

## *The Relative Inefficiency of Petroleum Fiscal Regimes in Latin America and the Caribbean*

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There has long been interest over fiscal mechanisms by which governments can appropriate rents from mining and petroleum operations. Typical mechanisms include royalties, income taxes, and carried interests. For many Latin American and Caribbean (LAC) countries these revenues can be important sources of funding for social programs and development. Yet economic policy with respect to mineral wealth poses a series of challenges. Primarily, fiscal arrangements need to ensure that governments benefit from the financial gains associated with natural resource exploitation without adversely impacting private sector exploration and investment, without which these resources would produce no value.

Of particular interest, therefore, is optimal taxation design. Optimality includes considerations of the effect of taxation on operating decisions. Does taxation sterilize reserves? Does it affect the speed of extraction? How efficient is a given suite of fiscal terms within a country at capturing the greatest economic rents without distorting investments and operations in ways that reduce the potential value of the resource? And, given that tax revenues often fund important social programs and development, when does the government begin to receive payments from the project?

Over the last few decades, thinking on natural resource taxation has evolved in many leading mining and hydrocarbon producing countries towards developing non-distortionary fiscal tools. The fiscal systems applied to mining and oil and gas in LAC have, however, largely escaped such comprehensive and comparative analyses. This report examines the performance of mining and petroleum taxation policies in thirteen Latin American and Caribbean mineral and energy producing countries, and in particular for 26 petroleum projects and 15 mining projects representative of the region. We focus on the ability of each country's system of taxation (i.e., fiscal regime) to foster development of these projects in a manner that efficiently exploits the resource while allowing appropriate flows of project rents to the Government. Depending on the country and the fiscal regime in place, these flows may take the form of income tax and/or special tax revenues, production royalties, participation in production and profits, cash bonus bids, land-use and licensing fees, and mandated contributions to various socially-oriented funds.

Each country included in the study has developed its own, very unique fiscal regime for petroleum and mining—no two are alike, not even across the two sectors. Some are quite simple, but many are complicated. For oil and gas, both Production-Sharing

contracts (PSC) and traditional Concessionary systems are in common usage. Indeed, some individual countries employ both types of fiscal regimes. In mining, there is no production-sharing or bonus bids, but instead up to six different types of taxes by which rents are transferred to the Government or approved social programs.

Of utmost importance is the ability of each fiscal regime to efficiently capture economic rents for the nation without unduly discouraging exploration and resource development. Equally important is the robustness of the chosen regime to perform well under a range of economic circumstances, including high versus low prices and high versus low costs, as well as under a range of project specifics, such as deep water versus shallow water oil and different metals and types of mines.

We have examined the performance of each regime with respect to these factors via the optimization of an engineering-economic model of each project both before taxation and after taxation using the methodology in Smith (2014).<sup>1</sup> All the regimes induce Operator distortions, with subsequent deadweight loss. The petroleum fiscal regimes tend to be more distortionary than the mining regimes, with an average deadweight loss of 18% versus 4% for development stage projects at base-level market prices. To put this 18% deadweight loss into perspective, for the average dollar raised by the government through petroleum taxation, 45 cents of project rent is destroyed. The worst systems that we modeled destroy more than \$1.00 of social rent per \$1.00 of tax revenue raised. When we back up and evaluate exploration-stage petroleum projects the deadweight loss rises to 33%, with the tax burden extinguishing private sector investment completely at three of the 26 projects modeled. The petroleum regimes are relatively inefficient compared with mining in large part because of their extensive reliance on less efficient fiscal instruments like royalties.

The Government Take of total project rents averages well over 50% for the projects we examined, with the highest Government Takes generally causing the most distortions and as a result being least efficient. Figure 1 presents the Fiscal Yield of the fiscal systems as applied to the 23 petroleum exploration projects that remain viable under taxation. Fiscal Yield is the

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See footnote at end of text.

percentage of no-tax project rent or value captured by

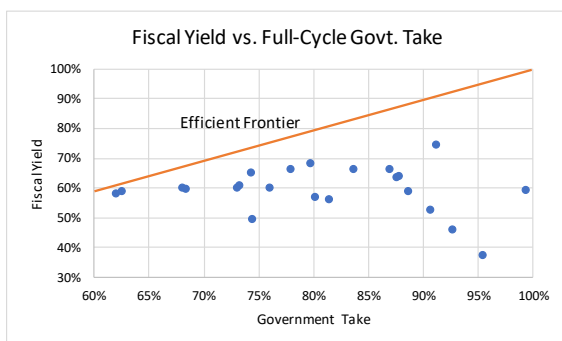


Figure 1: Fiscal Yield vs. Government Take, 23 Viable Petroleum Exploration Projects

the fiscal system, with a higher Fiscal Yield revealing higher absolute government revenues for a given project. A perfectly efficient tax would fall along the Efficient Frontier shown in the figure. It is clear that the petroleum regimes are inefficient. For several projects the fiscal system is so aggressive as to create a lower yield compared with projects that face a lower Government Take. The Laffer curve is at play.

A notable result of our analysis is that the impact of a fiscal regime depends greatly on the specifics of the project being taxed. That is, the distortionary effects within a fiscal system are not uniform across the projects to which the system is applied, and incorrect inferences could be drawn by passing the fiscal system through a single “representative” project. Nor are the distortionary effects independent of project economics, with more distortions as economic and physical conditions change to create lower pre-tax profit margins and higher effective tax rates.

What can be done to improve fiscal efficiency in petroleum taxation? The literature on effective resource taxation is plentiful, and generally advises against the fiscal practices being used in LAC in favor of neutral taxes like cash flow taxes or resource rent taxes. No LAC country that we examined has attempted to design a neutral taxation system. The lowest inefficiencies were found in Chile (for mining) and Guyana (for petroleum), largely because of their relatively low rate of taxation and their emphasis on

profits taxes rather than sales or production royalties. The simplest way to reduce the existing distortions in the petroleum fiscal regimes is to apply lower rates of taxation. Then there is the more sophisticated path of replacing the existing fiscal systems with rent taxes. An intermediate step would be to place more weight on corporate income taxation (CIT) as a way of taxing resource projects, as with special surtaxes above and beyond the global corporate income tax rates such that the desired level of government revenue is achieved. Our simulations show that when CIT allows for unlimited loss carryforwards and accelerated depreciation combined with intangibles expensing, these instruments perform quite well. Using only an elevated CIT to effect a 55% Fiscal Yield on a hypothetical petroleum exploration project created a 10 cent value loss for every dollar raised. Applying only royalties to raise that same level of government revenue caused 40 cents of value loss per dollar raised.

When judging any fiscal regime either before or after these modifications, it is important to understand that the performance of a fiscal regime should not be assessed using the conventional measure of Government Take. Although that measure represents the fraction of realized profit from a given project that is captured by the government, it fails to account for investments that are not made and potential government revenues that are never generated due to tax-induced distortions. Fiscal Yield is the more useful measure of a fiscal system, as it reveals just how much of a project’s inherent value flows to the government.

Footnote

<sup>1</sup> The model was revised by Davis and Domínguez (2017) for applicability to mining projects, and implemented by CRU after extensive model buildout.

References

Davis, Graham A., and Eugenio L. Domínguez. “A Discounted Cash Flow Model of Tax Avoidance and Distortions in Mining Projects.” Unpublished manuscript, May 16, 2017.

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