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International Studies Program
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Can Decentralization Help Rebuild Indonesia?

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How Should Revenues From Natural Resources Be Shared in Indonesia? Executive Summary

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1. The share of "mining and quarrying" in GDP is above 10 percent in 29 of 100 countries for which we could find data[1]. It accounts for more than one-fifth of GDP in 13 countries. Indonesia's mining share is 10.1 percent, about 5 times 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.

2. We can find no significant relationship across countries between the ratio of tax to GDP and the mining share for the1990s. One explanation for this result is that other tax bases have emerged as economies have developed, and there is less reliance on the extractive sector for government revenue. This finding is also consistent with the hypothesis that revenues raised from the natural resource base and those raised from other bases are substitutes. We find evidence of such substitution in Indonesia.

3. Using a similar cross-section analysis for the 1990's, we 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 of GDP), the expected local government

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

expenditure share will be higher by 13 percent. When one remembers that the average sub national government share of expenditures is only about 17 percent, this may be seen as a fairly large response. Based on its mining share, per capita GDP, population and land area, Indonesia's local government expenditure share in the 1990s was 14.4 points below the expected level [2]. The "big bang" decentralization of 2001 brought Indonesia close to 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 this more decentralized structure.

4. 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 and cultural differences between the natural resource regions and the rest of Indonesia. **5.** There are, objective arguments in support of giving sub national governments a claim on a share of these revenues. These payments may be seen as compensation for the economic and social costs of natural resource extraction. More importantly, a share of natural resource revenues may be justified as payment for using up an exhaustible resource, i.e., for replacing the heritage of the region. **6.** 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. The most important is related to the basic question of who owns the natural riches, the region or the national government. There also is a concern about tying the finance of essential

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

local government-provided services to an unstable revenue flow. Finally, there is the fear that local governments could not efficiently spend such a large revenue windfall.

7. Few policy analysts or politicians believe that there should be no natural resource revenue sharing. The question is, "how large a share?" There are at least two ways to approach the calculation of this share. Option one: would be to appoint a high-level "grants" commission to carry out the work and design a five year "contract" to recommend to the President and to Parliament. Option two: is 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. At 1998 – 1999 levels, this would have resulted in a devolution of natural resource revenues of about 2.2 percent of GDP. This is above the present level of about 0.6 percent of GDP.

8. Many policy analysts advocate deducting natural resource transfer from DAU (general revenue sharing) allocations on grounds that these are an enhancement to fiscal capacity. In fact, such deduction was built into the original DAU allocation formula. However, this is based on the presumption that natural resource sharing is no more than a second, general purpose transfer, and is being used for financing recurrent expenditures. However, if there is no special purpose justification for natural resource revenue sharing, why not simply combine it with DAU? If, on the other hand, natural resource revenue sharing is a compensation for the cost of natural resource extraction, or for exhausting the resources of a region, then there is no basis to argue "enhanced fiscal capacity."

9. How does one deal with the twin problems of (a) unwise use of windfall revenues to local governments with large mining sectors, and (b) the revenue financing of essential local services with an unstable 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 is the creation of a heritage fund arrangement. The Fund could be used to finance development expenditures that would produce benefits for the present and future generation. Payments into the Heritage Fund (or a sinking fund) could fluctuate with commodity prices without harming the provision of these programs. The Fund could be conservatively managed by an outside, third party.

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. [3]

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 in 29 of 100 countries for which we could find data [4]. It accounts for more than one-fifth

[3] 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.

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

of GDP in 13 countries. Indonesia's mining share is 10.1 percent, about 5 times 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 that there was a significant, positive relationship between the mining share and the tax ratio in 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 for various specifications, is that we can find no significant relationship between the tax ratio and the mining share for the 1990s. 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. One

explanation for this result is that other tax bases have emerged as economies have developed, and there is less reliance on the extractive sector. This finding is also consistent with the hypothesis that revenues raised from the natural resource base and those raised from other bases are substitutes. We find evidence of such substitution in Indonesia, and discuss this below.

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 central government expenditures 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. There are issues of political control over these resources that might discourage decentralization of governance. Finally, there are questions of corruption that might point to more centralization: both the central control over mining concessions and the fear of corruption associated with large sums of money passing through local government budgets.

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. This will push countries with more natural resource wealth towards a larger degree of decentralization.

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 forty percent of the variation on the degree of decentralization across 62 countries, with per capita GDP, population, area 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.[5]

In summary, we cannot conclude that countries with larger mining shares raise more revenues to distribute among the various 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 GDP), the expected local government expenditure share will be higher by 13 percent. When one remembers that the average sub national government share of expenditures is only about 17 percent, this may be seen as a fairly large response. Based on its mining share, per capita GDP, population and land area, Indonesia's local government expenditure share in the 1990s was 14.4 points below the expected level [6]. The decentralization of 2001 brought Indonesia close to 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 this more decentralized structure.

[5] We omitted 37 countries because data for all variables were not available. These countries have an average mining share of 8.2 percent, compared to the sample average of 7.8 percent.

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

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.

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 of GDP were allocated to the sub national governments. The allocation would take the form of a shared tax of this amount or a direct allocation from the central government. 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 43 percent of local government expenditures (in the 1990s) (Appendix Table 1). The distribution of this revenue potential among the 35 countries shown in Table 3, suggests that in 5 countries, 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 water port at Medan, these resources are exhaustible. The returns from fertile land in a region may be taxed in perpetuity. Natural resource regions may tax the returns from an exhaustible resource only over the finite life of the resource. Clearly the flow of tax entitlements from the exhaustible resource will be more front-loaded. To 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 on 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 heritage argument has found acceptance around the world. As we show in Appendix Table 4, countries that decentralize do share natural resource revenues with

their regional governments. The tougher question is “who owns the natural resources?” and this gives rise to the lightning rod question, “how much of the rents from natural resources ought to be devolved to the local governments?”

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 has behavior patterns that are 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

Another advantage of formally decentralizing natural resource revenues may not be as obvious. 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. These "back door" approaches can be quite harmful to economic development, by discouraging investors, and can drive up transaction costs.

The informal approach to revenue raising will almost certainly lead local governments to the natural resource sector. The mining sector would be a good target for informal taxes, because it is a visible sector and because of the perception that the tax is 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 numerous ad hoc taxes that were discriminatory against activities where the perception was that the burden could be exported. So called business (registration) tax is an example of such taxes. It is imposed on businesses based on their sizes, usually proxied by their installed power capacity. Thus it is discriminatory against manufacturing industries. It does not create serious political problems, because the tax burden can be exported (Simanjuntak, 2002).

Another response to a failure to allocate formal revenue raising powers to local governments is that they may, by one means or another, confiscate some of the natural resource rents for themselves. 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 accommodate such

fluctuations because they can run deficits and finance these with borrowings. They also can postpone large capital projects. Deficit financing of current expenses is not an option that is, or 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. Any policy solution that ties revenue decentralization to natural resource tax revenues will require some feature that accommodates this instability.

Macroeconomic Considerations

Macroeconomic planning and growth considerations may 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 26 percent of oil tax revenues devolved 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 0.6 percent of GDP. The result of decentralization could be a noticeable displacement of public investments.

Would this make any difference in the portfolios of investments? Presumably, national government officials plan infrastructure development according to a development program and take into account local, regional and national benefits. Elected local government officials will be more prone to invest the proceeds of natural resource sharing in more visible projects with benefits weighted toward the very short run.

There also is the question of resource mobilization. Large amounts of natural resource revenue sharing will discourage some districts from increasing their effort with respect to raising their own source local revenues. For a country like Indonesia, 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 this distribution of natural resource revenues in two ways. The first is according to what the law prescribes, and the second is according to the actual amounts received.

The legal distribution of natural resource revenue is based primarily on tax sharing, where specified percentages of the tax revenue raised from each extractive activity 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 actual base that is shared is a more complicated story. By the formal regulation, 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 best way to answer this question is to study the actual revenue flows that result from this set of laws and regulations. The actual distribution of per capita natural resource revenue received by each district shows an extremely large range, from Rp 271.3 million 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 popular attention and criticism to the distribution.

Is this revenue sharing distribution out of step 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 determinants of per capita 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 is not equalizing, if either per capita GDP or the poverty rate, are taken as the barometer of equalization. Interestingly, however, the distribution of per capita natural resource revenue sharing was positively and significantly related to the distribution of per capita DAU (general purpose) transfers. The two transfer systems were reinforcing rather than offsetting.

Another view is that this is the “wrong” question. 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 about inequities across regions in the distribution of these revenues. The purpose of this revenue sharing program is to compensate natural resource regions for costs incurred and for the use of exhaustible resources. Its distribution should be driven only by 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 also causes perverse local effects that can retard longer term economic development. Most often cited are: (a) a spending effect, where a greater share of domestic resources are allocated to the non-tradable sectors such as services and government, and (b) the drawing of labor toward the higher paying mining sector and away from other economic activity in the region. The former crowds out development of a new export sector, whereas the latter drives up production costs in other tradable sectors.

There are even less pleasant possibilities. One is that the new-found wealth in resource rich districts may be 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 these effects for Indonesian local governments, but some would argue that their existence is a reasonable hypothesis. The introduction of natural resource revenue sharing in Indonesia surely produced a windfall problem. Some local governments were overnight beneficiaries of a new revenue sharing program, and the amounts received were in some cases quite significant. We might estimate the magnitude and relative importance of this windfall in the following way. We know that there was a "'hold harmless" provision on DAU so that in 2001 it was

approximately the same size as the sum of the previous SDO and Inpress transfers in 2000. In Appendix Table 3, we show the distribution of 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 of our calculations show that several districts received quite significant additions to the budget as a result of natural resource revenue sharing. While 268 districts received Natural Resource Revenue Transfers that were less than 10 percent of their DAU transfers, 23 districts received amounts that were more than 100 percent of their DAU allocation (See Table 3). This is evidence of a revenue increment significant enough to be treated as a windfall. While some local officials may have recognized this revenue sharing for what it was, a repayment for natural resource exhaustion, others almost surely viewed it more as some would view a one-time revenue bonanza.

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. It may also be the case that national unity demands some sharing of the returns from natural resource extraction.

- 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 (McLure, 2000).

Some 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 any number of ways that one might choose the "right level" of vertical sharing of Natural Resource Revenues. Either a bottom up or a top down approach could be used to determine the vertical share.

A bottom up approach to determining the vertical share (VS) might be described by the following:

$$VS = \frac{CR + H + U}{NRR}$$

Ideally, the amount going to the local governments would include a cost reimbursement component (CR) and a "heritage" component (H). 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 (U), 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 denominator would be total natural resource reserves (NRR). This 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 also consider a top-down approach to measuring the vertical share, i.e., we might ask how much the central government can afford? One hypothesis is this: The central government can afford to replace its "excessive" reliance on natural resource taxes with an increase in domestic taxes. This increase could then be returned in the form of revenue sharing to the natural resource regions. To make this case, and to measure the "affordable" vertical share, we must show two things: (a) that mining sector taxes have been substituted for other taxes, and (b) that tax effort is low.

There is some evidence that Indonesia has substituted taxes on the natural resource sector for taxes on the "domestic sector." We posit a structural relationship between oil tax revenues (OR) and non-oil tax revenues (NOR) as:

$$NOR = f(Y_p, PO, OR)$$

$$OR = f(PO, NOR),$$

where PO = price of oil. Using quarterly data and a two stage least squares estimate, we find a negative relationship between "domestic" tax revenues and oil tax revenues (Table 6).

The second question is whether the overall level of taxation is low in Indonesia. Following the traditional method (Bahl, 1971), we estimate the taxable capacity of Indonesia using two different specifications of functional form, and the agricultural share of GDP and openness as independent variables. By either of these equations, Indonesia is found to be a low taxing country. Its estimated taxable capacity ranges

between 19.6 and 19.9 percent of GDP, both estimates being well above its actual level of taxation of 15.2 percent of GDP in 1998 12.7 percent in 2001. 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?

We have simulated an implied vertical share using this "affordability" method, as reported in Table 7, for the late 1990's. For the year 1998, for example, the actual tax ratio was 15.2 percent of GDP. To reach the target of 19.9 percent of GDP, a revenue "surplus" equivalent to 4.7 percent of GDP would be created by some approach to increasing taxes to the international average. In 1998, oil tax revenues were equivalent to 4.2 percent of GDP. If the total amount of increased taxes were used to "replace" oil revenues in the central government general budget, the entitlement of local governments in oil revenue collections would have been 111.9 percent in 1998. That is, all oil tax revenue collections would have been dedicated to the natural resource revenue sharing pool. During the 1994-1999 period, the contribution would not have dropped below 87.5 percent of oil tax revenue collections, though it would have fluctuated widely. This is one view of a "normative" vertical share. By comparison, the actual level of natural resource revenue sharing in 2001, as a percent of oil tax revenues was about 36 percent. One might conclude, using this criterion, that the present vertical share is low.

Horizontal Sharing

Horizontal sharing refers to the distribution of natural resource revenues among the districts. Unfortunately, there is no clear "right" way to do horizontal distribution. As is suggested in Appendix Table 4, countries choose a wide array of formula and derivation-type distributions. A "derivation" approach allocates revenues back to the local government where they were collected. Some use ad hoc methods and others more transparent approaches. The approach a country chooses depends on economic and social objectives, politics, history and even accident.

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 should be 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. This supports the argument that 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 general purpose transfer (DAU), i.e., there is no case for special natural resource revenue sharing if it is to be allocated to all regions for general purposes.

However, allocation among local governments purely on a derivation basis is no easy matter. For one thing, the incremental "costs" of the extractive activities may be borne in adjacent districts, as for example in the case of road construction and maintenance, water and air pollution, etc. In other cases the ownership of the resource

may not be clear. For example, the well may be drilled in district A but it may tap 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 near-by 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, in Indonesia. The decentralization of 2001 relegated the provinces to a minor role in the intergovernmental fiscal system.

The solution to horizontal distribution that the Indonesian government settled on in 2001 is some sort of rough proration. The system is based on a combination of derivation, formulae and ad hoc rules. While the rationale for this horizontal sharing 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 firm or one sector, for the purpose of exporting burdens, 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 good 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, on a derivation basis.

Some policy analysts have concentrated on identifying taxes that can be applied specifically to the natural resources sector. In an interesting analysis of the options for local taxation of mining activities, Otto (2001) suggests that good candidates might include 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 Indonesian 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. [7]

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

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 will almost certainly try to renegotiate on a regular basis. In that case,

[7] 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."

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

2. Special negotiations encourage imitation, i.e., other provinces will seek the same type of accommodation. Soon, every local government becomes "special" in terms of their expected revenue sharing. Local governments will also imitate one another in terms of the tactics they use to achieve a better agreement.

3. If there are no transparent rules that bind all local governments, 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.

Heritage Fund

One of the primary goals of natural resource revenue sharing should be to finance the replacement of an exhaustible resource with an alternative, sustainable economic base. In theory, the benefits of the program should accrue to present and

future residents. However, the current system of natural resource revenue sharing in Indonesia all but guarantees that there will be no inter-generational transfer. Local politicians and other local elites will have a decided bias in favor of spending the money to benefit current voters or the current power structures. Though there has not yet been a thorough monitoring of these expenditures, many believe that much of the money has been squandered. This is a result that one might expect in the case of receipt of a large revenue windfall with little accountability to voters and little transparency.

A way around this "windfall" problem is the creation of a Heritage Fund as the central mechanism for administering natural resource revenue sharing. The system might work as follows:

- The overall vertical share for natural resource revenue sharing would be a proportion of natural resource revenues, while the horizontal share would be according to some transparent method.

- Payments into the Heritage Fund would be prescribed as a percent of the natural resource revenue sharing allocation.[8] Each local government would have an account.

- Annual and full payments to the Heritage Fund would be guaranteed.

- Expenditures from the Fund would be earmarked for "pre-approved" development projects. For those districts receiving small amounts, the

[8] The remainder would be to reimburse the incremental costs of natural resource extraction.

natural resource transfer could be seen as augmenting conditional grants. In effect, the money would be used for hard and soft infrastructure projects that are consistent with a structural adjustment of the local economic base.

- Management of the Heritage Fund could be by an independent third party. Or, payments to the Fund could be treated as a dedicated revenue stream of payments to a sinking Fund to service and repay a foreign loan. The lender would manage the sinking Fund to accommodate the erratic revenue flow resulting from fluctuating oil and mineral prices, and could pre-fund certain projects The dedication of a revenue stream from natural resources should defray both collateral concerns and foreign exchange risk.

The Heritage Fund concept has great merit as a policy for Indonesia. It at once addresses the revenue instability and the windfall issues. It makes possible an intergenerational transfer because it is earmarked for a capital project. 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.

CONCLUSIONS AND POLICY IMPLICATIONS

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 setting up the present arrangement. The basis for calculating the vertical share should be the best estimates that one can make of the "costs" of natural resource extraction, and a calculation of a "heritage" amount. This would move the decision towards a different vertical share for each region. So would individual negotiations.

There is no perfect way to calculate the "heritage" compensation, or even the cost reimbursement amounts. However, hard analysis can significantly reduce the subjectivity in assigning the vertical (and horizontal) shares. One feasible option would

be to appoint a high-level “grants” commission to carry out the work and design a five year “contract” to recommend to the President and to Parliament.

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. At 1998 – 1999 levels, this would have resulted in a devolution of natural resource revenues of about 2.2 percent of GDP. This is above the present level of about 0.6 percent of GDP.

Once a method is in place for establishing the size of the vertical share (and horizontal share), one might take on the four questions that seem to plague the formation of a firm intergovernmental policy for natural resources.

1. Should the natural resource revenue sharing regime be linked to the general purpose grant program of the government (the DAU)? On a conceptual level, there is a strong argument that they should not be linked. 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. Essential services, in natural resource regions and in other regions, should continue to be financed by DAU and local resources. Natural resource revenue sharing should be seen as an earmarked, conditional transfer. The purpose is to compensate local governments for the additional costs associated with natural resource activity, and for the “exhausted” economic base of the region. So long as its use is formally limited to these purposes, it should not be seen as an enhancement of the general fiscal

capacity of the district government. It is no more an addition to the ability to finance local government services than is an earmarked conditional grant. It would be incorrect to deduct revenues from natural resource transfers (or other conditional transfers) from DAU entitlements.

Many policy analysts advocate deducting natural resource transfer from DAU allocations, on grounds that these are an enhancement to fiscal capacity. In fact, such deduction was built into the original formula. However, this is based on the presumption that natural resource sharing is no more than a second, general purpose transfer, and is being used for financing recurrent expenditures. However, if there is no special purpose justification for natural resource revenue sharing, why not simply combine it with DAU?

2. Should the natural resource revenue sharing system be based on transparent formula (as for example, determination by a grants commission) or should they be negotiated on a province-by-province basis? 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. A better approach would be to allow a grants commission to factor “special circumstances” into the allocation criteria.

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. Local governments with a strong mining sector should follow these general rules in the same way as local governments with strong manufacturing or tourism or agricultural sectors.. 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 twin problems of (a) unwise use of windfall revenues to local governments with large mining sectors, and (b) the revenue financing of essential local services with an unstable 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 is the creation of a heritage fund arrangement. The Fund could be used to finance development expenditures that would produce benefits for the present and future generation. Payments into the Heritage Fund (or a sinking fund) could fluctuate with commodity prices without harming the provision of these programs. The Fund could be conservatively managed by an outside, third party.

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

Percent	Number of countries
10 or less	71
11-20	16
21-30	7
31-40	5
41-50	1
Above 51	0

a) Average for the period 1990-1999

Source: National Accounts Statistics, The United Nations

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	1.18 (5.90) ***	2.06 (6.55) ***	3.41 (7.63) ***	2.39 (2.84) ***	-4.71 (-3.58) ***
GDP per capita	0.24 (9.61) ***	0.17 (4.79) ***			0.30 (4.35) ***
Mining share of GDP	-0.02 (-0.87)	-0.05 (-1.70)	0.001 (0.06)		0.13 (2.14) ***
Agricultural share of GDP			-0.25 (-5.04)	-0.29 (-8.08) ***	
Openness[3]			0.07 (0.70)	0.21 (2.18) ***	
Area					0.11 (1.55)
Population				0.03 (1.03)	0.20 (2.16) ***
Estimation method	OLS	OLS	OLS	OLS	OLS
Number of observations	81	41	68	112	62
Adj R^2	0.54	0.46	0.27	0.43	0.37

*** ,**,* denotes 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 1990-1999.

Source: World Development Indicators, The World Bank
National Accounts Statistics, The United Nations
Government Finance Statistics, International Monetary Fund

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

Percent	Number of countries
10 or less	25
11-20	2
21-30	1
31-50	2
51-100	2
101 or more	3

[a)] Ten percent of the mining share of GDP divided by subnational government expenditures. Average for the period 1990-1999

Source: National Accounts Statistics, The United Nations
Government Finance Statistics, International Monetary Fund

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

Amounts Rp.	Number of districts
1,000 or less	16
1,001-10,000	169
10,001-100,000	100
100,001-1,000,000	37
Above 1,000,000	14

Source: Government of Indonesia. **http://www.djpkdp.go.id**

Table 5. Regression Analysis of per capita Natural Resource Revenue Sharing across the Districts in Indonesia[1]

Dependent Variable:	NRRSpc[2]	NRRSpc[2]	NRRSpc[2]
Intercept	19.68 (8.29)***	11.03 (4.90)***	-2.85 (-18.25)***
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)***	
DAUpc			1.81 (12.07)***
Estimation method	OLS	OLS	OLS
Number of observations	336	336	336
Adj R^2	0.33	0.49	0.30

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

Source: Government of Indonesia. http://www.djkpkd.go.id

Table 6. 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 are drawn from the Government of Indonesia sources.

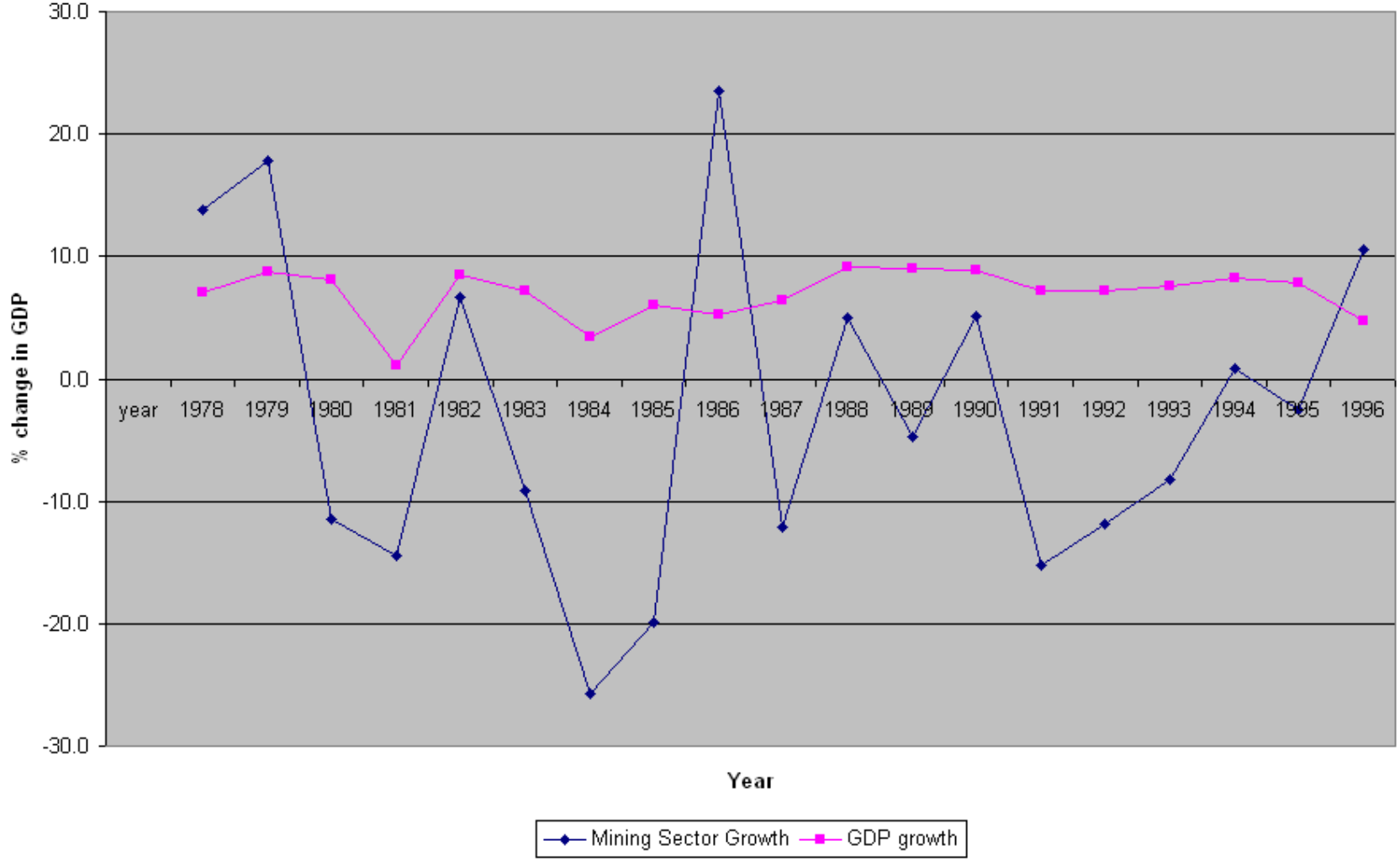
Table 7. Natural Resource Revenue Sharing as a Residual Claim

Year	Actual Tax Ratio	Target	Surplus	Oil Revenue	Potential[1]
1994	16.0	19.9	3.9	3.5	111.4
1995	15.8	19.9	4.1	2.9	144.3
1996	14.5	19.9	5.4	3.7	145.9
1997	15.0	19.9	4.9	5.6	87.5
1998	15.2	19.9	4.7	4.2	111.9

Note: [1)]Surplus as a percent of oil revenue.
All variables are shown as a share of GDP except “Potential” in the far right column.

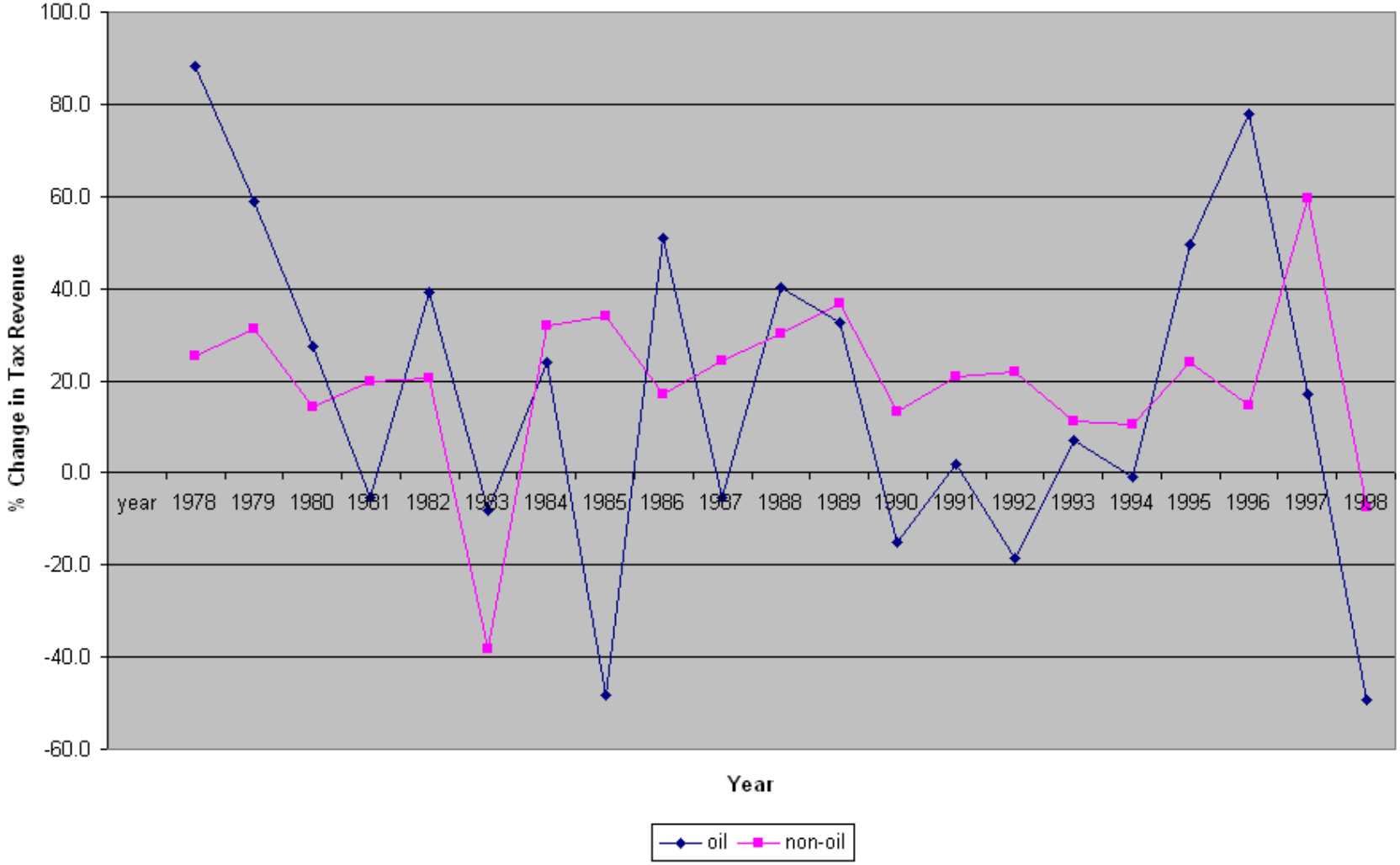
Source: Government Finance Statistics Yearbook, International Monetary Fund and the Government of Indonesia sources.

Figure 1. Percent Change in Mining Sector and Total GDP in Indonesia: 1979-97



Source: Mining Sector Growth data are from National Accounts Statistics. The United Nations
GDP growth data are from World Development Indicators. The World Bank

Figure 2. Percent Change in Oil and Non-Oil Tax Revenues in Indonesia: 1979-99



Source: Ministry of Finance. Data are posted at the World Bank Jakarta Office website http://www.worldbank.or.id

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APPENDIX Table 1. Selected Characteristics:
Countries ranked by the size of mining sector in GDP1

Country Name	Mining [a]	Decentralization [b]	Tax Ratio [c]	Revenue Ratio [d]	Mining/ Sub.exp [e]
United Arab Emirates	46.7	..	..	..	..
Nigeria	35.7	28.9	7.8	..	..
Botswana	35.6	4.8	33.8	..	198.5
Kuwait	35.5	..	..	..	..
Saudi Arabia	35.4	..	..	..	..
Ukraine	34.6	28.9	37.0	..	..
Mongolia	29.1	35.1	24.2	30.1	21.4
Bulgaria	28.2	18.1	33.1	42.4	2612.2
Macedonia, FYR	27.6	..	..	..	..
Algeria	27.3	..	..	..	..
Kazakhstan	25.9	37.0	14.5	23.0	..
Azerbaijan	24.7	24.1	22.4	23.1	..
Portugal	24.2	11.2	32.6	36.6	..
Costa Rica	19.4	3.0	21.2	20.6	..
Lithuania	18.4	26.2	30.1	32.2	..
Venezuela	18.3	..	..	..	..
Bahrain	17.8	2.9	..	28.1	220.3
Trinidad and Tobago	16.5	4.4	23.2	29.3	98.6
Croatia	16.0	10.8	44.6	48.5	0.6
Papua New Guinea	15.8	..	..	..	..
Iran, Islamic Rep.	14.2	0.0	7.2	..	..
Israel	14.0	13.6	35.3	42.3	..
Yemen, Rep.	13.3	..	..	..	..
Namibia	13.1	..	30.2	..	..
Norway	12.9	32.4	40.9	52.9	0.8
Ecuador	12.3	..	..	..	..
Guyana	11.6	..	..	..	..
Romania	11.1	11.6	30.3	34.6	..
Indonesia	**10.1**	**12.2**	**15.8**	**18.2**	**43.3**
Sierra Leone	9.4	..	11.2	..	..
Moldova	8.5	27.9	26.2	37.2	..
Chile	8.5	8.0	19.6	24.7	33.9
Bolivia	8.4	23.4	14.5	20.7	12.1
Colombia	8.2	43.5	..	..	..
South Africa	7.7	29.1	27.7	29.3	5.2
Sudan	5.9	..	6.3	..	..
Tunisia	5.3	..	..	..	..
Jordan	4.6	..	..	..	..
Australia	4.0	42.4	28.8	34.4	2.2
Suriname	3.8	..	..	..	..
Canada	3.5	57.4	37.3	45.5	1.0
Dominican Republic	3.5	2.3	13.5	15.0	78.3
Kyrgyz Republic	3.2	25.5	14.0	..	..
Bahamas, The	3.2	..	15.6	..	..
Malta	3.1	..	26.8	..	..

Netherlands	2.9	24.0	43.0	50.4	1.7
Bhutan	2.2	..	6.1	..	..
United Kingdom	2.1	22.8	35.4	39.2	1.9
Morocco	2.1	..	..	..	..
India	2.0	45.5	14.5	19.2	1.4
Peru	1.9	18.9	12.8	17.0	13.9
Czech Republic	1.8	20.6	38.5	41.6	..
Estonia	1.6	25.2	34.8	38.4	1.4
United States	1.6	46.3	28.0	33.4	0.8
Georgia	1.6	20.0	8.2	..	..
Honduras	1.6	..	..	..	..
Mali	1.5	1.4	10.7	..	..
Mexico	1.5	26.1	16.7	19.3	3.0
Brazil	1.5	39.2	27.2	39.7	0.7
Swaziland	1.5	1.8	29.7	..	..
Thailand	1.4	8.0	17.2	19.4	8.3
New Zealand	1.4	10.1	36.7	..	3.7
Turkey	1.3	..	24.4	..	..
Sri Lanka	1.2	9.1	17.3	..	..
Greece	1.1	7.9	32.1	..	..
Philippines	1.1	7.9	..	..	8.7
Slovak Republic	1.0	8.9	38.6	39.8	2.6
Denmark	0.8	44.4	48.6	56.8	0.4
Burundi	0.8	..	15.2	..	..
Belize	0.6	..	..	..	..
Senegal	0.6	5.5	14.9	..	..
Myanmar	0.6	..	..	..	..
Pakistan	0.5	29.2	..	..	..
Spain	0.5	30.6	33.6	35.4	..
Nepal	0.5	..	..	..	..
France	0.4	17.6	43.0	46.5	0.7
Austria	0.4	30.9	42.4	49.1	0.2
El Salvador	0.4	..	..	..	..
Korea, Rep.	0.4	45.6	20.9	..	..
Paraguay	0.4	2.8	9.4	13.3	..
Finland	0.4	35.9	38.5	46.5	0.1
Cyprus	0.3	..	..	..	..
St. Vincent and the Grenadines	0.3	..	..	..	..
Sweden	0.3	33.8	51.7	57.2	0.1
Ethiopia	0.2	1.5	10.4	..	..
Japan	0.2	60.6	28.1	..	..
Cote d'Ivoire	0.2	3.2	16.7	..	..
Kenya	0.2	4.1	22.6	..	..
Uruguay	0.2	10.3	..	..	0.5
Cambodia	0.2	..	..	..	..
Latvia	0.2	24.0	32.7	38.6	0.2
Panama	0.2	2.5	18.6	27.1	2.5
Lesotho	0.1	..	39.2	..	..
Mauritius	0.1	4.6	19.2	22.0	1.1
Puerto Rico	0.1	..	..	..	..

Singapore	0.1	..	16.3	..	..
Hong Kong, China	0.0	..	..	..	..
Gambia, The	0.0	..	19.9	..	..
Bangladesh	0.0	..	39.8	..	..
Seychelles	0.0	..	34.4	..	..
Mean	7.8	20.6	25.5	33.8	
Median	1.9	20.0	26.2	34.5	
Variance	116.8	237.3	131.9	143.0	

Note:

[1] The data are the average of 1990-1999

[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 government 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 (%)

Source: mining data are from National Accounts Statistics, The United Nations;

Tax, revenue, expenditure data are from Government Finance Statistics Yearbook, International Monetary Fund;

APPENDIX Table 2. Fiscal Decentralization Effort

Country	Decentralization [a)]	Expected Decentralization [b)]	Decentralization Effort [c)]
Australia	42.4	43.1	1.0
Austria	30.9	17.7	1.7
Azerbaijan	24.1	9.3	2.6
Bahrain	2.9	6.8	0.4
Bolivia	23.4	12.2	1.9
Botswana	4.8	14.8	0.3
Brazil	39.2	36.9	1.1
Bulgaria	18.1	13.1	1.4
Canada	57.4	47.6	1.2
Chile	8.0	21.6	0.4
Colombia	43.5	22.7	1.9
Costa Rica	3.0	12.1	0.2
Cote d'Ivoire	3.2	7.0	0.5
Croatia	10.8	13.1	0.8
Czech Republic	20.6	13.1	1.6
Denmark	44.4	17.3	2.6
Dominican Republic	2.3	9.0	0.3
Estonia	25.2	7.4	3.4
Ethiopia	1.5	6.0	0.3
Finland	35.9	18.0	2.0
France	17.6	32.5	0.5
Georgia	20.0	5.2	3.8
Greece	7.9	16.9	0.5
India	45.5	23.5	1.9
Indonesia	**12.2**	**26.6**	**0.5**
Israel	13.6	18.3	0.7
Japan	60.6	38.1	1.6
Kazakhstan	37.0	21.6	1.7
Kenya	4.1	6.7	0.6
Korea, Rep.	45.6	18.4	2.5
Kyrgyz Republic	25.5	8.2	3.1
Latvia	24.0	5.6	4.3
Lithuania	26.2	11.0	2.4
Mali	1.4	7.1	0.2
Mauritius	4.6	3.4	1.4
Mexico	26.1	25.8	1.0
Moldova	27.9	7.4	3.8
Mongolia	35.1	9.5	3.7
Netherlands	24.0	23.6	1.0
New Zealand	10.1	16.9	0.6
Nigeria	28.9	17.2	1.7
Norway	32.4	30.2	1.1
Pakistan	29.2	12.0	2.4
Panama	2.5	6.1	0.4
Paraguay	2.8	8.1	0.3
Peru	18.9	16.8	1.1
Philippines	7.9	13.3	0.6

Portugal	11.2	23.9	0.5
Romania	11.6	15.1	0.8
Senegal	5.5	6.2	0.9
Slovak Republic	8.9	9.1	1.0
South Africa	29.1	26.8	1.1
Spain	30.6	25.5	1.2
Sri Lanka	9.1	7.5	1.2
Swaziland	1.8	4.4	0.4
Sweden	33.8	20.2	1.7
Thailand	8.0	18.5	0.4
Trinidad and Tobago	4.4	8.0	0.6
Ukraine	28.9	22.4	1.3
United Kingdom	22.8	32.9	0.7
United States	46.3	74.5	0.6
Uruguay	10.3	8.7	1.2

Note:

[a)] Defined as the ratio of subnational to total government expenditure. Data are an average for the 1990-1999 period.

[b)] Estimates are based on equation shown in Table 2.

[c)] Ratio of actual to estimated expenditure decentralization

Source: Government Finance Statistics Yearbook, 2001. International Monetary Fund

APPENDIX Table 3. Ratio of Natural Resource Revenue Sharing to DAU transfers in 2001

Ratio	NRRS/DAU
0.10 or less	268
0.11-0.25	24
0.24-0.50	14
0.51-0.75	2
0.76-1.00	5
1.01-2.00	13
2.00 or more	10

Source: Government of Indonesia. http://www.djpkpd.go.id

APPENDIX Table 4. Natural Resource Revenue Sharing Practices

Country		Vertical Share	Distribution Criteria
Brazil	States:	Taxes on minerals (45%)	Origin
	Locals:		
		Tax on Gold (70%)	Origin
		2.3% of revenues from crude oil production	Origin
		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 province 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	Derivation
		Export duties on timber and other forest products	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
Philippines		Tax on petroleum products	Derivation
Russia	Provinces	Natural resource taxes (39%)	
	Locals	Natural resource taxes (36%)	

Source: The source for Pakistan is: The World Bank. 2000. "Pakistan: Reforming Provincial Finances in the Context of Devolution. An Eight Point Agenda" Report No. 21362-PAK.
The source for Estonia is: The World Bank. 1995. "Estonia: Financing Local Governments" Report No. 14925-EE.
The source for Russia is: Frienkman and Yossifov. 1998. The World Bank.
The source for all other countries is: Shah, Anwar. 1994. "The Reform of Intergovernmental Fiscal Relations in Developing and Emerging Market Economies. *Policy and Research Series 23.* The World Bank.