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PPAA/94/24

INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

Fiscal Regimes for Natural Resource Producing Developing Countries

by

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November 1994

Abstract

In many developing countries and economies in transition, a variety of fiscal instruments should be used to tax mining and petroleum projects. They should be subject to the income tax like other activities in the economy; import duties can provide revenue early in the life of a project; royalties should be used to ensure a minimum return that varies with project cash flow; and a resource rent tax may be used but not relied upon as part of the fiscal package. These conclusions are based on the observations that: (i) the government has a dual fiscal role in relation to natural resource projects; it is the sovereign tax power and often the natural resource owner, and (ii) the property rights to natural resources and the associated fiscal arrangements are often not stable.

JEL Classification Numbers:

H25; Q38

^{1/} An earlier version of this paper was presented at the International Institute of Public Finance 50th Congress in Cambridge Massachusetts, August 1994. Opinions expressed are those of the authors and not necessarily those of the IMF.

<u>Table of Contents</u>	<u>Page</u>
I. Introduction	4
II. Fiscal Instruments	5
1. Sovereign tax power	5
a. Income taxation	5
b. Withholding taxes	7
c. Import duties	7
2. The government as resource owner	8
a. Lease bonuses	9
b. Royalties	10
c. Resource rent tax	12
d. Government equity	14
3. An illustration of some alternative fiscal instruments	17
III. Conclusion	18
Table	
1. Selected African Countries: Contribution of Mining to Exports, GDP, and Government Revenue, 1989	2
Charts	
1. Resource Rent Tax and Exploration: Impact on IRR	12a
2. Government Revenue: Equity Versus Resource Rent Tax	16a
3. Alternative Fiscal Regimes	18a
References	20

I. Introduction

Many developing countries and some economies in transition depend heavily on mineral and petroleum extraction for fiscal revenue and foreign exchange. In Africa, for example, hard mineral exports account for over 75 percent of exports of seven countries drawn from a sample of 19 countries shown in Table 1. Because mineral, as well as petroleum, projects are often enclave activities with few direct links to the domestic economy, the public sector must be the principal agent for translating resource production into wider economic benefits. For many countries, revenue from the mineral and petroleum sector is a major source of government revenue. The mineral sector is estimated to contribute an average of 30 percent of tax revenue in the sample of African countries shown in the Table.

This paper provides a policy-oriented guide to fiscal regimes for the mineral and petroleum sector. ^{1/} Much of the theoretical discussion of mineral and petroleum taxation has focused on how to tax economic rents. This theoretical discussion is motivated by the observation that intra-marginal mineral and petroleum projects may be characterized by economic rents on account of limited supply and variable extraction costs of these natural resources. The fiscal question raised by this observation is whether these economic rents can be secured for the government without imposing efficiency costs on natural resource extraction. The analysis of rent taxation is based on the presumption of stable and well-defined property rights over the natural resource. We depart from this theoretical

^{1/} Some of the same issues arise in the fiscal treatment of other natural resources, such as forestry, but tax arrangements applicable to other natural resources are not examined specifically in this paper.

Table 1. Selected African Countries: Contribution of Mining to Exports, GDP, and Government Revenue, 1989

	Formal Mining Exports (In Millions of U.S. Dollars)	Mining Exports (As percent of Exports)	Mining Value Added (As Percent of GDP)	Mineral Tax Revenue (As Percent of Tax Revenue)
Zaire	1,798	83	16	35
Botswana	1,506	83	51	58
Zambia	1,337	95	13	16
Namibia	799	76	29	36
Guinea	627	82	25	72
Zimbabwe	411	26	6	...
Niger	232	75	6	16
Angola	230	8	2	...
Gabon	225	16	5	...
Liberia	200	58
Ghana	186	23	2	...
Mauritania	181	41	10	...
Togo	115	22	8	...
Sierra Leone	89	80	6	5
Senegal	76	10	1	...
Central African Republic	40	25	3	...
Burkina Faso	33	15	1	...
Swaziland	30	10	1	...
Mali	25	9	1	1
Total	8,140	47	10	30 <u>1/</u>

Source: World Bank (1992).

1/ Estimate.

discussion of natural resource taxation by focusing on the fiscal implications of two factors that have significant implications for natural resource tax policy. The first point of departure is that the government has a dual fiscal role; it is the sovereign tax power and, in many cases, is also the natural resource owner. The second point of departure from the theoretical discussion is that the property rights, defining the rights to natural resources and the associated fiscal arrangements, are often not stable. Importantly, in our view, the design of natural resource tax arrangements plays a role in determining the stability of natural resource property rights and thus influences the efficiency with which natural resources are exploited and their potential fiscal return.

The government has two fiscal roles with respect to the natural resources sector: it is the sovereign tax power and the resource owner. As the sovereign tax power, the government has the responsibility to ensure that the natural resource sector makes its due contribution to public revenues in the same manner as other industries. As the resource owner, the government must determine when to exploit its natural resources as well as ensure that it gets an appropriate price for its resources and distributes the benefits of resource exploitation so as to promote sustainable economic growth and intergenerational benefits.

At one level, there is a fundamental conflict between resource companies and the government over the division of the risk and reward of resource development. Both parties want to maximize rewards and shift as much risk as possible to the other party. At another level, resource agreements and the associated fiscal rules are a means of creating an

identity of interest between the resource company and the government. The magnitude of revenues to be divided is maximized by designing fiscal arrangements that encourage a stable fiscal environment and efficient resource development.

Most mining and petroleum agreements are written for periods of 10 to 30 years, the aim being to define a stable relationship between the investors (often multinational companies) and the government. 1/ One reason resource projects are developed under long-term agreements is that the balance of power shifts over the life of a project. Before exploration begins or in its early stages, the power is with the resource companies because there is worldwide competition to attract potential investors. The power then shifts to the government, and political pressure for renegotiating the original agreement can become almost irresistible once a successful project has come on stream and is generating significant positive net cash flows. At the tail end of the project, when the resource deposit is almost depleted, the balance of power shifts again. The resource company can walk away from the project should it conclude that the government is making excessive demands. 2/

Given the shifting balance of power over the life of a project, it is difficult to achieve an identity of interests that will continue to hold over the life of the project. Further, both the division of the rewards from natural resource exploitation and the relative weights assigned to

1/ See Smith and Wells (1975).

2/ Tilton, Millett, and Ward (1986) discuss the relationship between mining companies and the Government in the context of Papua New Guinea, and Gillis and Beals (1980) discuss the Indonesian experience.

various fiscal instruments involve political judgment. A unique best policy cannot be proposed--there are unavoidable trade-offs between revenue, risk, and timing of the receipt of revenue. But, it is likely that multiple fiscal instruments will be needed to protect the interests of both parties over the life of the agreement. Product-based instruments can ensure the government receives at least a minimum payment for the exploitation of the natural resources of the country. Profit-based instruments reduce the likelihood of unplanned changes in resource contracts because they mean that the government shares in the returns from projects that turn out to be more profitable than expected.

This paper is structured as follows. The next section reviews the instruments available to government both in its role as sovereign tax power and as owner of the natural resources as well as illustrates some implications of alternative policy regimes. The final section provides some general conclusions.

II. Fiscal Instruments

1. Sovereign tax power

a. Income taxation

The income tax is best suited to meeting the objectives of the government's general tax power and should be levied on all resource and nonresource companies. It would be levied on resource sector companies whether or not the government owned the resources in the ground. Consequently, the decision by some governments to design income tax provisions specific to resource projects--such as accelerated capital deductions--is inappropriate. Rather, specific resource sector issues

should be addressed by changing the price the government is charging for the use of its resource wealth. This price is levied by fiscal instruments, such as royalties, that are discussed below.

Similarly to income taxation of other industries, income taxation of the resource sector involves matching of income and expenses. Most important, expenditures that produce a benefit over more than one accounting period should be capitalized and written-off over their "useful life." This ensures a rough matching of income with the expenses necessary to produce that income. Depletion of natural resources is simply a special case of capital recovery. Nevertheless, the particular features of the mineral and petroleum sectors mean that some income tax issues are more important than in other industries. Owing to the large initial capital outlays incurred in exploration and development of resource projects, defining capital deductions and the permissible debt-equity ratio are important to maintaining the tax base and, in the latter case, to avoiding earnings stripping through artificially high debt-equity ratios.

The involvement of multinational companies increases the likelihood of abusive transfer pricing as does the incentive created by the differential tax treatment of resource and nonresource companies within a country. Countries require provisions in their tax law enabling a price adjustment to be made where under- or overpricing between associates has resulted in a lowering of taxable profit. To enforce such provisions tax returns, at a minimum, should request details of domestic or international transactions with related parties.

In addition, an income tax is important in sectors, such as resources, in which foreign investment plays an important role as many countries tax the worldwide income of their companies and allow a foreign tax credit. Investors from these countries--including Japan, the United Kingdom, and the United States--will want an income tax so as to have a creditable tax in their home country.

b. Withholding taxes

Withholding taxes on dividends, interest payments, and technical know-how and related payments are an appropriate second-tier tax to be levied on mineral and petroleum companies. The use of withholding taxes also assists in discouraging abusive transfer pricing in the case of intra-group loans and technical assistance payments.

c. Import duties

Mineral and petroleum companies should be subject to import duties like other companies. Import duties are an element of the general tax powers of government rather than an instrument to secure a return on resource ownership. Thus, as a general rule, the tariffs applied to the resources sector should be those generally applicable in the economy. Resources sector companies rely heavily on imported capital equipment and intermediate inputs for their exploration, development, and operational activities. This makes import duties an important, timely, and relatively stable source of government revenue from the resources sector. Nevertheless, it must be recognized that high levels of import duties could discourage investment.

2. The government as resource owner

The fiscal arrangements with respect to natural resources need to take into account that, at least in many circumstances, the government is the landowner or the owner of the mineral rights. If a valuable resource is going to be extracted, the government should receive a payment for this resource, separate from the regular income tax. The choice among fiscal instruments hinges on the timing of revenue, ease of administration, and risk sharing. Hidden costs (or implicit taxes) such as mandated construction of schools, medical clinics, local roads, training, and localization requirements reduce what companies are willing or able to pay in explicit taxes.

Traditional efficiency considerations would likely lead to the choice of one fiscal instrument that does not distort investment and production decisions or at least minimizes those distortions. There are, however, broader considerations of efficiency in reality. For example, the impact on investment decisions of the risk that future governments may change contractually agreed upon fiscal rules or even nationalize a mine. It may be in the interests of both parties (and efficiency) to design a combination of fiscal instruments to reduce this possibility. ^{1/}

The fiscal instruments chosen will influence the amount that the investor is willing to pay for the right to extract the resource. An

^{1/} Nellor and Robinson (1984) show that both mining companies and the government may agree to use royalties, despite the conventionally defined inefficiencies of these charges, when the probability that fiscal arrangements will be revised in the course of extraction is a function of the after-tax cash flow of the mining enterprise. The survey of natural resource taxes in Nellor (1987) shows both the widespread use of multiple tax instruments as well as the extensive use of royalties.

auction of a mining lease, for example, provides revenue immediately, is efficient in a traditional sense, but may yield little revenue if there is a risk that the fiscal rules will be changed once the mining activity has commenced. Thus, the government may be faced with a trade-off if it values both the level of revenue and the receipt of revenues sooner rather than later.

The government also has an intertemporal production decision to make-- it must assess whether resources should be exploited today or at some point in the future--this analysis of the opportunity cost of extraction should help it to define the minimum return that it should accept from an investor.

Finally, some governments want to extend the scope of resource taxes downstream to various manufacturing activities, such as refining or liquefaction of gas. At least conceptually, the analysis of mineral and petroleum taxation based on resource ownership is restricted to taxing the resource at the well or mine head.

a. Lease bonuses

Lease bonuses are up-front payments that could be determined by auction or at the discretion of the government. These payments are generally easy to administer. They mean that the investor bears the risk that the project will not be commercially viable because the return to government is fixed.

Reliance on a lease bonus offers little incentive for future governments to abide by the terms of natural resource lease arrangements. This raises a further element of risk--risk that a subsequent government will change either the fiscal arrangements or nationalize the mine or petroleum project. Thus, even if there was perfect foresight concerning the ex ante

profitability of a prospect, an auction for a lease may yield little return to the government.

b. Royalties

Royalties are levied either on the volume or on the value of resources extracted. Royalties secure revenues as soon as production commences, are considerably easier to administer than most other fiscal instruments, and ensure that a minimum payment is made by the companies for the resources that they extract.

The conventional advice in the literature is to discourage the use of royalties. Proponents of this view note that royalties raise the marginal cost of extracting a resource and this may discourage development of otherwise marginal projects. ^{1/} In projects that do proceed, lower quality ores are left undeveloped. These propositions have been used to justify the use of profit-based fiscal instruments that are viewed as less distorting of investment and production decisions than royalties.

We suggest an alternative view that use of a royalty as the price for natural resource extraction is not necessarily distorting. The royalty, as a price for resource extraction, serves a role in determining whether investment should or should not proceed. The government-owned ore or petroleum should be left in the ground for future development if companies are not prepared to meet this price reflecting the government's opportunity cost of resource extraction. The government should determine what minimum payment it is willing to accept for the resource recognizing that it has given up its capital (i.e., the resource in the ground) once the resource is

^{1/} See, for example, Garnaut (1983).

extracted. There is no reason to provide the resource to companies for nothing--however, under some "neutral" profit-based fiscal arrangements the government is at risk of receiving little or nothing from resource ownership. ^{1/}

The case for use of royalties is reinforced by the significant administrative and monitoring advantages of royalties over other fiscal instruments. The royalty should be based on a transparent price formula agreed upon as part of the mining or petroleum agreement. Conceptually, the commodity price on which the royalty is based should be the mine or wellhead price, and the maximum royalty that the government could impose without making investment unprofitable is then defined as the difference between the wellhead price and the cost of extraction. In some countries, the price used for determining the royalty is the export f.o.b. price. An overriding concern should be the use of an observable price and this could necessitate using the downstream price. In such cases the rate of royalty would need to be adjusted in a simple and predictable way to reflect extraction and other intermediate costs. Royalties should be deductible for purposes of determining income tax liability because they are a cost of production.

Royalties can vary across projects depending on government perception of profitability (royalty rates could be auctioned) and higher royalty rates could be triggered by higher commodity prices according to an agreed formula based on transparent market prices for the commodity.

^{1/} See Conrad and Shalizi (1988), and Conrad, Shalizi, and Syme (1990) for a more extensive development of this argument.

c. Resource rent tax

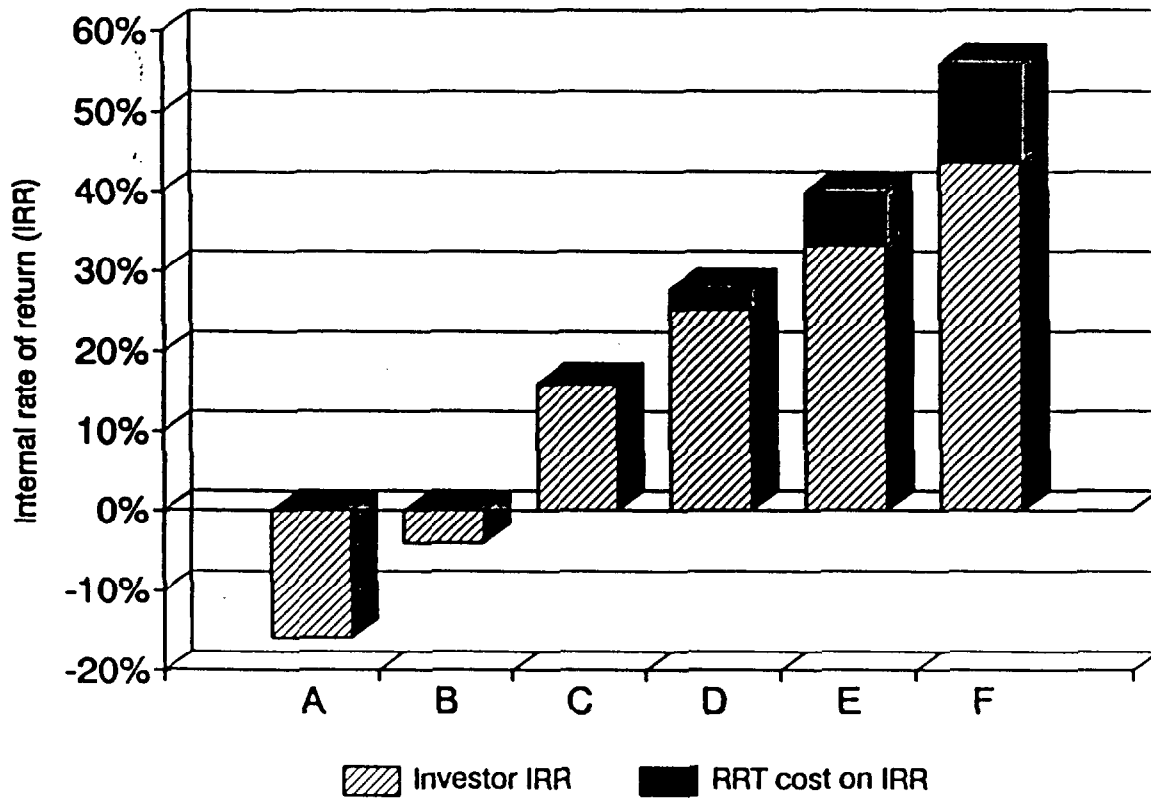
A resource rent tax (RRT) is similar to a cash-flow tax but is imposed only if the accumulated cash flow is positive. ^{1/} The net negative cash flow is accumulated at an interest rate that, in theory, is equal to the company's cost of capital or discount rate. A RRT takes a share of returns once this rate of return has been earned by the company.

As envisaged by its designers, the RRT efficiently captures a share of natural resource rent which is the return over and above the company's cost of capital. Because the RRT only shares in returns in excess of the company's opportunity cost of capital it does not distort investment and is thus viewed as a superior fiscal instrument to royalties. Another advantage of the RRT is that it cannot incur losses for the government unlike other fiscal instruments, such as cash-flow taxes, or equity which can yield similar returns to the RRT. Further, the RRT may enhance contract stability because it automatically provides additional revenue in highly profitable projects.

Contrary to its theoretical attractiveness, the RRT can discourage exploration in practice. The RRT cannot be neutral with respect to the exploration decision because investors know that they will be taxed on highly successful projects whereas unsuccessful projects will be unaffected. Consequently, the company's expected return from exploration is reduced by RRT, and this distorts exploration decisions. Chart 1 demonstrates this problem with the RRT. The assumption is that a particular mineral prospect could have six equally likely outcomes. The expected outcome (a simple

^{1/} See Garnaut and Clunies-Ross (1975) and (1979).

Chart 1. Resource Rent Tax and Exploration: Impact on IRR



Source: IMF staff calculations.

average of the six possible outcomes) would be a 20 percent internal rate of return. This might be an acceptable prospect if there were no RRT.

Introduce the RRT, and the expected outcome is lowered because the investor's rate of return is reduced if the prospect turns out better than expected. This will distort exploration decisions.

Also, excessive capital investment or a reduced rate of production will be encouraged if the RRT accumulation rate is set above the company's discount rate, which will vary from company to company and can never be known with certainty. ^{1/} For example, assume a company's discount rate is 15 percent and the RRT accumulation rate is 20 percent. Absent the RRT, the company would just be willing to invest 1 million today if it received a payback of 1.15 million a year from now. This investment would not be marginal if the company expects to be subject to RRT because for RRT purposes the 1 million outlay this year would be uplifted to 1.2 million next year, giving the company a 0.05 million loss that will reduce RRT taxable income in the future, providing an unintended tax benefit. In fact, if the accumulation rate is set too high, companies will have an incentive to stretch out development of a project.

The RRT is a high-risk measure for the government gaining a return on resource ownership; although revenue could be sizable in favorable circumstances there is also a significant chance that resource development will yield little revenue. RRT only provides a return to government on

^{1/} In Papua New Guinea, the RRT is calculated using U.S. dollar-based accounting. The accumulation rate for the tax is set at either the U.S. prime rate plus 12 percentage points or 20 percent in the case of mineral projects and at 27 percent in the case of petroleum projects.

those projects yielding above normal rates of return. It is possible that the project may be seen to be earning high positive net cash flows but yield no revenue creating political pressure for revision of the resource contract. Further because the investor receives the threshold return before the government receives any revenue, the revenue stream, if any, is "back-ended."

In our view, RRT can play a role of capturing rents not collected by royalties and of enhancing contract stability by improving revenue buoyancy in relation to highly profitable projects, but it should not be relied on as the major fiscal instrument from which a return on resource ownership is gained.

d. Government equity

Government equity in mineral and petroleum projects is an important political symbol in many countries. Government equity gives a sense of participating in the development of the country. However, beyond these arguments, there is a compelling case for the government not taking an equity interest in mineral and petroleum projects. Nevertheless, should the government decide to take an equity position in mineral and petroleum projects it should use a carried interest.

There are a number of costs associated with public ownership. First, when the government takes an ownership position, it exposes itself to risk. At the time the government is required to exercise its equity option, it can never be known with certainty whether it is making a good investment. Though it may appear that a particular project will be highly successful, unexpected events, such as a fall in mineral prices can turn a promising

equity investment into a significant government liability. Second, taxation is more likely to maximize government revenue flow than an equity interest that looks to dividends which may never be paid. Third, equity requires the government to divert funds that otherwise could finance priority development projects. Moreover, a government equity interest could weaken the country's external position. If the government borrows externally to pay for its equity interest, there will be years when the government is required to pay interest on its indebtedness even though it received no dividends from its investment. Fourth, there can be a conflict between the government's role as a shareholder (or joint venturer) and its role as a regulator. As a shareholder, the government will want to maximize its return from its investment. As a regulator, the government will want to ensure that the mining project fully complies with all government regulations.

Fiscal instruments can be designed that yield the government the same return as equity but which are preferable because they eliminate some of the potential costs of equity. A RRT earns the government the same present value return as an equity interest that is purchased for cash, assuming the revenue streams are discounted at the RRT accumulation rate. But, the time profile and risk exposure of paid-up equity and RRT are quite different. Chart 2 illustrates that with a paid-up equity stake, the government initially incurs substantial negative cash flows--its share of costs--and is subsequently compensated by revenues once production commences. In present value terms, the RRT yields the same revenue. Revenue, however, is only received once the project earns the accumulation rate of return. Should a project be unprofitable, the RRT prevents the government from incurring a

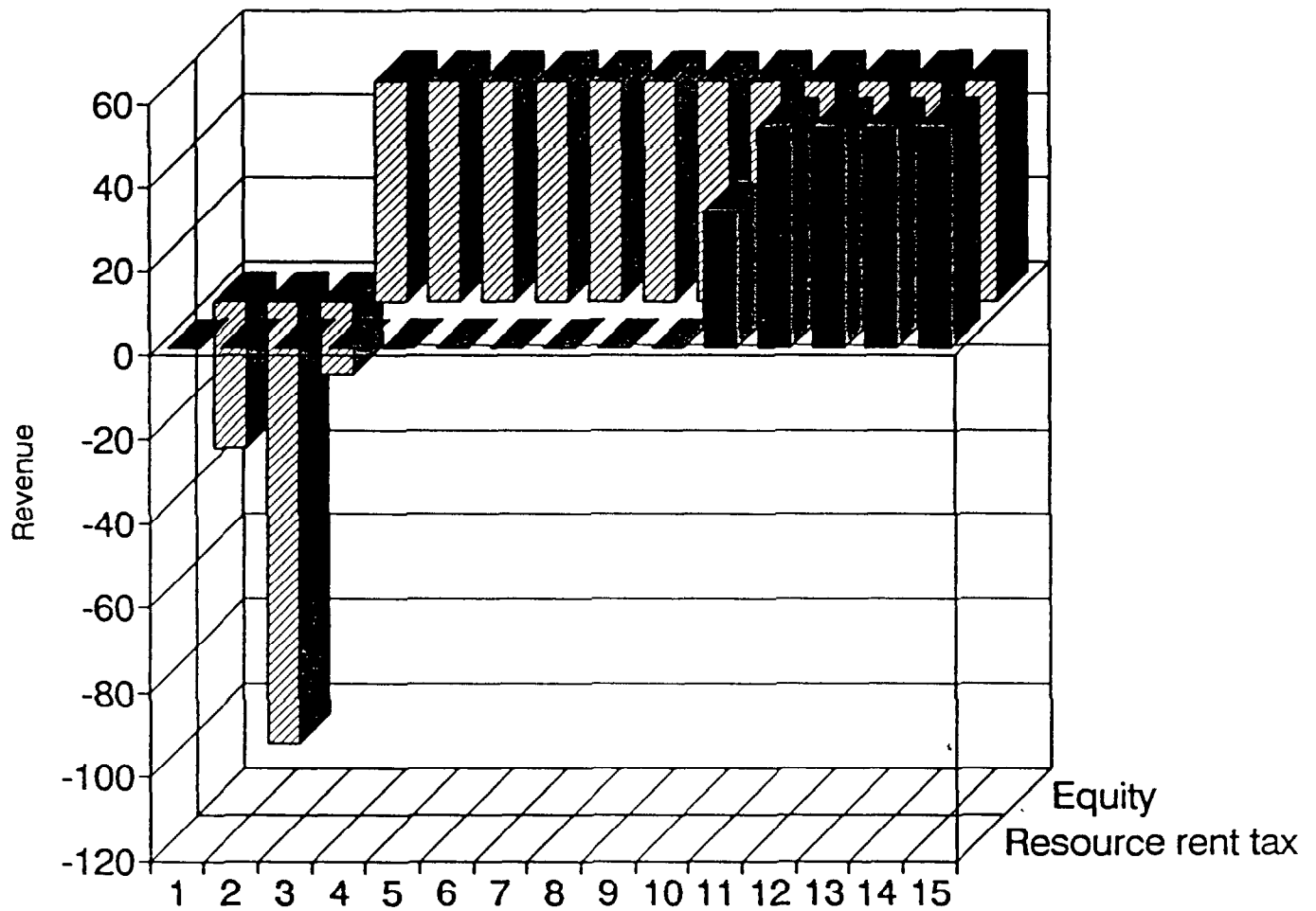
loss whereas losses can be incurred when the government holds paid-up equity.

Should the government decide to take an equity interest, it should use a carried interest. ^{1/} This form of gaining equity is less risky than a working interest which requires up-front cash. A RRT, at a 35 percent rate for example, is equivalent to the government having a 35 percent carried interest if the accumulation rate for the RRT is the same as the interest rate charged for the carried interest. For example, assume the accumulation rate and interest rate are both 20 percent. In the case of the RRT, the government receives nothing until the project earns 20 percent. The government then receives 35 percent of additional profits. In the case of the carried interest, the government receives nothing until the project earns enough for the carried interest to be paid off. If the interest rate on the carry is 20 percent, this will not occur until the project earns 20 percent. Thus, a RRT provides the government all the benefits of a carried interest without the downside of ownership that the government would be exposed to after the carried interest crystallized.

Production sharing can be viewed as another form of government equity. In theory, the government and the private investors are partners. The government contributes capital to the project in the form of the ore body while the private investors contribute the exploration and development costs

^{1/} Under a carried interest, funds are deemed to be loaned to the government by the project investors. Interest is charged on the government's carried interest at a prescribed rate and the loan is repayable out of the government's share of profits from the project. The government's equity interest only crystallizes when the "loan" is paid off. In essence, under a carried interest, government purchases equity by means of a nonrecourse loan provided by the project investors.

Chart 2. Government Revenue:
Equity versus Resource Rent Tax



Source: IMF staff calculations.

and operate the project. The government and the private investors agree to share production from the project, though the government often can require the private investors to market its share of the product. Production-sharing arrangements can take many forms and often are quite difficult to monitor and administer as the arrangements are complex and the parties can disagree on just how the arrangement should be interpreted. In a simple production-sharing arrangement, the government and the private investors only share production after the investors have recovered the original exploration costs, development costs, and operating costs in the form of product. A production-sharing agreement along these lines is essentially equivalent to the government having a carried interest, and thus is less risky than a working interest which requires the government to purchase its equity. Some production-sharing agreements limit the cost recovery in any one year to 30 or 40 percent of production, thus ensuring that the government receives some share production when the project first begins to produce.

3. An illustration of some alternative fiscal instruments

A fiscal regime that is less reliant on income taxation and more on royalties will generate a relatively more stable and timely revenue stream. The fiscal arrangements for resource projects involve political judgments regarding the trade-off between factors such as revenues, risk, and timing of revenues. These trade-offs are illustrated in Chart 3 by comparing two fiscal regimes operating on a hypothetical mining project that yields a 24 percent pre-tax internal rate of return. The first regime--termed Fiscal Regime A--is an income tax imposed at a 35 percent tax rate and provides

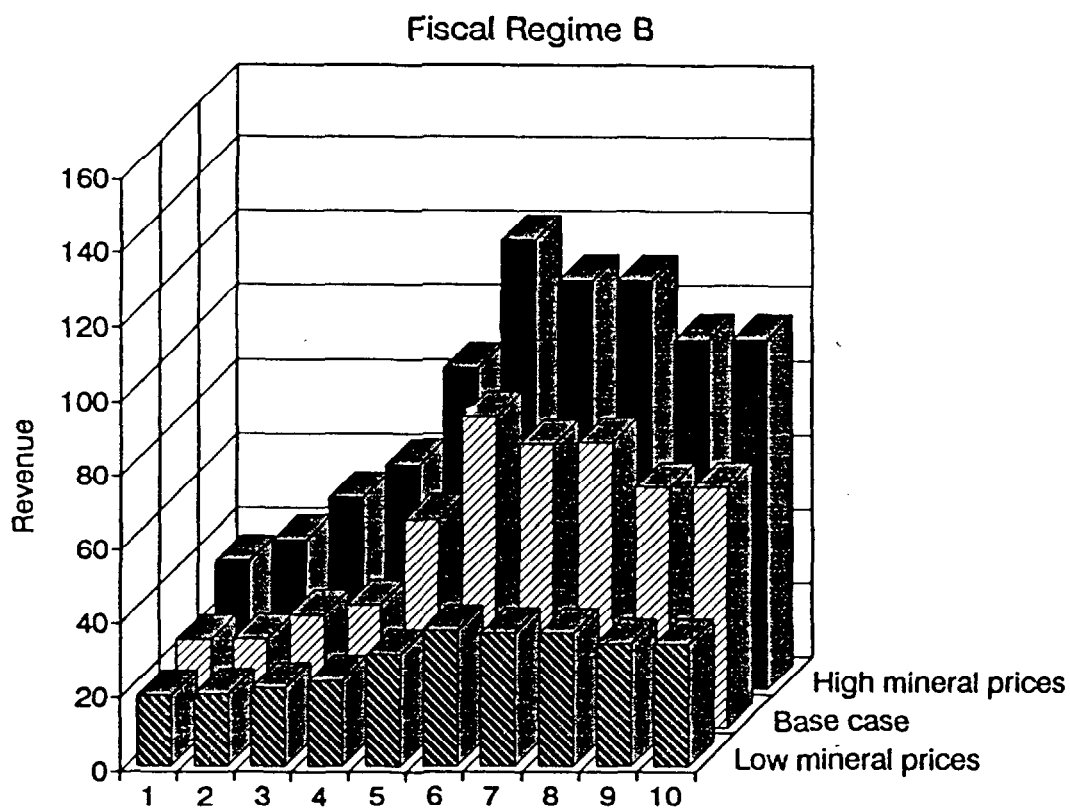
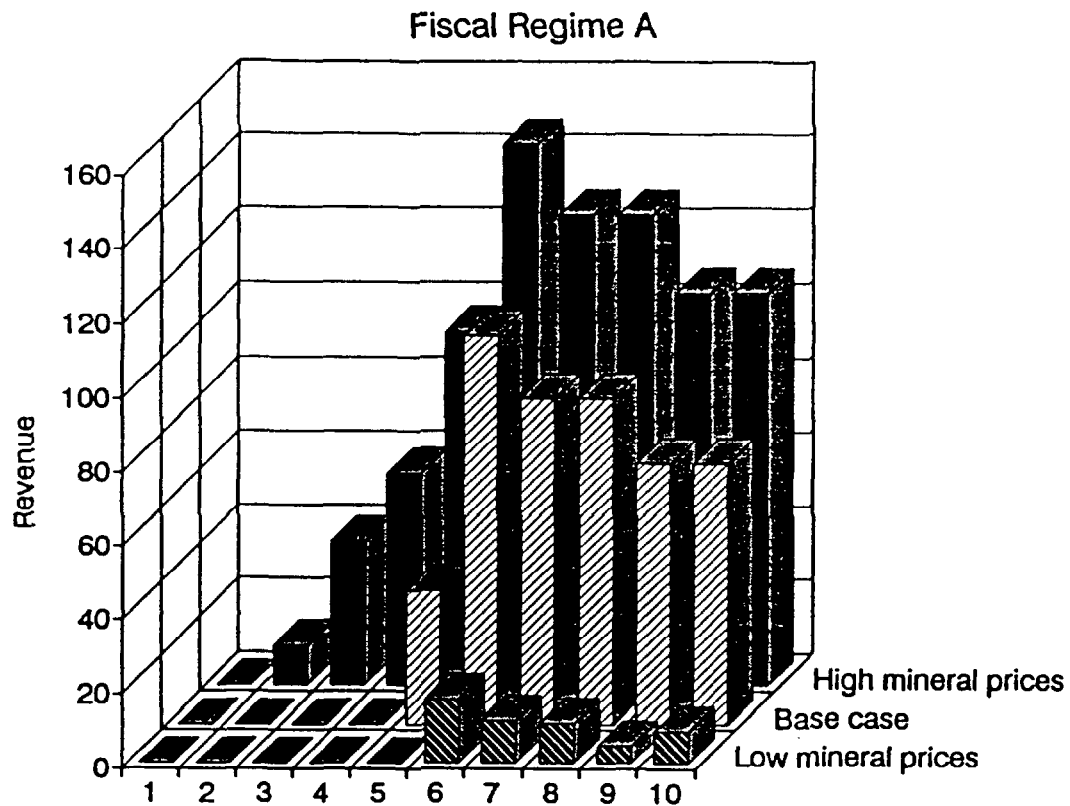
accelerated capital deductions until investment costs are recovered. The second regime--termed Fiscal Regime B--consists of an income tax and a royalty. The income tax is levied at the rate of 20 percent and does not provide the generous capital deductions. The standard capital deductions are 20 percent for exploration outlays and 10 percent for other capital outlays on a declining balance basis. The permissible debt equity ratio is 3 to 1. A royalty is levied at 7.5 percent on the sales value of the mineral output. Revenues are compared for each fiscal regime under three scenarios; a base case and high and low mineral price scenarios. These scenarios are assumed to increase or decrease the revenue stream by 20 percent.

Both fiscal regimes generate revenue streams that vary considerably with higher and lower revenues, but Fiscal Regime A is considerably riskier than Fiscal Regime B. Under Fiscal Regime A, no tax revenue is received until the fifth year of production in the base case and until the sixth year of production when commodity prices are low. When mineral prices are high, however, Fiscal Regime A produces somewhat higher revenues than the alternative fiscal regime. Under Fiscal Regime B, revenue is received throughout the life of the mine irrespective of the mineral price scenario and the variance of revenue is also less than the alternative fiscal regime.

III. Conclusion

In many developing countries and economies in transition, the fiscal regime should comprise a broad range of instruments with emphasis on current revenue, lowering government risk exposure, and reducing tax and other

Chart 3. Alternative Fiscal Regimes



administrative burdens. The following issues should be considered in establishing the fiscal regime for mineral and petroleum projects:

- Resource contract stability is likely to be enhanced by use of a variety of fiscal instruments.
- Mining and petroleum projects should be subject to the income tax like other activities in the economy. The various income tax provisions must be designed carefully particularly in relation to capital deductions, permissible debt-equity ratios, and transfer pricing. Transfer pricing is not only a problem at the international level but also domestically because of the different tax treatment of the resource versus nonresource sectors.
- Import duties can play an important role in providing revenue early in the life of a project because of the importance of imported capital equipment. In many countries capital equipment is often exempt from duties so if revenue is a primary objective, a minimum tariff on capital equipment could be recommended.
- Royalties should play an important role--the rate of the royalty cannot be prescribed as a general rule--but will depend on perceptions of profitability and the other aspects of the fiscal package. The rates of royalty may vary across mining leases and they could have stepped rates triggered by higher prices. A transparent price should be used for determining the royalty liability.
- A resource rent tax may be used as one element of the resource sector fiscal regime but should not be relied upon as the major part of the fiscal package.
- If government equity is to be used consideration should be given to using a carried rather than a working interest.

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