the fully state owned Petoro, a company managing Norwegian offshore oil and natural gas properties, and State's Direct Financial Interest (SDFI), on behalf of the government. Meanwhile, the government controls licensing of exploration and production of fields.

Norway has a unique system to capture rent from oil and gas production. In contrast to the Canadian jurisdictions and Alaska, which collect the majority of oil and gas revenues from royalties, Norway does not auction off licenses. In Norway, licensees, which give companies the right to explore, drill, produce and sell oil and gas in the country for a certain period of time, are awarded to oil and gas companies. The rationale is that it disperses exploration risks over a large number of wells and companies, rather than just those companies willing to place significant bids in an auction. Consequently, revenue is obtained mainly through a system of taxes and direct ownership of resources through royalties, area fees and a carbon dioxide tax, among other taxes. In addition, the special tax on profits allows the Norwegian government to capture significant revenues and a high portion of economic rent. Meanwhile, the carbon dioxide tax is part of the country's long-term plan to reduce greenhouse gas emissions and is an important part of the country's rent capture regime.

A couple of factors are cited as the major factors permitting resource revenue to be managed transparently as part of an integrated fiscal management system, such as the well established institutional framework, its long tradition of transparency for both fiscal policy and central bank operations, and its broad revenue base (with oil revenue accounting for typically less than 15 percent of total fiscal revenues) of Norway. Particularly, Norway has a well-formulated and transparent asset management strategy for its Government Petroleum Fund. The Ministry of Finance bears overall responsibility for the Petroleum Fund’s asset management, but has delegated the task of the operational asset management to the central bank (Norges Bank) based on a management agreement. The Ministry of Finance defines the strategy for investment by identifying a benchmark portfolio against which Norges Bank seeks to achieve the highest possible return. Meanwhile, the Ministry of Finance also controls exposure to risk so that the actual return should remain within a range around there turn on the benchmark portfolio[2].

Norway’s fiscal policy drives Petroleum Fund operations rather than vice versa. The Petroleum Fund accumulates all oil revenue and returns on financial investments, and transfers from the Petroleum Fund to the budget are only made to the extent necessary to finance the non-oil deficit, with the size of the non-oil deficit determined by annual, medium-term and long-term fiscal policy.

(2). Centralized sharing arrangement

a. Indonesia (Revenue Sharing)

[2] (see http://www.norgesbank.no/english/petroleum_fund/management/strategy.html)

Indonesia is rich in natural resources, and the role of oil, gas and other mineral sectors is very significant in Indonesian economics. The contribution of these natural resources sector to the Indonesian economy constitutes about 27% of GDP in 1992 and about 24% in 2005. By constitution, natural resources are owned by the unitary state in Indonesia. Natural resources' contribution to government revenue is significant. In 2005, about 22 percent of government revenue came from non-tax natural resources revenue, the second most important revenue source after income tax from non-oil and gas.

Indonesia experienced a significant political and economic decentralization in recent years[3]. Particularly, decentralization brings to the provincial (a) the allocation by the national government of the IRA funds to all provinces, in particular to the disadvantaged and resource-poor provinces, and (b) resource rent revenue sharing, particularly with the resource rich provinces (Eckardt and Shah 2006). Meanwhile, fiscal decentralization also grants extensive responsibility to all of Indonesia's provinces (East Timor was to be dealt with separately) in all matters except defense, foreign judicial, fiscal, monetary and religious affairs and matters that are deemed "strategic".

The revised law 33/2004 introduces a new type of shared revenue which slightly increases the sub-national share of oil and natural gas revenues. Starting in 2009, 84.5% of oil revenues and 69.5% gas revenues will accrue to the central budget and the rest to subnational governments. Subnational governments also receive an extra 0.5% of both oil and gas revenues to increase local expenditures on primary education. Table 1 summarizes the resource revenue sharing according to law 33/2004 in Indonesia.

Table 1: Resource Revenue Sharing in Indonesia according to Law 33/2004

Revenue Source	Central Government	Originating Provincial Government	Originating Local Government	All Local Governments in originating Province	All Local Governments (Equal Share)
Mining Land Rent	20%	16%	64%	-	-
Mining Royalty	20%	16%	32%	32%	-
Forestry License	20%	16%	64%	-	-
Forestry Royalty	20%	16%	32%	32%	
Fishery Royalty	20%	-	-	-	80%
Geothermal Mining	20%	16%	32%	32%	-
Oil					-
Base rate	84.5%	3%	6%	6%	-
Conditional rate	-	0.1%	0.2%	0.2%	-

[3] see the Law on Regional Autonomy and the Law on Intergovernmental Fiscal Relations passed on April 23 and April 25, 1999 respectively

(Education)					
Natural Gas					
Base rate	69.5	6%	12%	12%	-
Conditional rate (Education)	-	0.1%	0.2%	0.2%	-

Source: Adapted from Eckardt and Shah (2006)

South Africa (Revenue-Sharing)

South Africa's constitution does not treat ownership of natural resources specifically but residual powers are vested with the federal government and this function is not include under the areas of concurrent jurisdiction (schedule 4) or exclusive provincial jurisdiction (schedule 5). Under Chapter 13 Section 213, the Constitution establishes this National Revenue Fund into which all revenues received by the federal government must be paid, irrespective of source. The division of these revenues proceeds by an act of parliament which must provide for an equitable vertical and horizontal distribution. The constitution stipulates an "equitable share" of revenues between provinces based on the recommendations of the Financial and Fiscal Commission after consultation with the national government, provinces and municipalities.

Established under section 220 of the Constitution, the Financial and Fiscal Commission exists as an autonomous government body. Its advice to parliament on the equitable division of revenue is to consider the fiscal capacity of the provinces and municipalities, as well as economic disparities amongst the provinces. Additionally, the allocation must ensure that provinces and municipalities possess revenues sufficient to provide basic services and perform their mandated functions.

Under section 226 of the Constitution, provinces can levy taxes, levies and duties other than income tax, value-added tax, general sales tax, rates on property or customs duties, as well as flat-rate surcharges on any tax, levy or duty that is imposed by national legislation (other than on corporate income tax, value-added tax, rates on property or customs duties), provided that these taxes would not materially and unreasonably prejudice national economic policies or economic activities across provincial boundaries.

Only recently has South Africa moved to impose specific taxes on its large mineral resource wealth. Previously, only general taxes, including corporate income taxes and property taxes applied. Royalties were negotiated and only available where the state had specifically purchased mineral properties. The 2008 final draft of the Mineral and Petroleum Resources Bill, under revision and consultation since 2003, creates a regime for collection of royalties by the State and provides for all mineral rights to vest with the State.

Certain submissions to the Portfolio Committee on Finance during consultations around this bill advocated for earmarking of mineral revenues and the establishment of a dedicated national fund for the benefit of "labour sending areas" and the development of mining communities. The Committee's response opposed such earmarking on the basis of accountability over spending and the principle that benefits belong to all South Africans. However, the Committee was amenable to federal spending programs targeted at development of mining and labour supplying communities. Such sharing was not specifically included in the Bill's final draft.

The Bill does preserve the rights of traditional communities to previously-arranged royalties from mines on their land, but disallows any deduction for these royalties in those to be paid to the State. The Portfolio Committee on Finance encourages the conversion of these community royalties into equity stake in the particular operation.

Brazil (Tax/Revenue-Sharing)

Under the 1988 Brazilian Constitution, the States and Federal District are excluded from levying any tax upon mineral or energy resources except through transportation levies. The federal government is responsible for the delivery of 21.5% of all revenues to a Participation Fund. Dispersions from this fund are on a population basis.

For mineral resources, the federal government collects Financial Compensation for the Exploitation of Mineral Resources, equal to approximately 8% of gross monthly revenue. From this levy, 65% is earmarked for the municipalities where production takes place, 23% for the States or the Federal District, and 12% is directed to the National Department of Mineral Production, of which 2% must be allocated to environmental protection.

For petroleum resources, the Petroleum Regulation in Brazil Law of 1997 stipulates that any concession contract must provide for royalties at 10% (or adjusted for risk) of production value and a fee for land occupation. For onshore production, the law stipulates a division of royalties with 52.5% to the States where the production occurs, 15% to the municipalities where the production occurs, 7.5% to the municipalities affected by petroleum shipping, and 25% to the Ministry of Science and Technology for financing of petroleum research. When production occurs on the continental shelf, the distribution is 22.5% to the States fronting the production area, 22.5% to the municipalities fronting the production areas, 15% to the Navy Ministry for monitoring activities, 7.5% to municipalities affected by petroleum shipping, 7.5% for a Special Fund (to be distributed among all States, Territories, and Municipalities) and 25% to the Ministry of Science and Technology. Furthermore, the law provides that, of the total resources destined to the Ministry of Science and Technology, a minimum of 40% must be used to promote the scientific and technologic development of the Northern and Northeast Regions.

The law calls for "Special Participation" taxes, where projects are exceptionally profitable, to be levied on gross production after deduction for costs and regular royalties. From these profit taxes, 50% is to be directed to geological research and environmental protection by the federal government while 40% and 10% are to accrue respectively to the States and municipalities where production occurs or which front the offshore region.

b. Nigeria (Tax/Revenue Sharing)

Under Nigeria's 1999 Constitution and reiterated in Minerals and Mining Decree (Law No 34 of 1999), ownership of all minerals, mineral oils and natural gas under lands and offshore is vested in the Government of the Federation with management delegated to the National Assembly. Oil is the main source of revenue in Nigeria and unevenly distributed. 82 percent of the total revenue of the general government, or 40 percent of GDP comes from oil in 2000[4], and the revenue is concentrated in only a few of the 36 states, which have onshore or offshore oil production.

Oil revenue is shared between the federal government and the state and local governments in Nigeria. Revenues are received by the Nigerian Federal Government from: i) a proportion of oil sales arranged through separate Joint Venture agreements with private oil companies, administered through the Nigerian National Petroleum Corporation; ii) royalties at a present rate of 20%; iii) a petroleum profits tax levied at a rate of 85%; and iv) rents charged on land from which oil is extracted, pipeline right-of-way and licenses on gas-flaring.[5] The 1999 constitution provides a common pool of financial resources (the Federation Account) under which all monies are to be distributed among the federal, state, and local government councils in each state. National Assembly makes allocations from the Federation Account to supplement the revenue of each State. The share of the local governments is from the Federation Account through the states, and is paid into the State Joint Local Government Account.

Under section 162(2) of the 1999 Constitution, oil producing regions are guaranteed a share of not less than 13% of revenues accruing to the Federation Account. Since independence, various sharing formulae have been in place but all have emphasized a proportional allocation from a federal pool with some transfer on a derivation basis. The recent arrangements represent a decentralizing shift with greater allocation to regional governments and an increased share for the producing regions.

About half of the net proceeds (after deduction of first charges) are redistributed to state and local governments according to a formula decided by parliament every five years. After these derived funds are allocated to the respective subnational governments, a vertical formula is applied to divide the funds into that proportion received by the federal government (between 48.5 to 53%), state governments (between 24% and 26%) and local governments (around 20%). The constitution also establishes the Revenue Mobilization, Allocation and Fiscal Commission to advise the President on the revenue allocation to table before the National Assembly. In practice, this commission is chaired by the Finance Minister and consists of the finance commissioners of each state. The allocation principles emphasize population, inter-region equality, internal revenue generation, land mass and population density. From the federal allocation from the Federation Account, the federal government is also responsible for several statutory transfers. These include a statutory transfer to the Niger Delta Development Commission of an amount equivalent

[4] Oil revenues consist of (i) crude export earnings of the NNPC; (ii) profit taxes and royalties of oil-producing companies (usually joint-venture companies with a government majority ownership); and (iii) domestic crude sales and upstream gas sales.
[5] Federal Ministry of Finance, 2008

to 15% of the dispersions to the oil-producing regions from the Federation Account. These funds are to be invested in infrastructure and human resource programs in the Niger Delta region.

Under Nigeria's current system, only federal revenues are subjected to revenue sharing arrangement. All revenue collected by federal government goes to the Federation Account, and the Federation Account is divided into federal government, State Joint/Local Joint account, and Special Funds. Both State Joint and Local Joint account are shared based on same criterion for state and local governments respectively, and special Funds are designated for special purposes.

The states and local governments keep whatever internal revenue they are able to raise themselves, and share federally collected revenue. Notably, the federal government has authority for all major taxes and its annual revenues constitute about 90% of the collective revenue from all the three tiers of government in Nigeria. Table 2 shows the overall share, collection of resource revenues and distribution of federally collected revenues.

Table 2: Disbursements of federally collected revenues in Nigeria

Tiers of govt./Components	Overall share *(Annual Average %)*	Collection *(Annual Average %)*	Distribution of federally collected revenues	
			%	Remarks
Federal Government	43.65	90	48.5	
State Govt./State Govt. Joint Account	29.6	8	24	Criterion: • Equality 40% • Population 30%
Local Govt./Local Govt. Joint Account	20	2	20	• Social Development 10% • Land Mass and Terrain 10% • Internal Revenue Effect 10%
Special Funds	6.75		7.5	• FCT 1 • Ecology 2 • OMPADEC 3 • Derivation 1 • Stabilization 0.5
Total	100	100	100	

Source: Authors and Udeh, John (2002).

Consequently, States and local governments are highly dependent on revenue-sharing arrangements with the federal government. In 1999, 75 percent of state revenue came from redistributed revenue from the federal government, including their share of the VAT (85 percent of total proceeds), and 94 percent for local government revenue. Most of this revenue was oil related.

(3). Joint revenue sharing arrangement

a. China (Decentralized)

The natural resources in China are defined as the property of the central government. According to articles 9 of the 1982 Constitution, "Mineral resources, waters, forests, mountains, grassland, unreclaimed land, beaches and other natural resources are owned by the state. That is, by the whole people, with the exception of the forests, mountains, grassland, unreclaimed land and beaches that are owned by collectives in accordance with the law. The state ensures the rational use of natural resources and protects rare animals and plants. The appropriation or damage of natural resources by any organization or individual by whatever means is prohibited."

Resource revenues account for less 1% of total government revenues. The arrangement for resource revenue-sharing between the central government and subnational governments is defined by the Tax Sharing Reform in 1994. In general, the central and subnational governments have segregated revenue bases. The central government has title to tax offshore oil exploitation, and the subnational governments have title to those in their regions. In practice, almost all resource revenues accrue to subnational governments.

Provincial governments have discretion over resource revenue-sharing between the province and prefecture/county governments. Therefore, there are various resource revenue sharing mechanisms between the provincial and municipal governments. In general, the main part of resource tax goes to the provincial government: For example, in Gansu province, the provincial share is 70% and the sub-provincial share is 30%.

b. Pakistan (Tax Sharing)

Based on articles 141 and 142 of the Constitution of the Islamic Republic of Pakistan, 1973 as amended and recently restored to effect (the "Constitution"), the National Minerals Policy 1995 notes that minerals other than oil, gas and nuclear minerals and those occurring in special areas under the control of the national government (e.g., the federally administered tribal areas and the national area surrounding the capital city) are governed by the laws and regulations of the provinces in which they are located. Particularly, the Federal Government of Pakistan has exclusive authority over the development of petroleum resources, natural gas and "mineral resources necessary for the generation of nuclear energy;" and all other mineral resources occurring in federally administered areas. Meanwhile, the respective provincial governments of the four provinces of Pakistan have exclusive authority over the development of all mineral resources occurring within their respective borders other than those resources under the exclusive control the Federal Government.

Pakistan is not regarded as a natural resource-rich country. Under current system, all central excise duties on natural gas, surcharge on natural gas, royalty on natural gas, royalty on crude oil are passed through a “straight transfer”: That is, these are distributed entirely to provincial governments on a derivation basis[6].

c. Russia (Tax/Revenue-Sharing)

The Constitution of Russia does not provide clear definition on who has authority with respect to possession, utilization and management of natural resources. Article 72 of the Constitution of the Russian Federation provides for the joint jurisdiction of the federal government and its 89 subjects (members of the Federation) over "issues of the possession, utilization and management of land and of sub-surface, water and other natural resources" and "administrative, administrative-procedural, labor, family, housing, land, water and forest legislation; legislation on subsurface resources and on environmental protection."

Russia has considerable oil and gas revenues. At the federal level, oil and gas related revenues might make up to about 45-50 percent of total revenue. Natural resources taxes include petroleum production royalties, charges for use of mineral deposits[7], and are mainly collected by subnational governments. Natural resources are highly unevenly distributed and concentrated in some small regions. For Example, most oil and gas production is located in two autonomous regions (Khanty-Mansi and Yamalo-Nenets), about three-fourths of all metal production originate from 10 regions. Consequently, resource revenues are highly concentrated in a small number of regions. In 1997 the three regions best endowed in natural resources collected 47% of the sum of regional revenues from taxes, fees and charges on natural resources (Klotsvog and Kushnikova 1998; USGTAT 1998).

Presently, 60% of Russia’s oil production occurs in regions which account for 8.5% of its territories and 1.3% of its population[8]. Prior to 2002, 60% of taxes on mining operations accrued to the mineral-producing regions. In 2002, the federal government lowered the proportion for oil revenues to 20% and further to 15% in 2005. After 2004, natural gas revenues have accrued exclusively to the federal budget. From the federal budget, 15% of revenues are directed to a Stabilization Fund, 55% to the federal budget and 30% are transferred to subnational budgets. Revenues from mining taxes are included in the central equalization budget, which is used to address regional disparities. Such revenues are not specifically shared[9].

Natural resource tax revenue assignment is a sensitive matter, and the federal and sub-national governments often disagree on how to share the fiscal revenues from natural resources (McLure 1994; McLure et al. 1996). For example, in 1997-1998, the governors of the regions of Karelia and Khabarovsk challenged the federal ownership of forests

[6] Transfers of funds through the NFC Awards are the dominant source of revenue for the provincial governments, and account for about 80% of provincial revenue receipts.

[7] Exploration fees are mainly collected by subnational governments, and are important sources of own revenue in the oil-producing regions.

[8] Kurlyandskaya, 2007

[9] Ibid.

before the Supreme Court, but lost. The Budget Code of 1998 (amended through 2008) sets out the division of revenues for different resources. All taxes on natural gas accrue to the federal government while 95% of oil revenues and 40% of mineral extraction (with the exception of diamonds) accrue to the federal budget. Regions thus obtain 5% of natural gas revenues, 60% of taxes on minerals and all of those on diamond extraction. Regions are also entitled to 80% of revenues from production sharing agreements entered into before enactment of the federal law. All revenues from offshore oil production accrue to the federal government. All royalties from natural gas extraction and 95% of those from oil extraction accrue to the federal budget while the entirety of a common tax on mineral extraction accrues to the regions. Table 3 details these sharing arrangement between the levels of government.

Table 3: Statutory Assignment of Selected Natural Resource Revenues in Russia (%)

User fee type	Federal Share	Regional Share	Local share
Subsoil user fees (oil and gas)	40	30	30
Subsoil user fees (other than oil and gas)	25	25	50
Subsoil water user fees	40	60	0
Oil excises	100	0	0
Gas excises	100	0	0
Oil replacement fee[10]	20(100)	20(0)	0
Forest user fees[11]	40	60	0(100)
Surface water user fees	40	60	0
Aquatic biological resource user fees[12]	100	0	0
Pollution charges[13]	19	27	54
Water supply, sewage and treatment[14]	0	0	100
Land taxes and rentals	30	20	50

Source: adapted from Benoit Bosquet (2002)

(4). Joint base sharing arrangement

[10] 20% to the federal fund for mineral base replacement and 20% to the regional fund for mineral base replacement. The remaining 60% stays in the company conducting exploration activities, depending on the clauses of the ad hoc agreement with the Ministry of Natural Resources. If the company does not conduct such activities itself, 100% flow to the federal fund for mineral base replacement.

[11] The breakdown corresponds to the revenues from minimal stumpage fees. Excess stumnpage fees accrue to the local leskhozy.

[12] The receipts are sent to the federal fund for the management, research, protection and reproduction of biological resources.

[13] Divided into general budget revenues and earmarked budgetary environmental funds: the federal share breaks down into 10% to the federal budget and 9% to the federal environmental fund; the regional and local shares accrue to the regional and local environmental funds, respectively.

[14] All proceeds go to municipal water utilities for cost recovery.

Australia (Decentralized)

Taxation of mineral resources is vested with the respective state, while the national government has title to revenues from offshore petroleum resources and from uranium mining in the Northern Territory. Ownership of uranium in the Northern Territory remains with the national government. States otherwise levy royalties independently and typically apply different rates to different minerals.

Federal government revenues accrue from a Petroleum Resource Rent Tax, a crude excise tax, royalties and uranium mining in the Northern Territories. The taxes levied on petroleum do not overlap. For onshore petroleum, the crude excise is waived when a state government imposes a Resource Rent Royalty and negotiates a sharing agreement with the national government. Such a royalty is only applied to production in Western Australia and 75% of these revenues accrue to the national government.

For offshore resources, the Petroleum Resource Rent Tax is applied to all offshore petroleum production except on the North West Shelf. For the North West Shelf, a graduated royalty is payable to the Australian Government on the value of all petroleum (including gas) production from the project area and is shared with Western Australia. Revenue from the North West Shelf is shared accorded to a formula set out in Section 129 of the Petroleum (Submerged Lands) Act of 1967, which accords the Western Australia a share of approximately 2/3 of all royalties.

a. Canada (Decentralized)

Except for offshore resources and those located in Canada's Yukon and Northwest Territories, natural resources are constitutionally owned by the respective province. Provinces thus hold exclusive rights to royalties and associated resource revenues within their borders.

Agreements with Nova Scotia and with Newfoundland and Labrador entitle these provinces to revenues from offshore oil production. The *1985 Canada-Newfoundland Atlantic Accord* between the federal government and Newfoundland and Labrador allowed the province to tax these resources as if it were the owner. Similarly, the *1986 Canada-Nova Scotia Offshore Petroleum Resources Accord* entitles Nova Scotia to receive "the royalties, interest and penalties that would be payable in respect of petroleum under the Offshore Petroleum Royalty Act if the petroleum were produced from Nova Scotia lands" and grants Nova Scotia jurisdiction over the royalty rate.

b. United States (Decentralized)

In the United States, states are sovereign under the constitution and own the resources (except on federally-owned land). Resource revenue bases are then assigned to the states (McLure, 1994). Alaska – where oil revenue represents about 4/5 of the state's own-source revenue – illustrates the various taxes levied on natural resources.

On oil, the state of Alaska levies (i) a property tax (at 20 mills or two percent on appraised value), a severance tax ranging from 12 1/4 percent to 15 percent on oil, subject to a minimum tax per barrel; (ii) royalties, a production tax surcharge for hazardous spill; and (iii) a corporate income tax. The corporate income tax is based on corporation worldwide net income apportioned to Alaska under a three factor formula involving (i) the percentage of corporate sales and tariffs from Alaskan operations; (ii) the percentage of production from Alaska; and (iii) the percentage of property represented by Alaska holdings—at a maximum marginal rate of 9.4 percent. All state taxes and royalties are deductible for federal income tax purposes. Apparently, subnational government is fully accountable for the fiscal policy choices related to oil revenues and their possible uses for spending or savings. In particular, Alaska has created a fund to save part of the oil revenue for future generations.

(5). Decentralized arrangement

United Arab Emirates (Decentralized)

The United Arab Emirates (UAE) is an important oil producer with the fifth largest proven oil reserves in the Middle East. The UAE has been a member of the Organization of the Petroleum Exporting Countries (OPEC) since in 1967.

UAE has seven autonomous sheikdoms—Abu Dhabi, Dubai, Sharjah, Ajman, Umm al-Qaiwain, Ras al-Khaimah, and Fujairah. Under the country's constitution, each emirate maintains principal control of its own oil revenues and other natural resources. They turn over a set percentage of their revenues to the federal government, which takes care of defense, diplomacy, education, public health, banking, and several other concerns for everyone. The constitution gives each emirate explicit and exclusive control over any matter not specifically assigned to the federation. Oil and gas revenues include royalties, company profit transfers, and income tax. The federal government is mostly financed by cash and in-kind contribution, which is negotiated every year between the federal government and each emirate, from oil-producing emirates.

According to our knowledge, United Arab Emirates is the only country practicing full-decentralized arrangement of resource revenue. Oil is the major revenue source of the United Arab Emirates. The emirate of Abu Dhabi is the center of the oil and gas industry, followed by Dubai, Sharjah, and Ras al Khaimah. Hydrocarbon revenues account for around one-third of the UAE’s GDP, and oil and gas revenues accounted for about half of total government consolidated revenue. The non-oil sectors grew 18.6 percent in 2006 and have tripled during the last three years. However, the country remains dependent on oil revenue, and the government has announced large oil production capacity increases within the next seven years.

The classification of resource revenue sharing discussed above can be summarized in table 4.

Table 4 Classification of Resource Revenue Sharing

Arrangement type	Country	Country type	Ownership of Natural Resources	Authority on revenue sharing				Share of mining and quarrying in GDP[15]	Subnational share of total government expenditure
				Authority on revenue bases and rates	Authority on revenue collection	Authority on sharing arrangement	Arrangement related to origin of revenue		
Centralized	Azerbaijan	Unitary	Central	Central	Central	Central	No	24.7	24.1
	Norway	Unitary	Central	Central	Central	Central	No	12.9	32.4
Centralized revenue sharing	Indonesia	Unitary	Central	Central	Federal	Federal	9%[16]	10.1	12.2
	Nigeria	Federal	Federal	Federal	Federal	Federal	>=13%	35.7	28.9
Joint revenue sharing	China	Unitary	Central	Central	Central / Provincial/Local	Central / Provincial	100%, subnational collected		69.9
	Pakistan	Federal	Federal/provincial	Federal/provincial	Federal/provincial	Federal	98%	0.5	29.2
	Russia	Federal	Federal/State	Federal/State	Federal/State	Federal/State	100%, state collected	30	
Joint base sharing	Canada	Federal	Provincial	Federal and provincial separately	Federal and provincial separately	Federal and provincial separately	100%, state collected	3.5	57.4
	United States	Federal	State	Federal and State separately	Federal and State separately	Federal and State separately	100%, state collected	1.6	46.3
Decentralized	United Arab Emirates	Federal	Emirate	Emirate	Emirate	Federal/ Emirate	100%, Emirate collected	46.7	

Source: Authors, Bahl and Tumennasan (2002), and National Account Statistics, United Nations.

[15] Share of mining and quarrying in GDP and Subnational share of total government expenditure are adopted from Bahl and Tumennasan (2002) except for Russia, which is from National Account Statistics, United Nations.
[16] Base rate of oil.

IV. Evaluations for Resource Revenue Sharing Practices

In general, a more centralized resource revenue sharing system provides higher chances for better economic performance. It provides the possibility for the central/federal government to internalize the externality of resource industry, provide more even distribution across regions of resource revenues, and improve the stability of revenue in time horizon. For example, the operations of the Norwegian Petroleum Fund can be considered as best practice, as they are part of a coherent fiscal policy strategy. Fiscal policy aims at smoothing public spending over time and decoupling it from volatile oil revenue. Meanwhile, it seeks to replace oil wealth with financial assets, which are in fact expected to grow in value over time so as to be able to deal with the expected increase in public spending associated with an aging population (Scancke 2003). The full-centralized arrangement also provides the possibility for Azerbaijan to reduce its dependency on volatile oil revenues and facilitates simultaneous development of non-oil sector. Indonesia can also be regarded as achieving relatively successful growth in comparison with other resource-rich countries. Until 2000, all oil and gas revenue accrued to the central government and was not subject to any revenue-sharing arrangement. Centralized oil revneues provided the central government reasonable fiscal latitude to promote economic diversification.

However, even in a centralized revenue sharing system, there could be significant challenges as the significant portion of revenues goes to subnational government without corresponding responsibility assignment. In particular under the case that revenue arrangement is significantly related to the origin of revenue. In Nigeria, lack of legal mechanisms to impose fiscal discipline on lower tiers of governments is one of the key challenges faced by Nigeria. In particular, the revenue sharing system in Nigeria directded the benefit from higher oil prices in 2001-2002 to subnational governments, particularly to oil-producing states. However, there is no corresponding expenditure assignment adjustment (Ahmad and Mottu 2003). As the transfers are immediately spent, it not only contributes to inflation and macroeconomic issues, but also causes the problem related to government accountabilities. Meanwhile, the sharing arrangement leaves little room for the central government to implement macroeconomic policy. Revenue sharing in Nigeria also did not protect the state and local governments from price fluctuation, and equity became serious political issue as oil-producing states demand more share in resource revenue and non oil-producing states demand more equal redistribution.

Most likely, the regional/local ownership or joint ownership of resources usually leads to a more decentralizing resource revenue arrangement such as joint arrangement of revenue-sharing, joint arrangement of base-sharing arrangement, and full-decentralized arrangement. Meanwhile, the central ownership of resources may also leads to a decentralized resource revenue arrangement, such as China. Practically, a decentralized resource revenue sharing system generates more challenges for the economy. In Russia, sharing arrangement caused large disparities in revenue between resource-rich regions and the others. The five richest-resources regions, which have 5.5% of total population, collected 53% of all subnational government revenues from taxes, fees, and charges on natural resources in 1997 (Martinez-Vazquez and Boex 2000). In China, all resource-rich areas face serious environment damages and lack of the capacity of sustainable development as there is no link between the resource revenue sharing system and government responsibility assignment. Pakistan faces similar problems.

The disadvantage of a decentralizing resource revenue arrangement could be alleviated, to some extents, by the good governance of state/local governments. For example, the base-sharing arrangement in Canada and United States may be strongly related to the accountability of state/local governments. Canada and United States have good performance with their resource revenue sharing system, but it is worth to stress that their systems are based on mature intergovernmental fiscal relation, less fiscal dependency on resource revenues, as well as good local governance.

Clear responsibility assignment also helps improve the performance of resource revenue sharing system. Besides United States and Canada, United Arab Emirates benefits from clear responsibility assignment, and non-oil sector increased dramatically in recent years.

V. Lessons from Practices

Although traditional decentralization theory supports the argument that decentralization may improve local accountability in general, it is not supported by international practices in resource revenue sharing system in resource-rich countries. It is reasonable because of the negative externality related to resource industry and volatile of resource revenues. Practically, with the federal/central ownership, it could be more achievable to have a full-centralized arrangement of resource revenues. However, the state/local ownership of the natural resources may prevent the federal/central government from making a full-centralized arrangement of resource revenues. There are a couple of lessons we learn from international practices.

First, the key objective in designing resource revenue sharing system should be the sustainable development of the economy. Apparently, both theory and international practices support the argument that resource revenue should be centralized as much as possible to achieve this goal, either from efficiency, equity, or macroeconomic stability aspect. However, a centralized revenue arrangement is not a sufficient condition to be a successful system. In particular, a centralized system only provides the potential for the federal/central government to make sound arrangement. This potential could be damaged by mismanagement of resource revenues.

Under any forms of resource revenue sharing, it is necessary to spend oil revenues properly. How a country manages its oil wealth is very important because of the spending effect. A component of the Dutch Disease linked to the resource curse. Norway took a number of steps to spend its oil revenues in a way that did little harm and yielded enormous benefits to the country through huge investments in its citizens. Countries like Nigeria were wasting resources on industrial projects that served mainly to benefit corrupt politicians.

Second, how much of the resource revenues should go to subnational governments, particularly, whether the arrangement should be related to origin of resource revenue, is a critical issue. If a significant portion of revenues goes to the subnational governments without corresponding responsibility assignment, particularly to the origin of the revenue, not only the regional inequality problem cannot be solved, but also the inefficiency in the use of the resource revenue of local government could occur as another challenging problem like in Nigeria. Sound arrangement should balance the resource revenue going to the subnational government and the responsibility assignment to the subnational government, and limit the relation of the distribution of resource revenues and the origin of the revenue.

Third, under an economy that the resource revenue cannot be centralized, the design of resource revenue sharing system has to be accompanied with sound assignment of government responsibilities and accountabilities of local governments. Meanwhile, good local governance may offset some weaknesses in a decentralized resource revenue arrangement. However, a decentralized arrangement also should emphasis the sound intergovernmental transfer system since good local governance cannot solve the problem of regional inequality, particularly in an economy that shows high dependency on natural resources.

Fourth, fiscal discipline shows more important meaning in resource revenue sharing, particularly for the economy having high dependency on resource revenue. It could be more important in an arrangement that significant resource revenue goes to local government since local government usually has less capacity to deal with the instability of resource revenues. Although extra-budgetary funds usually present a number of transparency problems and are not recommended as a necessary contribution to resource revenue transparency, a number of countries have set up extra-budgetary funds with the aims to protect the budget and economy from the volatility of resource revenue flows. It can also save for future generations as well as other purposes use funds like development funds. Best practice for such funds emphasizes fiscal discipline such that no moneys may be spent directly from such funds, and any use of such funds should be through the government budget and subject to normal budget appropriation processes like Norway.

In summary, a uniform optimal solution may not exist, and the proper design of resource revenue sharing may need to be done case by case. However, a revenue sharing system has better mechanism to align the interest of different layers of government in internalizing the negative externality of resource industry and to have more even distribution of resource revenue has better chance to be successful. Meanwhile, the design of resource revenue sharing is not an isolated issue, instead it highly depends on the quality of management in resource revenues and the accountability of government especially for the economy with high dependency on resource revenues.

4. Equalization in federal systems with resource-rich regions

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