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How should Revenues from Natural Resources be Shared in Indonesia?

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How Should Revenues From Natural Resources Be Shared in Indonesia?

Roy Bahl* and Bayar Tumennasan**

The objective in this paper is to evaluate the system of sharing natural resource revenue in Indonesia against the criteria that are most often discussed in international forums. The paper has three parts. First, we examine the importance of the issue and try and place the practice in Indonesia in some comparative perspective. Second, we argue the case for and against decentralization of revenues raised from natural resources and consider the constraints to such a decentralization policy. Third, we examine the reform options in terms of the specific fiscal instruments that might be used. This research is exploratory and does not delve into the detail of the complicated system of mineral taxation and of the present system of natural resource revenue sharing in Indonesia. Only a few Indonesian scholars have addressed this subject, and we cannot find a comprehensive government policy paper on the subject. [1]

Importance of the Issue

Natural resources constitute a great source of wealth in many developing economies. As may be seen from the data in Appendix Table 1 and from the frequency distribution in Table 1, the share of "mining and quarrying" in GDP is above 10 percent

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[1] The one government paper that we did find that explicitly discusses and researches the topic of natural resource revenue sharing in Indonesia is Bappenas, 2000. .

in 16 of 91 countries for which we could find data [2]. It accounts for more than one-fifth of GDP in 8 countries. Indonesia's mining share is 9.8 percent, about one-third higher than the international median. Of the countries in the East Asian region only, Mongolia, and Papua New Guinea are more heavily dependent on natural resources than is Indonesia.

We also examine the "connect" between the share of mining in GDP and selected fiscal variables. We ask two questions. Do the countries that rely more heavily on natural resource production show a greater ratio of tax revenue to GDP? Do the countries that rely more heavily on natural resource production choose more or less decentralized fiscal structures?

With respect to the first question, one might expect a positive relationship between the tax ratio and the mining share of GDP. This is especially true in developing countries where there are relatively fewer "tax handles" to reach for. The mining sector is visible, relatively easily reached with the existing tax administration apparatus, and offers a lucrative revenue take. Bahl (1971) found a significant, positive relationship between the mining share and the tax ratio using data for the 1960s.

We estimate a log-linear regression of the determinants of the tax ratio to GDP using the independent variables that have become standard in tax effort analysis: per capita GDP, the agriculture share of GDP, the level of openness of trade, land area and population size. We also introduce the mining share of GDP as an independent variable. The result of this analysis, reported in Table 2, is that we can find no significant relationship between the tax ratio and the mining share for the 1990s. One explanation

[2] The GDP category "mining and quarrying" includes crude petroleum and natural gas production, and coal, metal ore and other mining.

for this result is that other sources of revenue have emerged as economies have developed, and there is less reliance on the extractive sector. When we specify the dependent variable as the revenue ratio, to include all tax and non-tax revenues of the consolidated government, we get the same result.

The second question is whether countries that rely more heavily on the natural resource sector tend to be more or less decentralized. There is ambiguity here about what one should expect. One might hypothesize more centralization. The revenue stakes are high, and countries that can tap natural resources for supporting government finances can avoid imposing high general tax rates on the voting public. Central government officials, and parliaments, might be loath to give up this natural advantage. Moreover, there are issues of political control and corruption that might discourage decentralization of governance.

On the other hand, natural resource wealth is not evenly distributed within countries, and those regions that house this natural wealth are likely to clamor for a larger and dedicated share of the returns. Debate over the sharing of natural resource wealth can seriously threaten national unity. So, one might also hypothesize some larger degree of decentralization, *cet.par.,* in countries with more natural resource wealth.

We use a cross-country panel of data to test for a relationship between the mining share and expenditure decentralization. In Table 2, we present the results of a regression analysis of the determinants of decentralization, based on some work in progress at Georgia State University (Alm, Bahl and Tumennasan, 2002.) We can explain about one half of the variation on the degree of decentralization across 55

countries, with per capita GDP, population and the mining share of GDP as significant explanatory variables. Countries with greater dependence on the mining sector, *cet.par.,* tend to be more decentralized.

In summary, we cannot conclude that countries with larger mining shares have more revenues to distribute among levels of government, but we do find that countries with larger mining shares tend to delegate more spending power to local governments. What to make of this? Apparently, the pressures to devolve some of the rents extracted from the natural resource sector are irresistible. Based on this cross section, we can say that if the mining share of GDP is higher in one country than another by 100 percent, (i.e., it is 20 percent versus 10 percent), the expected local government expenditure share will be higher by 2 percent. Based on its mining share, per capita GDP, population and land area, Indonesia's local government expenditure share in the 1990s was 7.2 points below the expected level [3]. By 2001, it had risen to about 10 points above the expected level. One could speculate that the nearly 10 percent mining share of GDP in Indonesia played some role in moving the government toward a more decentralized structure.

A related question that might be raised is the *potential* of natural resource revenues for financing local governments. Is the amount of money at issue significant in terms of the expenditure needs of local governments? How important can the sharing of revenues from natural resources be in the intergovernmental fiscal system? This is not meant to be a normative question, but rather a query about why local governments around the world look with so much interest on this question.

[3] Expected and actual levels of expenditure decentralization are reported in Appendix Table 2.

In Appendix Table 1, we report the results of a hypothetical calculation. For-countries for which we have data, we have calculated the amount of revenue that would flow if 10 percent of the mining share were allocated to the sub national governments. The ratio we report in column (5) is this 10 percent mining share as a percent of the actual expenditures of sub national governments. For example, we find that if in Indonesia, 10 percent of all the GDP generated in "mining and quarrying" sector were allocated to sub national governments it would be equivalent to 41 percent of local government expenditures (in the 1990s) (Appendix Table 1). The distribution of 44 countries shown in Table 3, suggests that in only 4 countries would the 10 percent share be great enough to cover one half of local government expenditures.

THE CASE FOR SHARING NATURAL RESOURCE REVENUES

The arguments for sharing natural resource revenues with regions are often based on political notions of fairness, and are almost always emotionally charged. The problem is even more complicated in Indonesia because the revenue sharing argument is confounded by the ethnic differences in the natural resource regions. There are, in fact, objective arguments in support of giving sub national governments a claim on a share of these revenues. We examine those arguments here, and then turn to the counter-case in the next section.

The Heritage Argument

Natural resource endowments are the heritage of the region. Unlike the beauty of Bali or the deep port at Medan, these resources are exhaustible. So, instead of

taxing, for example, the returns from fertile land in perpetuity, natural resource regions may tax the returns from an exhaustible resource only over its life. Clearly, to generate an equal lifetime amount, the flow of tax entitlements from the exhaustible resource will be more front- loaded. To the outside or casual observers, this front-loaded flow might be seen as exorbitant. To residents of the natural resource region, however, it may be seen as a payment for selling their heritage.

The region can make a strong claim to the returns from this natural endowment. McLure says it nicely: “Subnational governments have argued strongly that they may have the right to tax natural resources located within their boundaries, to convert resource wealth (their “heritage”) into financial capital—to turn “oil in the ground into money in the bank.” (1994, page 199). Link (1978) also reports a well-stated view of the sub national governments, by the Governor of the US state of North Dakota regarding the justification of a severance tax as “just compensation for losing forever a one-time harvest.”

The Cost Reimbursement Argument

There is a cost reimbursement argument for natural resource revenue sharing. Natural resource extraction and processing can be a “dirty business” imposing both high social costs and high infrastructure costs. Oil and natural gas drilling and processing can pollute the environment and impose social costs as well as clean-up costs on the community. Harvesting timber and various kinds of mining can impose real costs of restoring the land to its initial condition, or social costs if the land is not restored.

Though companies bear some of these costs, they do not bear all, hence a case for revenue sharing.

There is as well an infrastructure cost. Most natural resource extraction activity requires the provision of infrastructure facilities that must be constructed and maintained. These might include roads, public utilities, port facilities, etc. The "settlement costs" of servicing the larger population of workers, and perhaps a different mix of new citizens might also impose additional pressure on budgets (education, clinics, law enforcement, general community services). Finally, there is a cost associated with hosting a population that is possibly "different" and far from the local culture. Required technical expertise and required capital investment make it unlikely that natural resource industries will be owned, managed and operated solely by the local population. Some will also see this cultural incursion as a social cost to the host community.

Rationalizing the Revenue Structure

Indonesia is decentralizing and local governments are taking on new expenditure responsibilities and looking for new revenue opportunities. Giving them a share of natural resources revenue, by some transparent formulae, will forestall their looking for back door approaches to revenue raising. The latter approach will almost certainly lead them to the natural resource sector and the imposition of informal charges. The mining sector would be a good target for informal taxes, because it is visible and because of the perception that the tax is fully exported to foreigners. There is a history of local governments using informal taxes when transparent approaches (e.g., formal local

taxing power or transfer entitlements) are not part of the intergovernmental system. Chinese local governments have made heavy use of such taxes and fees and then allocated them to off-budget accounts (Bahl, 2000). In the first year of decentralization, Indonesian local governments imposed some ad hoc taxes that were discriminatory against activities where the perception was that the burden could be exported.

The Russian case is instructive here. The division of natural resource taxation is clearly prescribed as between the central, regional and local government levels. However, the local governments end up keeping a significantly larger share than their entitlement (Bosquet, 2002). The central government finds it difficult to enforce the sharing arrangements it has prescribed.

Politics and National Unity

The politics of natural resource revenue sharing may be on the side of a larger regional government entitlement. The alternative, civil unrest and threatened secession, may be far more costly. Certainly this has been an important issue in the Russian Federation (McLure, 1994; Bosquet, 2002).

THE CASE AGAINST SHARING NATURAL RESOURCE REVENUES

Some policy analysts and political leaders will make the case against natural resource revenue sharing. A set of very solid arguments would lead this group to recommend a smaller revenue share for sub national governments.

Revenue Stability

Natural resource revenues are inherently unstable, and the provision of essential local government services should not be tied to an unstable revenue stream. This seems a reasonable proposition. Central governments can withstand such fluctuations because they can run deficits and finance these with borrowings or by postponing large capital projects. Deficit finance is not an option that should be open to local governments.

How unstable are natural resource revenues in Indonesia? In Figures 1 and 2, we describe the relative stability of the natural resource sector. In Figure 1, it may be seen that the distribution of GDP originating in the mining sector is considerably more variable than the distribution of total GDP. In Figure 2, we show that the instability of oil tax revenues is much greater than that in other revenues in the Indonesian financing structure. The revenue instability argument against natural resource revenue sharing would appear to have considerable merit.

Macroeconomic Considerations

Macroeconomic planning and growth considerations dictate that revenues raised from natural resources be kept by the central government. The government deficit is estimated in the range of 3 percent of GDP in 2001 and 2002. The receipts from oil and gas revenues, estimated at about 2 percent of GDP in these years, are essential to holding the deficit at this level. Without a tax increase, even an allocation equivalent to the 25 percent of oil tax revenues in 2001 might be seen as threatening fiscal stability.

There also is a question about whether the devolution of natural resource revenues would lead to a replacement of national government investment priorities with local government investment priorities. Especially in the regions where natural resources are an important part of the economy, there is a significant amount of resources involved. And in aggregate, the distribution in 2001 was about 1 percent of GDP. The result could be a noticeable displacement of public investments.

Would this make any difference? Presumably, national government officials take the longer view and plan infrastructure development according to a development program. Elected local government officials will tend to have a higher discount rate and will be more prone to invest the proceeds in more visible projects with benefits weighted toward the very short run.

Finally, there is the question of resource mobilization. Large amounts of natural resource revenue sharing to some districts will discourage tax effort with respect to own source local revenues. For a country with a low level of tax effort, this is a problem of some import.

Equalization

Natural Resource endowments are unevenly distributed in nearly all countries. For example, in Russia, about 10 percent of all metal production originates in 10 regions, and about half of all natural resource revenues were collected in three regions (Bosquet, 2002, page 40). If revenues are shared among local governments purely on a derivation basis, gross inequities in the revenue sharing system will occur.

The concentration of natural resource endowments is also the case in Indonesia. And, it almost certainly follows that any derivation-based distribution will produce disparities in grant receipts. We study these disparities by examining the per capita distribution of natural resource revenue sharing across districts for 2001. One could evaluate the distribution of natural resource revenues among local governments in two ways. The first is according to the law, and the second is based on actual amounts received.

The legal distribution of natural resource revenue is based primarily on tax sharing, where specified percentages of the tax revenue are divided between central and local governments, with different vertical shares for different components of the natural resource sector. For example, in the case of oil, the sharing rate is 85/15. In the case of natural gas it is 70/30. The base that is shared is a more complicated story. The distribution among local governments is accomplished in two steps. First, a share goes to the local government where the extraction takes place. Second, a share goes to all eligible jurisdictions in the province.

Does this method of distribution lead to inequities, and does it compromise the equalization of the overall system of intergovernmental transfers? The actual distribution of per capita natural resource revenue received by each district is shown in Appendix Table 3. The range is extremely large, from Rp 271.3 to Rp 4.6 million. The distribution of the per capita amounts received is summarized in the frequency distribution in Table 4. The variation reported in this table is striking: about an equal number of districts receive above Rp 1 million per capita as receive less than Rp one thousand per capita. No matter what the justification for this gap, and no matter that

only about 10 percent of the districts are in the outlying categories, such disparities are likely to bring criticism to the distribution.

Is this distribution out of touch with the goals of the government for promoting equity among the districts in Indonesia? The regression results reported in Table 5 show an interesting pattern in the distribution of natural resources revenue sharing. Districts with a higher per capita value added received more in per capita natural resource revenue sharing. Districts with a higher concentration of poverty received less, all other things held constant. Clearly the distribution of natural resource revenue sharing was not equalizing, if per capita GDP is taken as the barometer of equalization. Interestingly, however, the distribution of per capita natural resource revenue sharing was positively and significantly related to the per capita distribution of DAU transfers. The two transfer systems were reinforcing rather than offsetting.

Another view is that these are the "wrong" questions. There is no reason why natural resource revenue sharing should take on any particular pattern as regards the level of income or poverty, nor is there any reason to be concerned if inequities are great. The purpose of this revenue sharing program is to compensate natural resource regions for costs incurred and for the use of exhaustible resources. It should be related only to those two factors.

Windfalls and Inefficiency

The revenue gains to the local governments from natural resource revenue sharing can be a mixed blessing. There is an analogy to the Dutch disease or "resource curse" that has plagued many countries around the world (Corden, 1984; Auty, 1993).

An abundance of mineral wealth, received rather quickly, can significantly improve the quality of life, as for example is the case in Brunei (Heeks, 1998), but it can also retard longer term development by causing perverse local effects. Most often cited are the spending effects, where a greater share of domestic resources are allocated to the non-tradable sectors such as services and government, and the drawing of labor toward the higher paying mining sector and away from other economic activity in the region.

There are even less pleasant possibilities. One is that the new-found wealth maybe squandered on ill conceived projects. Another is that the great amounts of money involved may stimulate corrupt activities. Leite and Weidmann (1999) have argued that there is a positive relationship between corruption and natural resource abundance, and that this interplay retards economic growth. We have no evidence on this effect for Indonesian local governments, but some would argue that it is a reasonable hypothesis.

In Indonesia, the introduction of natural resource revenue sharing surely produced a windfall problem. How large was the windfall in Indonesia? We might estimate this windfall in the following way. We know that there was a hold harmless provision on DAU so that it was approximately the same size as the previous SDO and Inpress transfers that were previously the mainstays of local government finance in Indonesia. In Appendix Table 3, we show the ratio of natural resource transfers to DAU transfers.

The larger this number, the larger the potential “windfall” revenue from the natural resource distribution to the district. The results show that several districts received quite significant additions to the budget as a result of natural resource revenue sharing. Note

that 23 districts received amounts that were more than 100 percent of their DAU allocation. This is evidence of a revenue increment significant enough to be treated as a windfall.

POLICY OPTIONS AND CHOICES

As is clear from the above, there is no easy or correct answer about the "right" way to share revenues raised from the taxation of natural resources. A few policy directions do seem clear:

- There should be some sharing with the regions, if only because of the need to reimburse for the costs of being the home of natural resource activity.

- The central government is in the best position to tax natural resources, since it possesses the major, appropriate instruments of taxation and the tax administration advantages.

The other big questions are not so easily answered.

- What is the right division of revenues between central and local governments (vertical sharing)?

- How should the natural resource revenues be distributed among the local governments (horizontal sharing)?

- Should local governments be allowed to tax the extractive industries?

- Are special, negotiated revenue sharing arrangements a good idea, or should there be a national policy that applies to all of the provinces?

- If there is to be an allocation to local governments, should it carry restrictions as to the object of expenditure? Are "heritage fund" arrangements a feasible option for Indonesia?

The Correct Vertical Share

There are several ways that one might choose the "right level" of vertical sharing of Natural Resource Revenues. Ideally, the amount going to the local governments would include a cost reimbursement component (which cannot be directly measured) and a "heritage" component. The latter would be compensation to recognize that an exhaustible natural resource, unique to the region, was being used up and needed to be replaced with investment to develop a new economic base. Another component in the calculation is the opportunity cost of avoiding civil unrest or secession, i.e., how much of the natural resource revenue pie would it take to mitigate the call for independence by some of the natural resource provinces? The ideal calculation is not easily turned to a transparent policy, i.e., we do not know how to calculate these amounts or even how to add them together to develop a "vertical share."

We might consider a top-down approach to measuring the vertical share, i.e., we might ask how much the central government can afford? "Affordability" in this context might be measured in the following way. First, note that there is weak evidence that Indonesia has substituted taxes on the natural resource sector for taxes on the "domestic sector." Using quarterly data and a two stage least squares estimate, we find a negative relationship between "domestic" tax revenues and oil tax revenues (Appendix Table 4). Let us suppose, *cet.par*., that Indonesia increased its level of tax effort to the international average while not increasing its taxation of the natural resources sector. The question we raise is the following: What share of natural resource revenue would this free up for distribution to the local government sector?

First we must estimate tax effort for Indonesia. Following the traditional method (Bahl, 1971), we estimate the taxable capacity of Indonesia using two different specifications of functional form and agricultural share of GDP and openness as independent variables. By either of these equations, Indonesia is a low taxing country. Its estimated taxable capacity ranges between 17.4 and 24 percent of GDP, both estimates being above its actual level of taxation of 15.2 percent of GDP in 1998 12.7 percent in 2001.

We have simulated an implied vertical share using this method, as reported in Table 6. For the year 1998, for example, the actual tax ratio was 15.2 percent of GDP. To reach the "low target' of 17.4 percent of GDP, a tax surplus of equivalent to 2.2 percent of GDP would be created by some approach to increasing taxes. In 1998, oil tax revenues were equivalent to 4.2 percent of GDP. If the total amount of increased taxes were used to "replace" lost oil revenues in the central government budget, the entitlement of local governments in oil revenue collections would have been 53 percent in 1998. During the 1994-1999 period, it would not have dropped below 40 percent. This is one view of a "normative" vertical share. The actual level of natural resource revenue sharing in 2001, as a percent of oil tax revenues was about 36 percent.

The above calculation might be unreasonable because there would be other, possibly prior, claims on this increased level of taxes. Assume, for example, that the budget deficit was a priority claim on incremental resources. In 1998, the deficit of 2.7 percent of GDP would more than absorb the 2.2 percent of GDP tax surplus and no funds for distribution would be available. However, in the earlier 1990s, the amounts available for distribution would have been significant. This simulation points up the

problems and prospects with an affordability approach to calculating the vertical share. The problem is that strictly, this approach shows that the vertical share could fluctuate widely, a pattern that is not suitable for local finance. On the other hand, the longer-term pattern shows that a considerably greater share than that presently distributed is quite affordable.

Horizontal Sharing

Horizontal sharing refers to the distribution of natural resource revenues among the districts. What is the right way to do this? There is no clear "right" way to do horizontal distribution. As is shown in Appendix Table 5, countries choose a wide array of formula and derivation type distributions. Some use ad hoc methods and others more transparent approaches.

A first question to answer in doing formula design is whether the revenues should be assigned exclusively to those places where the natural resources were extracted, or should it include local governments subject to immediate spillover effects, or should it include local governments in general? Or, should the sharing be divided into pools to reflect all of these groups.

One part of the answer here would seem straightforward: the sharing is meant to compensate local governments for the incremental costs of being home to extractive industries, and for the using up of an exhaustible resource. Clearly, sharing should be on a derivation basis, i.e., it should be allocated to the effected regions. Any general revenue sharing should come under the DAU, i.e., there is no case for special natural resource revenue sharing if it is to be allocated to all regions.

However, allocation among local governments purely on a derivation basis is no easy matter. For one thing, the incremental "costs" may be borne in adjacent districts, as for example in the case of road construction and maintenance or water and air pollution, etc. In other cases, for example, the well may be drilled in district A but taps a pool that belongs to both districts A and B. And then, there is the offshore issue. A more indirect effect is that labor in the region may be drawn to the extractive sector by higher wages, thereby siphoning off some of the productive labor in adjacent districts and driving up wage rates in general. These problems might have been more easily handled in a world where provinces were major local government players, but things are now far more difficult.

The solution that the Indonesians have come to know is some sort of rough proration. The present system is based on some rules, and while the rationale is not all that clear, there is at least some transparency.

Local Taxes and Charges

Should local governments be allowed to tax the extractive sector? The simple answer is that they should, but within the general framework for fiscal decentralization that Indonesia is now in process of designing and implementing.

The basic methods of taxing the extractive sector -- personal and corporate income taxes, VAT, trade taxes -- should remain with the central government. At least tax administration considerations dictate this.

Local governments could participate by raising fees and charges from the extractive sector. However, this should be done within the general framework of

allowable local government revenue raising. Fees and charges should be general levies on all businesses, and should be aimed to recoup some of the cost of providing services. The targeting of one sector, for the purpose of exporting taxes, should be prohibited.

Local governments could also be allowed to levy taxes on broader bases. The property tax (PBB) is an appropriate local government tax. It is a levy on the wealth held by the owners of a company, and at least part of the tax may be borne locally. There is a case for the PBB revenues from the mining sector to be shared with the local governments.

Another possibility is for the local government to participate in the payroll tax. This power could be extended to all local governments in Indonesia, but those with large shares of employment in the higher-paying extractive sector might benefit disproportionately. The tax revenue would belong to the local governments where the employment was located (rather than where the headquarters firm was located). It could be levied as a piggyback tax where the central government sets the tax base and collects the tax, but the local government imposes a special tax rate (within some specified limit). This piggyback income tax would be levied on all local firms and not just on those in the mining sector. This levy could replace the 20 percent individual income tax share that is now distributed as an intergovernmental transfer. Few analysts have looked at the case for local taxation of natural resources. In an interesting analysis of the options for local taxation of mining activities, Otto (2001) suggests royalties based on a unit assessment, licensing fees, surface rentals or land use fees, stamp duties, property tax, and user fees. In terms of the actual practice, he finds that

the property tax is the only levy on this list that is commonly used. McKenzie (mimeograph) argues for central taxing power over the natural resource sector as the most efficient solution, but allows that political realism may make the case for subnational government participation.

Special Autonomy

Two provinces, Aceh and West Papua, have negotiated a special revenue sharing agreement with the central government. Some would see merit to this approach. It certainly recognizes relevant differences. Aceh is nearing the end of its natural resource (natural gas) dependent era, and West Papua is in a much earlier stage of its exploitation of oil and minerals. Surely the revenue sharing arrangements should be different. Another advantage of negotiation is that it is bi-lateral and may be easier to bring to closure. At least a protracted debate in the Parliament seems to have been avoided [4].

On the other hand, there are some major negatives to special negotiations of revenue sharing:

1. Special negotiations never end. One option is that they must be renewed after a certain period of time. However, if a firm and binding agreement is not made on the life of the contract, or is not recognized, one of the parties might try to renegotiate on a regular basis. In that case, certainty in the

[4] Herbst (2001, page 5) makes the interesting point that Russia allocated resources among regions on an ad hoc basis largely to hold the federation together, but that "if such systems of ad hoc allocations continue indefinitely, countries may not go beyond crisis management."

distribution of natural resource revenues will not have been gained, by either the central government or the recipient local government.

2. Special negotiations open the door for imitation, i.e., for other provinces to seek the same type of accommodation. Soon, every local government becomes “special” in terms of their expected revenue sharing.

3. If there are no transparent rules that bind all local government, then there is no intergovernmental fiscal policy. The central government, as it moves from negotiation to negotiation, will be making it up as they go. This is not a desirable strategy. Each negotiation will set a new precedent, and the next local government will ask for at least as much as the one before. The situation may not be any more satisfactory from the point of view of the local governments. They are in the early stages of decentralization in Indonesia and may not have the skills to bargain well in the early rounds, or their bargaining table may have been captured by local elites who do not speak adequately for, or in the best interest of, the local population.

CONCLUSION

The sharing of natural resource revenues with the local governments in Indonesia would seem unavoidable. And, it would seem fair. Local governments do incur a variety of private and social costs associated with natural resource extraction, they should be compensated for exhaustion of the resource, and there are political economy questions about the costs of civil unrest. The question would not seem to be

whether there should be sharing of these revenues, the questions are “how much sharing” and “how should it be done.”

What is the right vertical share, i.e., how much of the shared revenue should belong to the center and how much should belong to the local governments? This is perhaps the most difficult question to answer, both conceptually and in terms of the politics. It would not seem possible to make a precise, direct calculation of the costs based on the factors that dictate revenue sharing. What to do?

Option One: Let the government and the regions negotiate a general agreement, as was done in 2000. The basis for calculating the vertical share should be the best estimates that one can make of the “costs” of natural resource extraction. This would move the decision towards a different vertical share for each region. So would individual negotiations.

Option Two: An affordability approach. Let the government raise tax effort to the international average (or compute what this amount would be) and use that “surplus” to free up resources for a greater allocation of natural resource revenues to the regions.

In either case, the vertical share is likely to be at a higher level than the present (2001) 36 percent of oil tax revenues, or 0.6 percent of GDP.

Once the size of the vertical share is established, one might take on the four questions that seem to plague the formation of a firm intergovernmental policy in this area.

1. Should the natural resource revenue sharing regime be linked to the general purpose grant program of the government (the DAU). One answer to this

question is that they should not. These transfers are for entirely different purposes. The DAU is to cover the minimum costs of local government provision of a decentralized set of expenditure responsibilities. Natural resource revenue sharing is to compensate for additional costs associated with natural resource activity, and to replace the “exhausted” economic base of the region. Essential services, in natural resource regions and in other regions, should continue to be financed by DAU and local resources. There should be no offsets between the two revenue sharing regimes. They should be kept independent.

2. Should the systems be based on transparent formula or should they be negotiated? While negotiation seems to have had the advantage of being more quickly and more easily accomplished, it is not a good long run solution. It invites continued re-contracting, is not transparent, favors better negotiators and local governments that are in stronger political position, and it is the anti-thesis of the development of a coherent government policy on intergovernmental fiscal relations.

3. Should local governments be able to tax the natural resource sector? One answer is that the center should lay down taxing and tax sharing rules for all local governments in the country, and that local governments with a strong mining sector should also follow these general rules. Fees, charges, and some form of sharing of local payroll taxes and property taxes are good

candidates for local revenue raising. No special local taxes on the extractive sector should be allowed.

4. How does one deal with the problems of (a) windfall revenues to local governments with large mining sectors, and (b) the instability of the revenue flow from natural resource industries? Local governments would seem ill-equipped to handle the lumpy revenue flows from natural resource revenue sharing. One solution to this problem might lie with the creation of a heritage fund arrangement. The idea is to create a Fund, whose earnings could produce benefits for the present and future generation. Payments into the fund could fluctuate with commodity prices without harming the provision of local government programs, and expenditures from the fund could be evened out over time. The Fund would be conservatively invested, the corpus would grow overtime, and earnings would be earmarked for prescribed investments in regional development. Some governments have been successful with the management of oil and mining stabilization funds (Alsaka, Norway, Chile), but a key to success seems to be the degree to which the government has a history of practicing fiscal discipline (Fasano, 2000). Whether such a fund could succeed in Indonesia is an open and interesting question.

Table 1. Mining share as a percent of GDP [a)]

Percent	Number of countries
10 or less	75
11-20	8
21-30	1
31-40	4
41-50	3
Above 51	0

[a)] Average for the period 1990-1999
Source: See Appendix Table 1.

TABLE 2. REGRESSION ANALYSIS OF THE LEVEL OF TAXATION, REVENUE AND DECENTRALIZATION AGAINST SELECTED INDEPENDENT VARIABLES [5]

Dependent Variable:	Tax Ratio[1]	Revenue Ratio[2]	Tax Ratio[1]	Tax Ratio[1]	Decentralization[4]
Intercept	1.79 (5.23) ***	2.00 (5.90) ***	3.33 (8.12) ***	32.60 (14.03) ***	-6.26 (-4.48) ***
GDP per capita	0.17 (4.32)***	0.17 (4.46) ***			0.41 (5.65) ***
Mining share of GDP	-0.01 (-0.08)	0.01 (0.36)			0.02 (2.68) ***
Agricultural share of GDP			-0.33 (-7.67) ***	-0.54 (-8.83) ***	
Openness[3]			0.11 (1.32)	0.02 (0.86)	
Area			-0.33 (-7.67) ***	-0.54 (-8.83) ***	0.12 (1.70)
Population			0.11 (1.32)	0.02 (0.86)	0.22 (2.42) ***
Estimation method	OLS	OLS	OLS	OLS	OLS
Number of observations	54	38	99	99	55
Adj R^2	0.25	0.33	0.39	0.45	0.46

*** ,**,* denote significance at 1%, 5%, and 10% levels, respectively.
t-statistics are shown in parentheses.
[1)] Tax Revenue as a Share of GDP.
[2)] Total Government Revenue as a Share of GDP
[3)] Sum of Export and Import Shares of GDP
[4)] Subnational Government Share of Total Government Expenditure
[5)] Data are averages for the years 1991-1999.

Table 3. The Potential of the Natural Resource Sector as a Source of Financing Decentralized Governance [a)]

Percent	Number of countries with 10 percent of Mining GDP as Percent of Actual Subnational Government Expenditure
10r less	35
11-20	2
21-30	1
31-50	2
51-100	2
101 or more	2

[a)] Average for the period 1990-1999
Source: See Appendix Table 1.

Table 4. Frequency distribution of the per capita Natural Resource Revenue Sharing across districts

Amounts Rp.	Number of districts
1,000 or less	16
1,000-10,000	169
10,000-100,000	100
100,000-1,000,000	37
Above 1,000,000	14

Source: See Appendix Table 2.

TABLE 5. REGRESSION ANALYSIS OF PER CAPITA NATURAL RESOURCE REVENUE SHARING ACROSS THE DISTRICTS IN INDONESIA [1]

Dependent Variable:	NRRSpc[2]	NRRSpc[2]
Intercept	19.68 (8.29)***	11.03 (4.90)***
Poverty	-0.24 (-1.61)*	-0.52 (-3.82)***
GPRPpc	-0.15 (-1.01)	0.26 (1.98)**
Population	-1.25 (-12.95)***	-1.25 (-14.83) ***
Area		0.50 (10.08)***
Estimation method	OLS	OLS
Number of observations	336	336
Adj R^2	0.33	0.49

*** ,**,* denote significance at 1%, 5%, and 10% levels, respectively.
t-statistics are shown in parentheses.
[1)] Data are for 2001
[2)] Natural Resource Revenue per capita

Table 6. Natural Resource Revenue Sharing as a Residual Claim

Year	Actual Tax Ratio	Target	Surplus	Oil Revenue	Potential [1]	Budget deficit	Adjusted Potential [2]
1994	16.0	17.4	1.4	3.5	40.0	0.9	66.7
1995	15.8	17.4	1.6	2.9	55.4	2.2	131.3
1996	14.5	17.4	2.9	3.7	77.4	1.2	108.5
1997	15.0	17.4	2.4	5.6	42.3	-0.7	30.4
1998	15.2	17.4	2.2	4.2	53.3	-2.7	-11.0

Note:
[1)] Surplus as percent of oil revenue;
[2)] Adjusted surplus as percent of oil revenue.
All variables are shown as a share of GDP except Potential

Figure 1. Mining sector and GDP growth in Indonesia

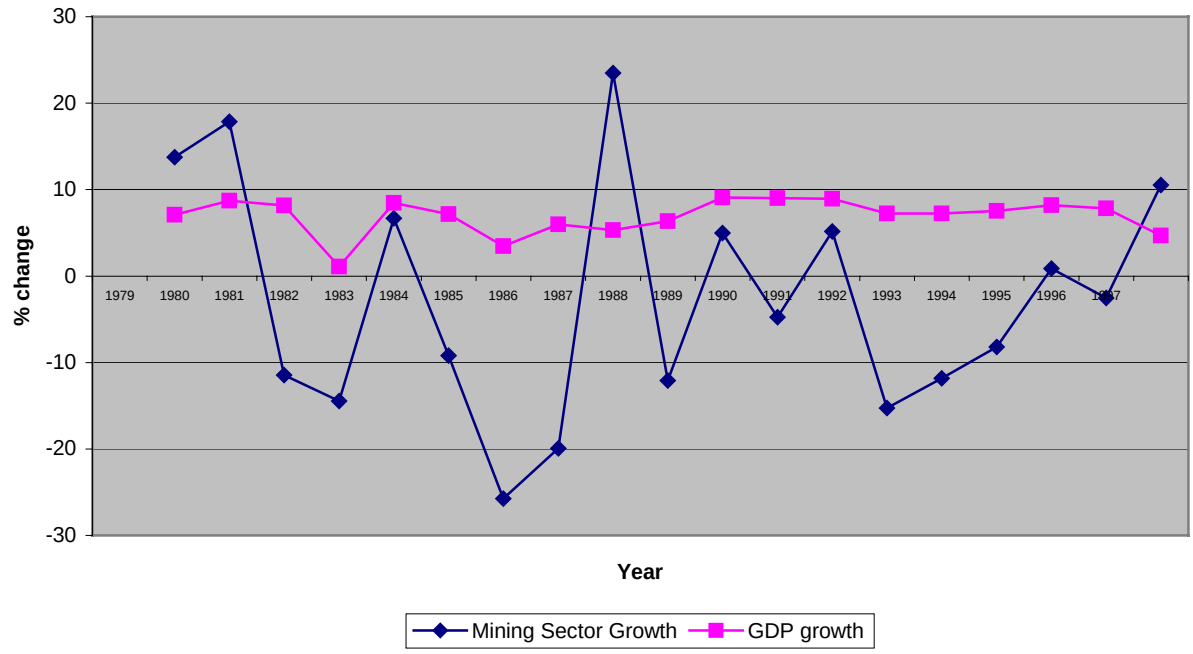
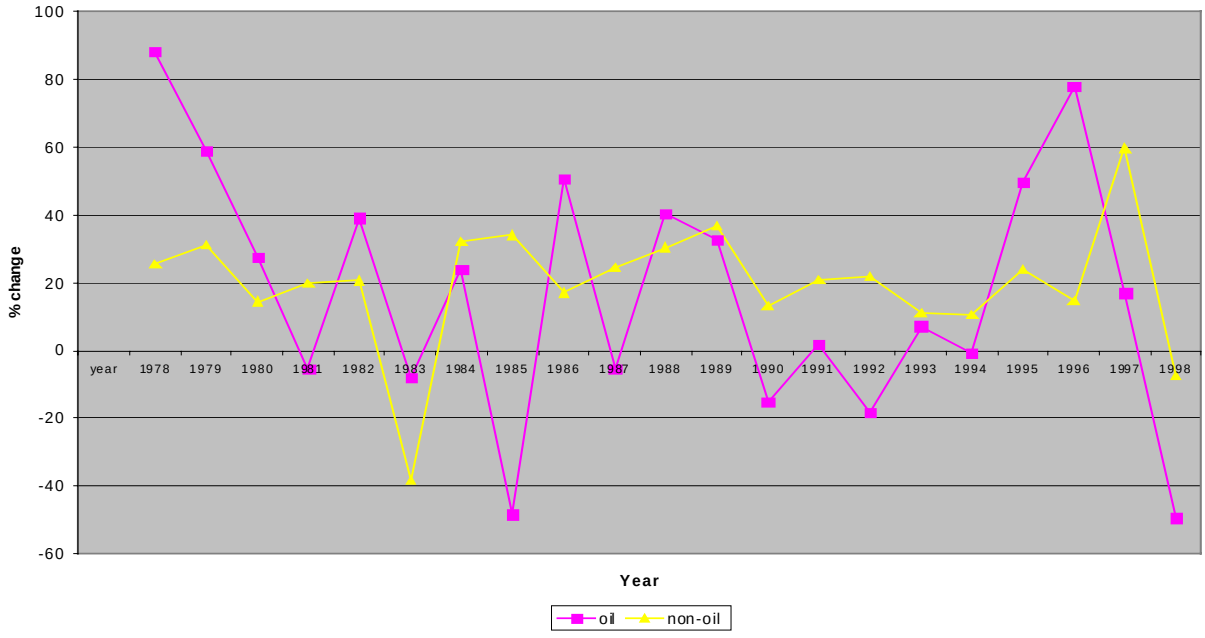


Figure 2. Changes in Oil and Non-Oil Tax Revenues in Indonesia



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APPENDIX Table 1. Countries ranked by the size of mining sector in GDP [1]

Country Name	Mining [a)]	Decentralization [b)]	Tax Ratio [c)]	Revenue Ratio [d)]	Mining/Sub.exp [e)]
Botswana	47.7	4.6	31.1	..	198.5
Oman	42.7	..	..	..	..
Mongolia	41.3	35.4	24.5	30.1	21.4
United Arab Emirates	37.4	..	..	..	..
Kuwait	35.7	..	..	..	..
Saudi Arabia	34.2	..	..	..	..
Nigeria	33.4	28.8	7.5	..	..
Bahrain	22.1	2.9	..	28.1	220.3
Bangladesh	18.4	..	..	..	..
Papua New Guinea	17.0	..	..	..	..
Namibia	16.9	..	30.4	..	..
Venezuela	16.8	..	..	..	..
Trinidad and Tobago	14.4	4.4	23.3	29.3	98.6
Zambia	14.4	3.0	17.6	..	..
Guyana	14.4	..	..	..	..
Ecuador	10.7	..	..	..	..
Indonesia	**9.8**	**12.2**	**15.7**	**18.2**	**41.2**
Cameroon	9.1	..	10.0	..	..
Peru	8.4	18.9	12.8	17.0	13.9
Jamaica	7.3	..	..	..	..
Malaysia	7.2	18.1	20.9	31.1	13.8
Bolivia	6.7	23.4	14.5	20.7	9.1
South Africa	6.6	29.1	27.8	29.3	4.3
Chile	6.3	7.9	19.6	24.7	30.3
Colombia	5.3	..	..	..	..
Zimbabwe	4.8	10.6	23.6	26.8	..
Vietnam	4.8	..	..	..	..
Australia	4.6	42.4	28.8	34.4	2.2
Canada	3.9	57.5	36.2	45.5	1.0
Poland	3.2	17.5	40.6	43.3	2.8
Jordan	3.2	..	..	..	..
Bhutan	3.1	..	6.2	..	..
Dominican Republic	3.0	2.3	13.8	15.0	78.3
China	2.9	57.0	12.2	..	2.8
Malta	2.8	..	27.1	..	..
Netherlands	2.8	23.9	45.2	50.4	1.6
United Kingdom	2.4	22.7	35.4	39.2	1.8
Suriname	2.0	..	..	..	..
Morocco	2.0	..	..	..	..
India	1.9	45.5	14.4	19.2	1.3
Argentina	1.9	42.6	19.2	21.6	1.8
Norway	1.7	32.4	40.9	52.9	0.1
Honduras	1.6	..	..	..	..
Bulgaria	1.6	18.1	33.1	42.4	7.1

Mexico	1.5	26.5	16.6	19.3	2.7
Mali	1.5	..	10.7	..	..
New Zealand	1.4	10.0	36.9	..	3.7
Thailand	1.3	8.1	17.2	19.4	8.0
Greece	1.3	..	39.7	..	..
Estonia	1.3	25.2	34.8	38.4	1.4
Turkey	1.2	..	23.4	..	..
Denmark	1.2	44.4	48.8	56.8	0.3
Slovenia	1.1	11.1	41.9	43.5	2.3
Brazil	1.1	40.7	27.8	39.7	0.6
Sri Lanka	1.1	..	..	..	..
Tanzania	1.0	..	13.1	..	..
Philippines	1.0	..	..	..	8.1
Tunisia	0.8	..	..	..	..
Burundi	0.8	..	16.2	..	..
Ireland	0.8	23.9	33.8	36.3	0.7
France	0.8	17.6	42.6	46.5	0.7
Belize	0.7	..	..	..	..
Myanmar	0.6	..	..	..	..
Barbados	0.5	..	..	..	..
Pakistan	0.5	..	..	..	..
Hungary	0.4	22.8	39.6	48.9	0.3
Italy	0.4	23.4	..	47.0	0.3
Austria	0.4	30.9	42.4	49.1	0.2
Croatia	0.4	10.0	44.1	48.5	0.6
Grenada	0.3	..	..	..	..
Uganda	0.3	..	8.9	..	..
Luxembourg	0.3	15.7	44.3	46.8	0.3
Senegal	0.3	5.4	14.9	..	..
Ethiopia	0.3	..	11.2	..	..
Finland	0.3	35.8	38.5	46.5	0.1
Cyprus	0.3	..	..	..	..
Sweden	0.3	33.8	51.7	57.2	0.1
Belgium	0.2	11.0	44.7	46.2	0.4
Japan	0.2	..	19.1	..	..
Uruguay	0.2	10.5	..	..	0.5
El Salvador	0.2	..	..	..	..
Panama	0.2	..	..	27.1	2.5
Nepal	0.2	..	..	..	..
Latvia	0.2	24.1	31.5	38.6	0.1
Lesotho	0.1	..	39.2	..	..
Mauritius	0.1	4.6	19.2	22.0	1.1
Haiti	0.1	..	..	..	..
Guatemala	0.1	10.2	..	..	0.9
Puerto Rico	0.1	..	..	..	..
Singapore	0.0	..	16.3	..	..
Hong Kong, China	0.0	..	..	..	..

Mean	6.2	21.9	26.8	35.8	17.9
Median	1.5	20.8	25.8	38.4	1.8
Variance	115.3	209.2	156.6	152.7	2173.6

Note:

[1] The data are the average of 1991-1999

[a] Share of mining and quarrying in GDP. Mining and quarrying include crude petroleum and natural gas production, coal, metal ore and other minings.

[b] Subnational share of total government expenditures.

[c] Ratio of total government tax revenues over GDP.

[d] Total government revenue over GDP

[e] 10% of mining GDP over Subnational government expenditure (%)

[f] 10% of mining GDP over Subnational government tax revenue (%)

Source: mining data are from World Marketing Data and Statistics 2001 and

data for Botswana, Mongolia and New Zealand are from National Accounts Statistics, The United Nations;

Tax, revenue, expenditure data are from Government Finance Statistics Yearbook, IMF;

APPENDIX Table 2. Fiscal Decentralization Effort

Country	Decentralization a)	Expected Decentralization b)	Decentralization Effort c)
Australia	42.4	40.1	1.1
Austria	30.9	20.2	1.5
Azerbaijan	25.3	8.4	3.0
Bahrain	2.9	5.8	0.5
Bolivia	18.2	7.9	2.3
Botswana	5.3	17.9	0.3
Brazil	37.1	32.9	1.1
Bulgaria	20.2	14.0	1.4
Canada	56.9	45.3	1.3
Chile	7.4	16.3	0.5
Colombia	43.5	17.0	2.6
Costa Rica	2.9	10.3	0.3
Cote d'Ivoire	3.2	5.9	0.5
Croatia	8.7	13.9	0.6
Czech Republic	19.5	10.7	1.8
Denmark	43.7	18.0	2.4
Dominican Republic	2.2	5.9	0.4
Estonia	29.9	5.7	5.2
Ethiopia	1.5	4.1	0.4
Finland	36.5	20.6	1.8
France	17.6	38.9	0.5
Greece	7.9	15.6	0.5
India	45.4	15.7	2.9
Indonesia	**12.0**	**19.2**	**0.6**
Israel	13.2	16.8	0.8
Japan	60.6	52.5	1.2
Kenya	4.2	5.4	0.8
Korea, Rep.	42.3	19.0	2.2
Latvia	24.2	5.7	4.3
Lithuania	29.5	12.5	2.4
Mali	1.4	4.3	0.3
Mauritius	4.5	3.2	1.4
Mexico	25.1	22.0	1.1
Mongolia	36.6	8.9	4.1
Netherlands	24.4	22.0	1.1
New Zealand	9.3	15.5	0.6
Nigeria	29.9	17.8	1.7
Norway	31.7	29.2	1.1
Panama	2.5	5.9	0.4

Paraguay	2.0	7.0	0.3
Peru	17.8	12.5	1.4
Philippines	7.9	10.1	0.8
Portugal	10.4	26.4	0.4
Romania	10.9	9.0	1.2
Senegal	5.1	4.4	1.2
Slovak Republic	11.5	7.3	1.6
South Africa	22.4	21.7	1.0
Spain	30.3	27.6	1.1
Sweden	34.5	24.7	1.4
Thailand	7.8	14.6	0.5
Trinidad and Tobago	4.6	6.4	0.7
Ukraine	26.2	32.1	0.8
United Kingdom	23.4	31.5	0.7
United States	45.2	81.3	0.6
Uruguay	10.0	8.9	1.1

Note:

[a)] Defined as the ratio of subnational to total government expenditure. Data are an average for the 1991-1999 period.

[b)] Estimated as reported in Table 2.

[c)] Ratio of actual to estimated expenditure decentralization

Source: Government Finance Statistics. IMF

APPENDIX Table 3. Natural Resource Revenue Sharing for the districts in Indonesia

Code	District	NRRSpc	NRRS/DAU
101	Kab. Aceh Barat	93,687.5	0.24
102	Kab. Aceh Besar	129,055.3	0.22
103	Kab. Aceh Selatan	146,557.7	0.28
104	Kab. Aceh Singkil	314,636.8	0.38
105	Kab. Aceh Tengah	164,064.3	0.26
106	Kab. Aceh Tenggara	176,744.6	0.29
107	Kab. Aceh Timur	76,307.4	0.30
108	Kab. Aceh Utara	656,547.0	2.08
109	Kab. Bireuen	109,883.3	0.27
110	Kab. Pidie	78,573.7	0.16
111	Kab. Simeuleu	661,917.3	0.43
112	Kota Banda Aceh	169,808.7	0.27
113	Kota Sabang	1,572,938.7	0.47
201	Kab. Asahan	2,182.4	0.01
202	Kab. Dairi	9,289.4	0.02
203	Kab. Deli Serdang	1,518.5	0.01
204	Kab. Tanah Karo	7,303.1	0.01
205	Kab. Labuhan Batu	5,046.5	0.02
206	Kab. Langkat	14,833.1	0.06
207	Kab. Mandailing Natal	13,476.3	0.03
208	Kab. Nias	5,640.2	0.02
209	Kab. Simalungun	2,385.5	0.01
210	Kab. Tapsel	6,315.9	0.02
211	Kab. Tapteng	12,237.3	0.02
212	Kab. Taput	6,242.0	0.01
213	Kab. Toba Samosir	6,713.4	0.01
214	Kota Binjai	9,572.3	0.02
215	Kota Medan	1,074.6	0.01
216	Kota P. Siantar	8,474.9	0.02
217	Kota Sibolga	24,975.5	0.02
218	Kota T. Balai	15,458.6	0.02
219	Kota T. Tinggi	16,317.6	0.02
301	Kab. 50 Kota	4,148.7	0.01
302	Kab. Agam	3,105.3	0.01
303	Kab. Kep. Mentawai	49,595.3	0.03
304	Kab. P. Pariaman	6,311.2	0.02
305	Kab. Pasaman	2,915.6	0.01
306	Kab. Pes. Selatan	4,255.0	0.01
307	kab. S.Lunto Sij.	15,320.0	0.03

308	Kab. Solok	3,384.1	0.01
309	Kab. Tanah Datar	4,056.8	0.01
310	Kota B. Tinggi	14,036.8	0.02
311	Kota P. Panjang	32,088.6	0.02
312	Kota Padang	1,812.0	0.01
313	Kota Payakumbuh	13,186.7	0.01
314	Kota Sawahlunto	59,759.2	0.04
315	Kota Solok	26,781.6	0.02
401	Kab. Bengkalis	1,361,682.2	3.42
402	Kab. Indragiri Hilir	217,866.7	0.59
403	Kab. Indragiri Hulu	497,954.2	0.76
404	Kab. Kampar	611,302.8	1.47
405	Kab. Karimun	817,840.7	1.13
406	Kab. Riau. Kep	381,030.9	1.27
407	Kab. Kuantan Singingi	551,029.7	1.00
408	Kab. Natuna	1,512,448.2	0.79
409	Kab. Pelalawan	807,741.8	1.11
410	Kab. Rokan Hilir	1,394,533.6	5.31
411	Kab. Rokan Hulu	474,093.2	1.21
412	Kab. Siak	1,971,912.6	4.92
413	Kota Batam	269,136.5	1.12
414	Kota Dumai	683,998.2	1.27
415	Kota Pekan Baru	200,745.4	0.82
501	Kab. Batanghari	34,689.4	0.06
502	Kab. Bungo	20,100.1	0.03
503	Kab. Kerinci	12,993.2	0.02
504	Kab. Merangin	17,562.1	0.03
505	Kab. Muaro Jambi	33,245.0	0.08
506	Kab. Sarolangun	27,533.0	0.04
507	Kab. Tj. Jabung Barat	32,572.3	0.06
508	Kab. Tj. Jabung Timur	60,760.7	0.12
509	Kab. Tebo	23,560.0	0.05
510	Kota Jambi	18,892.1	0.05
601	Kab. Lahat	75,371.1	0.34
602	Kab. M. Banyuasin	157,286.4	0.78
603	Kab. M. Rawas	107,063.8	0.50
604	Kab. Muara Enim	103,945.6	0.47
605	Kab. OKI	47,681.8	0.19
606	Kab. OKU	43,817.7	0.19
607	Kota Palembang	30,607.3	0.15
701	Kab. Bengkulu Selatan	5,927.5	0.01
702	Kab. Bengkulu Utara	9,065.5	0.02

703	Kab. Rejang Lebong	4,343.7	0.01
704	Kota Bengkulu	7,674.7	0.01
801	Kab. Lampung Barat	38,429.0	0.11
802	Kab. Lampung Selatan	12,464.0	0.06
803	Kab. Lampung Tengah	13,437.5	0.05
804	Kab. Lampung Utara	26,585.2	0.07
805	Kab. Lampung Timur	24,306.7	0.10
806	Kab. Tanggamus	17,574.5	0.07
807	Kab. T. Bawang	20,318.9	0.09
808	Kab. Way Kanan	39,309.3	0.12
809	Kota B. Lampung	18,916.4	0.07
810	Kota Metro	118,965.8	0.13
1,001	Kab. Bandung	1,813.8	0.01
1,002	Kab. Bekasi	5,097.5	0.04
1,003	Kab. Bogor	2,886.2	0.02
1,004	Kab. Ciamis	4,615.8	0.02
1,005	Kab. Cianjur	3,790.2	0.02
1,006	Kab. Cirebon	3,662.8	0.02
1,007	Kab. Garut	3,479.3	0.02
1,008	Kab. Indramayu	11,291.2	0.06
1,009	Kab. Karawang	18,216.6	0.12
1,010	Kab. Kuningan	7,456.6	0.03
1,011	Kab. Majalengka	7,115.8	0.03
1,012	Kab. Purwakarta	10,206.9	0.04
1,013	Kab. Subang	10,126.9	0.05
1,014	Kab. Sukabumi	3,760.8	0.02
1,015	Kab. Sumedang	7,701.8	0.03
1,016	Kab. Tasikmalaya	3,542.0	0.02
1,017	Kota Bandung	3,269.2	0.02
1,018	Kota Bekasi	4,271.4	0.03
1,019	Kota Bogor	9,417.9	0.04
1,020	Kota Cirebon	26,011.4	0.06
1,021	Kota Depok	6,109.6	0.04
1,022	Kota Sukabumi	27,753.8	0.06
1,101	Kab. Banjarnegara	1,246.6	0.00
1,102	Kab. Banyumas	826.1	0.00
1,103	Kab. Batang	1,502.7	0.00
1,104	Kab. Blora	3,980.8	0.01
1,105	Kab. Boyolali	1,135.5	0.00
1,106	Kab. Brebes	1,453.6	0.01
1,107	Kab. Cilacap	1,015.0	0.00
1,108	Kab. Demak	983.6	0.00

1,109	Kab. Grobogan	1,283.7	0.01
1,110	Kab. Jepara	996.9	0.00
1,111	Kab. Karanganyar	1,264.5	0.00
1,112	Kab. Kebumen	859.5	0.00
1,113	Kab. Kendal	1,393.8	0.00
1,114	Kab. Klaten	863.6	0.00
1,115	Kab. Kudus	1,516.7	0.01
1,116	Kab. Magelang	887.2	0.00
1,117	Kab. Pati	929.2	0.00
1,118	Kab. Pekalongan	1,272.2	0.00
1,119	Kab. Pemalang	1,473.5	0.01
1,120	Kab. Purbalingga	1,228.8	0.00
1,121	Kab. Purworejo	1,692.4	0.01
1,122	Kab. Rembang	2,520.6	0.01
1,123	Kab. Semarang	1,230.6	0.00
1,124	Kab. Sragen	1,134.8	0.00
1,125	Kab. Sukoharjo	1,236.5	0.00
1,126	Kab. Tegal	1,327.4	0.01
1,127	Kab. Temanggung	1,484.7	0.00
1,128	Kab. Wonogiri	1,008.8	0.00
1,129	Kab. Wonosobo	1,612.4	0.01
1,130	Kota Magelang	8,232.8	0.01
1,131	Kota Pekalongan	3,652.4	0.01
1,132	Kota Salatiga	6,342.1	0.01
1,133	Kota Semarang	710.0	0.00
1,134	Kota Surakarta	1,953.6	0.01
1,135	Kota Tegal	4,042.2	0.01
1,201	Kab. Bantul	882.0	0.00
1,202	Kab. G. Kidul	1,033.1	0.00
1,203	Kab. Kulon Progo	1,857.2	0.00
1,204	Kab. Sleman	764.0	0.00
1,205	Kota Yogyakarta	1,734.1	0.00
1,301	Kab. Bangkalan	3,043.5	0.01
1,302	Kab. Banyuwangi	2,070.3	0.01
1,303	Kab. Blitar	2,259.7	0.01
1,304	Kab. Bojonegoro	5,023.9	0.02
1,305	Kab. Bondowoso	3,440.5	0.01
1,306	Kab. Gresik	2,364.0	0.01
1,307	Kab. Jember	1,410.1	0.01
1,308	Kab. Jombang	2,185.5	0.01
1,309	Kab. Kediri	1,956.0	0.01
1,310	Kab. Lamongan	1,912.6	0.01

1,311	Kab. Lumajang	2,594.1	0.01
1,312	Kab. Madiun	4,229.4	0.01
1,313	Kab. Magetan	3,626.8	0.01
1,314	Kab. Malang	1,032.2	0.01
1,315	Kab. Mojokerto	2,540.2	0.01
1,316	Kab. Nganjuk	2,676.9	0.01
1,317	Kab. Ngawi	3,555.8	0.01
1,318	Kab. Pacitan	4,202.8	0.01
1,319	Kab. Pamekasan	3,125.4	0.01
1,320	Kab. Pasuruan	1,805.6	0.01
1,321	Kab. Ponorogo	3,072.9	0.01
1,322	Kab. Probolinggo	2,725.5	0.01
1,323	Kab. Sampang	2,877.7	0.01
1,324	Kab. Sidoarjo	2,073.7	0.01
1,325	Kab. Situbondo	3,968.7	0.01
1,326	Kab. Sumenep	41,048.4	0.11
1,327	Kab. Trenggalek	3,452.1	0.01
1,328	Kab. Tuban	2,623.3	0.01
1,329	Kab. Tulungagung	2,461.1	0.01
1,330	Kota Blitar	18,031.8	0.02
1,331	Kota Kediri	8,889.0	0.02
1,332	Kota Madiun	13,132.1	0.01
1,333	Kota Malang	2,871.5	0.01
1,334	Kota Mojokerto	19,723.3	0.02
1,335	Kota Pasuruan	12,803.3	0.02
1,336	Kota Probolinggo	11,180.9	0.02
1,337	Kota Surabaya	831.7	0.01
1,401	Kab. Bengkayang	6,770.1	0.02
1,402	Kab. Landak	6,500.3	0.02
1,403	Kab. Kapuas Hulu	17,623.9	0.02
1,404	Kab. Ketapang	11,139.9	0.02
1,405	Kab. Pontianak	3,024.8	0.01
1,406	Kab. Sambas	4,764.6	0.01
1,407	Kab. Sanggau	8,351.1	0.02
1,408	Kab. Sintang	13,481.3	0.03
1,409	Kota Pontianak	8,465.1	0.02
1,501	Kab. Barito Sel	96,491.0	0.13
1,502	Kab. Barito Utara	154,993.4	0.19
1,503	Kab. Kapuas	42,835.9	0.08
1,504	Kab. Kobar	105,294.7	0.18
1,505	Kab. Kotim	76,128.4	0.16
1,506	Kota Palangka Raya	95,319.3	0.13

1,601	Kab. Banjar	29,050.6	0.08
1,602	Kab. Barito Kuala	35,980.4	0.08
1,603	Kab. H.S. Selatan	46,168.9	0.07
1,604	Kab. H.S. Tengah	39,409.7	0.07
1,605	Kab. H.S. Utara	72,040.7	0.17
1,606	Kab. Kota Baru	87,985.9	0.28
1,607	Kab. Tabalong	137,915.2	0.24
1,608	Kab. Tanah Laut	110,717.2	0.26
1,609	Kab. Tapin	68,311.0	0.09
1,610	Kota Banjar Baru	71,512.0	0.10
1,611	Kota Banjarmasin	16,522.1	0.05
1,701	Kab. Berau	1,590,890.5	1.51
1,702	Kab. Bulungan	2,076,845.4	1.02
1,703	Kab. Kutai	2,635,860.5	3.76
1,705	Kab. Kutai Timur	1,731,378.8	2.48
1,706	Kab. Malinau	4,610,071.4	2.15
1,707	Kab. Nunukan	2,133,833.2	2.07
1,708	Kab. Pasir	761,609.9	1.37
1,709	Kota Balikpapan	400,612.0	1.21
1,710	Kota Bontang	1,634,981.9	2.15
1,711	Kota Samarinda	321,978.3	0.86
1,712	Kota Tarakan	1,440,691.3	2.29
1,801	Kab. Bolmang	6,741.3	0.02
1,802	Kab. Minahasa	4,834.3	0.01
1,803	Kab. Sangihe Talaud	6,190.7	0.01
1,804	Kota Bitung	10,529.5	0.01
1,805	Kota Manado	4,132.5	0.01
1,901	Kab. Banggai	9,191.6	0.02
1,902	Kab. Banggai Kep.	11,904.4	0.02
1,903	Kab. Buol	24,070.8	0.03
1,904	Kab. Toli-Toli	13,311.1	0.02
1,905	Kab. Donggala	3,735.7	0.01
1,906	Kab. Morowali	21,580.0	0.03
1,907	Kab. Poso	11,224.7	0.01
1,908	Kota Palu	5,810.2	0.01
2,001	Kab. Bantaeng	9,826.2	0.02
2,002	Kab. Barru	10,247.9	0.01
2,003	Kab. Bone	2,389.3	0.01
2,004	Kab. Bulukumba	4,393.0	0.01
2,005	Kab. Enrekang	15,250.1	0.02
2,006	Kab. Gowa	3,014.9	0.01
2,007	Kab. Jeneponto	4,882.2	0.01

2,008	Kab. Luwu	5,335.9	0.01
2,009	Kab. Luwu Utara	35,642.7	0.11
2,010	Kab. Majene	12,929.2	0.02
2,011	Kab. Mamuju	22,982.1	0.04
2,012	Kab. Maros	5,720.3	0.01
2,013	Kab. Pangkep	5,872.1	0.01
2,014	Kab. Pinrang	4,998.7	0.01
2,015	Kab. Polewali Mamasa	3,579.5	0.01
2,016	Kab. Selayar	14,970.5	0.02
2,017	Kab. Sidrap	6,586.4	0.01
2,018	Kab. Sinjai	7,572.0	0.01
2,019	Kab. Soppeng	7,096.4	0.01
2,020	Kab. Takalar	6,757.3	0.01
2,021	Kab. Tana Toraja	4,108.5	0.01
2,022	Kab. Wajo	4,728.6	0.01
2,023	Kota Pare-Pare	14,351.9	0.02
2,024	Kota Makasar	1,419.0	0.01
2,101	Kab. Buton	2,885.0	0.01
2,102	Kab. Kendari	4,989.8	0.01
2,103	Kab. Kolaka	11,170.5	0.02
2,104	Kab. Muna	6,388.5	0.01
2,105	Kota Kendari	7,738.0	0.01
2,201	Kab. Badung	2,009.4	0.00
2,202	Kab. Bangli	3,549.9	0.01
2,203	Kab. Buleleng	1,226.9	0.00
2,204	Kab. Gianyar	1,746.9	0.00
2,205	Kab. Jembrana	2,959.9	0.01
2,206	Kab. Karangasem	1,902.6	0.00
2,207	Kab. Klungkung	4,441.0	0.01
2,208	Kab. Tabanan	1,828.2	0.00
2,209	Kota Denpasar	1,308.4	0.00
2,301	Kab. Bima	8,553.9	0.02
2,302	Kab. Dompu	23,904.7	0.04
2,303	Kab. Lombok Barat	6,848.5	0.02
2,304	Kab. Lombok Tengah	5,807.4	0.02
2,305	Kab. Lombok Timur	4,434.6	0.02
2,306	Kab. Sumbawa	54,174.3	0.14
2,307	Kota Mataram	13,674.3	0.04
2,401	Kab. Alor	4,430.6	0.01
2,402	Kab. Belu	1,860.1	0.00
2,403	Kab. Ende	3,014.1	0.01
2,404	Kab. Flores Timur	3,539.2	0.01

2,405	Kab. Kupang	1,639.9	0.00
2,406	Kab. Lembata	7,643.5	0.01
2,407	Kab. Manggarai	1,218.2	0.00
2,408	Kab. Ngada	3,077.1	0.00
2,409	Kab. Sikka	2,618.6	0.01
2,410	Kab. Sumba Barat	1,998.6	0.00
2,411	Kab. Sumba Timur	4,013.0	0.01
2,412	Kab. Timtengsel	1,769.7	0.00
2,413	Kab. Timtengut	3,367.5	0.00
2,414	Kota Kupang	2,907.9	0.01
2,501	Kab. Mal. Tenggara Barat	15,641.9	0.02
2,502	Kab. Mal. Tengah	7,667.0	0.02
2,503	Kab. Mal. Tenggara	9,997.4	0.01
2,504	Kab. Pulau Buru	30,983.2	0.04
2,505	Kota Ambon	9,010.2	0.01
2,601	Kab. Biak Numfor	82,530.6	0.06
2,602	Kab. Fak-Fak	840,018.1	0.38
2,603	Kab. Jayapura	104,633.8	0.06
2,604	Kab. Jayawijaya	19,289.0	0.03
2,605	Kab. Manokwari	93,088.0	0.08
2,606	Kab. Merauke	54,636.6	0.04
2,607	Kab. Mimika	130,402.6	0.07
2,608	Kab. Nabire	79,263.7	0.06
2,609	Kab. Paniai	94,123.5	0.05
2,610	Kab. Puncak Jaya	118,759.3	0.07
2,611	Kab. Sorong	204,339.4	0.13
2,612	Kab. Yapen Waropen	187,786.1	0.09
2,613	Kota Jayapura	51,094.3	0.06
2,614	Kota Sorong	61,579.8	0.08
2,701	Kab. Halteng	68,918.3	0.06
2,702	Kab. Mal. Utara	28,664.7	0.06
2,703	Kota Ternate	42,038.3	0.06
2,801	Kab. Lebak	939.6	0.00
2,802	Kab. Pandeglang	829.1	0.00
2,803	Kab. Serang	486.6	0.00
2,804	Kab. Tangerang	271.3	0.00
2,805	Kota Cilegon	2,549.3	0.01
2,806	Kota Tangerang	573.3	0.00
2,901	Kab. Bangka	14,699.4	0.06
2,902	Kab. Belitung	27,331.8	0.06
2,903	Kota P. Pinang	40,009.6	0.06
3,001	Kab. Boalemo	9,344.1	0.02

3,002	Kab. Gorontalo	3,036.7	0.01
3,003	Kota Gorontalo	9,861.6	0.01
1,704	Kab. Kutai Barat	1,335,061.7	1.56
	Min	271.3	
	Max	4,610,071.4	
	Mean	128,647.0	0.20
	Median	7,719.9	0.02
	Variance	185,542,523,262.3	0.36
	Standard deviation	431,388.9	0.60

Note: NRRSpc - Natural Resource Revenue Sharing per capita

DAU - Block grants

Source: www.djpkdp.go.id

APPENDIX Table 4. Regression Analysis of the Oil Revenue and Non-Oil Revenue against selected independent variables.

Dependent Variable:	Non-Oil Revenue[1]	Oil Revenue[1]
Intercept	9.31 (4.57) ***	9.70 (1.20)
GDRPpc	1.62×10^{-6} (1.02)	
Oil Price	0.13 (0.23)	0.35 (2.15) **
Oil Revenue^	-0.49 (-1.12)	
Non-Oil Revenue^		-1.06 (-1.76) *
Estimation method	2SLS	2SLS
Number of observations	67	67
Adj R^2	0.13	0.27

*** ,**,* denote significance at 1%, 5%, and 10% levels, respectively.
t-statistics are shown in parentheses.
1) as a percent of GDP
^ Endogenous variable
Source: Quarterly per capita GDRP data are from the World Bank Indonesia Office.
Oil prices are from the Energy Information Administration. http://www.eia.doe.gov
Quarterly Oil and Non-Oil Revenue data was provided by Sri Mulyani Indrawati.

APPENDIX Table 5. Natural Resource Revenue Sharing Practices

Country		Vertical Share	Distribution Criteria
Brazil	States: Locals:	Taxes on minerals (45%) Tax on Gold (70%) 2.3% of revenues from crude oil production Taxes on minerals (50%)	Origin
China	Provinces:	Taxes on natural resources	For each province, the center determines a share of the tax revenues it collects that it may retain. The determination is made on the basis of a combination of: -Derivation -Formula -Negotiations and ad hoc decisions.
Estonia	Locals:	Taxes on oil sale (50%) Taxes on construction material (70%) Water supply tax (80%)	
Indonesia	Provinces:	Royalties on oil and gas sales, royalties on forestry and mining activities	Derivation Forest rolyalties: 65% federal (F), 35% state (S) and local (L), (28% S, 7% L); Mining royalties: 30% F, 70% S and L (56% S, 14% L)
Malaysia		Import and excise duties on oil (30% to States) Export duty on tin (10% to States) Export duties on other minerals Export duties on timber and other forest products	Derivation Derivation (exclusively for the states of Sabah and Sarawak, which were granted special privileges as a condition for joining the federation).
Mexico	States:	Import taxes and Petroleum export duties	Shared with petroleum refining and exporting cities (Derivation).

Nigeria		Most revenues collected centrally into Federation Account (FA). 73% of government revenue is oil-based.	
	States:	States Joint Account (SJA) 31.5% of FA.	5% of SJA distributed to mineral producing states on the basis of derivation.
	Locals:	10% of FA	Equal share (25%) Population (75%)
Pakistan	Provinces:	80% of excise duty and royalty on natural gas, surcharge on gas; royalty on crude oil and profits on hydroelectricity	Origin
Papua New Guinea	Provinces:	Royalties: mineral and petroleum, natural gas, timber, and fish.	Derivation (These reduce the amount of derivation Grant that the province is entitled to).
Philippines		Tax on petroleum products	Derivation
Russia	Provinces	Natural resource taxes (39%)	
	Locals	Natural resource taxes (36%)	

Source: Gupta, S.P., Peter Knight, Roberta J. Waxman, and Yin-Kann Wen. Ed. 1994. *Intergovernmental Fiscal Relations and Macroeconomic Management in Large Countries.* The World Bank.
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