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Mining Taxation in Colombia

Duanjie Chen and Guillermo Perry¹

Abstract

This paper assesses the current Colombian mining tax and royalty regime in terms of efficiency, competitiveness and revenue performance vis-a-vis other relevant mining countries. It then discusses the convenience of introducing a Resource Rent Tax (RRT) to new mining projects (together with a reduced common royalty rate for all minerals) and simulates its potential effects on efficiency and revenue performance. In particular, the paper examines the interactions between a RRT, royalties and the Corporate Income Tax under different RRT designs, tax rates and capital return allowances. It also discusses the convenience of project by project against sectorial ring-fencing. It concludes with a blueprint for reform as well as political economy and administrative considerations for the specific case of Colombia.

Keywords: Natural resources, Resource rent tax, marginal effective tax rate.

JEL Codes: H21, O13, Q38.

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Tributación minera en Colombia²

Duanjie Chen and Guillermo Perry³

Resumen

Este trabajo evalúa la eficiencia, competitividad y capacidad de recaudo del régimen tributario y de regalías colombiano en comparación con el de otros países mineros relevantes. Posteriormente, propone la implementación de un “Resource Rent Tax” (RRT) para proyectos mineros futuros (junto con una reducción y unificación de la tasa de regalías entre minerales) y simula el impacto que tendría éste sobre la eficiencia y el recaudo. Se examinan la interacción entre el RRT, las regalías y el impuesto de renta bajo distintos diseños y tasas de RRT y costo de oportunidad del capital. También se analiza si es preferible tener “ring-fencing” a nivel de proyecto o a nivel sectorial. El trabajo concluye con una propuesta de reforma junto con consideraciones administrativas y políticas para una exitosa implementación.

Palabras clave: Recursos naturales, Resource rent tax, tasa marginal de tributación efectiva.

Códigos JEL: H21, O13, Q38.

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1. Introduction

Mining has grown in importance in the Colombian economy. The annual production of coal increased from less than 5 million tons in the early 80's to 89 million tons in 2012. Similarly, from 1990 to 2012, both nickel and gold production more than doubled. As a share of GDP, mining increased from less than 1.8 percent before year 2000 to around 2.3 percent from 2005 onwards. Mining exports increased from around 10 percent of total exports in 2000 to a peak of 25 percent in 2009, and have stayed above 20 percent since then, due both to increased production and high export prices. As a result, royalties and taxes from mining activities, as a share in total Government revenue, increased from less than a half percent in 2000 to over 1.6 percent in 2011.

However, Colombia is far from reaching its relatively large mining potential⁴. In the meantime, policy debates and lack of Government coordination have so far impeded the country from taking advantage of its potential growth in mining in an environmentally sustainable and socially sound way. Although the most acrimonious part of the debate has referred to the environmental and social consequences of mining, there have also been voices asking for a higher Government take through either higher royalties or a special export tax, and several Congressional initiatives in recent years were oriented towards increasing royalty rates.

This Colombian story is part of a global trend. From 1990 to 2012, global mining exports grew more than fivefold, and their share of total merchandise exports increased from 3.6 percent to 4.4 percent⁵. During the same period, commodity prices also went through full cycles of swings⁶. As a result, the policy debate around mining taxation heated up in almost all resource rich democratic countries: at the peak of price escalation, the

⁴ According to The Fraser Institute Annual Survey of Mining Companies (2012/2013), should Colombia adopt the industry best practices and assuming no regulations, its mining potential, as ranked among 96 mining jurisdictions, could be improved from the current 40th to 21st.

⁵ Our estimate based on www.stat.wto.org.

⁶ Refer to <http://www.infomine.com/investment/metal-prices/>.

debate was focused on how big (and how progressive) a profit share a host government should obtain from investors; and when the bust occurred, more cautious notes were erred on the side of preserving mining investment⁷.

Therefore, the most pressing issues in mining taxation today appear to be centered on how much and in what manner should the government tax the cyclical “windfalls” associated with the mining industry without jeopardizing either the industry’s short-term growth or long-term sustainable development. It is within this context that the concept of a resource rent tax (RRT) has again caught the attention of policy makers around the world, as it would permit a high Government share in the windfalls without impairing investment prospects. An RRT approximates the theoretical optimal tax base by targeting revenues in excess of all current and capital costs of mining, including a “normal” rate of return to capital invested in either mining or non-mining industries. By taxing only the rent from mining, even to the fullest extent, it would not in theory distort investment allocation; and it would also reflect the principle of equity in taxation according to which tax is based on “ability to pay.”

Reality, however, is not so straightforward. There are two principal practical concerns against introducing an RRT in lieu of conventional (revenue-based) royalties⁸. They are: revenue stability and administrative efficiency

⁷ For a full account of the recent history in resource taxation amid boom and bust, refer to Bryan C. Land, “Resource rent taxes: a re-appraisal” (Section 2), in Philip Daniel, et al (edit), The Taxation of Petroleum and Minerals: Principles, Problems and Practice, International Monetary Fund, 2012.

⁸ Throughout this paper we adopt the conventional use of the term “royalty” to mean a revenue-based *ad valorem* levy, such as the existing mining royalty in Colombia. The “revenue” here means sales value or production value that is often net of transportation and distribution cost to form the royalty base. There are other forms of mining royalties, such as a specific unit-based levy at specific amounts, which might be the easiest to administer but is the least efficient among all major royalty and tax instruments targeting the mining industry. We do not consider here this type of specific unit-based royalties due to their high efficiency costs and the fact that they are less popular in countries with relatively advanced institutional settings like Colombia. For a complete “qualitative assessment of the performance of various royalty/taxation types with regard to the government’s main fiscal objectives,” refer to Pitro Guj, “Mineral royalties and other mining specific taxes” (particularly Figure 2), the International Mining for Development Centre, 2012. (http://im4dc.org/wp-content/uploads/2012/01/UWA_1698_Paper-01_-_Mineral-royalties-other-mining-specific-taxes1.pdf). Further, some authors deem as a mining “royalty” any fiscal levy by the government targeting only the mining industry that represents a payment to the resource owner for the right to take ownership of its property. Following this logic, the resource rent tax to be discussed and proposed in this paper would be a form of mining royalty. For reasons of clarity of exposition, when we refer to royalties here we mean conventional revenue-based *ad valorem* royalties.

First, since the rent from minerals arises only when accumulated revenues reach a level that is more than sufficient to cover the accumulated cost of mining, the Government would only begin to receive revenues from an RRT after multiple years of production in new projects. In addition, given the wide cyclical fluctuations that characterize commodity prices, government revenues from a mining RRT would be highly volatile. These traits would probably make an RRT politically unacceptable as the only form of mining taxation over and above general income tax and indirect taxes, given the fact that government revenues represent a significant fraction of potential domestic benefits from mining activities.⁹ Taking into account these considerations, most proponents of an RRT suggest combining it with a revenue-based royalty, though keeping the latter at a relatively low value to avoid high efficiency costs. Further, it can be argued that taking into consideration political risk, and hence investor concerns about the stability of the tax regime, such a combination may indeed approximate an optimal tax, both from the point of view of the Government and the investor¹⁰. After all, investment responds both to expected returns and risks, including political risks.

And second, as resource rent is calculated in a cumulative manner before the payout point, implementation of an RRT requires diligent bookkeeping and a more sophisticated tax administration than that required to administer a unit-based royalty system. In other words, the economic efficiency associated with an RRT may have costs in terms of the administrative efficiency of taxation. However, tax administrations in countries like Colombia are used to dealing with complex intertemporal issues in the administration of corporate taxes in oil, mining and infrastructure construction, and highly complex issues in other activities such as finance. It is true, as we discuss later on, that Colombia, as other developing countries, have serious difficulties in dealing with transfer prices –a common problem for administering an RRT, a corporate income tax or a revenue-based royalty

⁹ Other such potential domestic benefits arise mainly from potential backward and forward industrial and service linkages that can generate greater employment and national income, including government revenue.

¹⁰ See, in particular, Perry, G. and Ho, S.-J., (2012), "The effects of commodity taxation on sector performance", IDB Working Papers; Otto et al, Mining Royalties, A Global Study of Their Impact on Investors, Government, and Civil Society, The World Bank, 2006; Johnston, Johnston and Rogers, International Petroleum Taxation, Daniel Johnston & Co, 2008; and IMF, Fiscal regimes for Extractive industries: Design and Implementation, IMF Working Papers, August 2012.

(though in the Colombian case the Government sets the base price for the calculation of royalties following international prices and, thus, largely by passing the transfer pricing problem)- , as well as with complex financial products, such as derivatives, often used by the industry –which are a common problem for administering an RRT or a Corporate Income Tax. Therefore, the potential administrative challenges associated with a mining RRT are in principle not significantly higher than those encountered in the current administration of Corporate Income Taxes. This said, the ring-fencing recommendations included at the end of this paper may create significant additional administrative difficulties, which should be weighted carefully before adopting it. In summary, what needs to be borne in mind while designing an RRT is a good compromise between simplicity and effectiveness of control of tax elusion practices: a common criterion used in general tax design.

For tax efficiency and revenue potential, particularly during periods of high prices, we believe Colombia would benefit from a resource rent tax (RRT) targeting its mining (and its oil) industry. However, for the successful introduction of such a tax (i.e., with easy acceptance by both the public and mining investors) and sustainable implementation of an RRT, policy makers need to pay special attention to possible pitfalls including the aforementioned concerns. We also are mindful that the current revenue-based royalty for particular mining projects might have brought in rather high revenue in relation to profit, as a combined result of a high royalty rate and a rather low profit margin (e.g., in the case of the largest coal projects). We examine these issues in some detail in the text.

Therefore, after this introduction, we shall first discuss the main issues concerning the general design of an RRT, so as to outline the RRT structure that may suit Colombia and similar countries around the world. In the subsequent three sections, we shall provide, in sequence, an overview of Colombia's mining fiscal regime, a comparative analysis of this regime in terms of its tax efficiency, cross-border tax competitiveness and revenue performance, and propose a resource rent tax that is based on our conceptual discussion in Section 2 and assessed through efficiency and revenue simulations. The final section concludes our study.

2. Resource Rent Tax: Some design issues

A resource rent tax (RRT) is commonly defined as a tax based on the rent generated from resource extraction that exceeds any “nominal” return to capital. Although the concept of an RRT has only recently appeared to be popular among policy circles, the first adoption of such a tax can be traced back to 1977 by the Government of Papua New Guinea and dozens of jurisdictions have since adopted a form of RRT¹¹. In fact, all Canadian provincial mining taxes possess some features of an RRT (e.g., allowing most asset expenditures to be fully expensed while disallowing financing costs)¹². It is true, however, that not all RRTs were introduced without fierce controversy and a few of them did not last long. The most noticeable news stories on RRT were about the recent introduction and repeal of the Mining Resource Rent Tax (MRRT) in Australia within three years¹³. This notwithstanding, more governments are contemplating an RRT for their mining industries. These diverse country experiences with an RRT suggest that there is no one-size-fits-all in mining taxation. Even a theoretically sound tax instrument like an RRT needs to be carefully designed and harmonized with other aspects of the tax system to suit country-specific economic and institutional settings.

Some of the most pressing issues around introducing an RRT in Colombia appear to be the following:

1. How should an RRT interact with the conventional royalty and company income tax?
2. Who has the taxing power and how should RRT revenue be distributed?
3. How to structure the RRT in terms of its rate and progressiveness?
4. How to scope ring-fencing: for the mining activities as a whole, or by project?
5. What is the benchmark for setting the return allowance for carrying over RRT losses: the government long-term bond rate or the miner’s financing cost?

¹¹ For a list of some RRT examples, refer to Table 8.1 in Bryan C. Land, “Resource rent taxes: A re-appraisal,” in Philip Daniel, et al, The Taxation of Petroleum and Minerals: Principles, Problems and Practice, International Monetary Fund, 2012.

¹² For a recent assessment of the Canadian mining tax system, refer to D. Chen and J. Mintz, “Repairing Canada’s Mining-Tax System to be Less Distorting and Complex,” SPP Research Papers, 6(18), May 2013.

¹³ Refer to <https://www.ato.gov.au/Media-centre/Media-releases/ATO-provides-advice-on-MRRT-repeal/>. For a brief history of Australia’s MRRT, refer to http://en.wikipedia.org/wiki/Minerals_Resource_Rent_Tax

We discuss these issues below in sequence. With our main concern being the principle of tax efficiency, we choose our answers carefully to reflect Colombian reality. When there is no handy answer that can be drawn from the existing literature or international best practice, we make our judgment based on Colombian political economy or err on the side of administrative efficiency.

2.1 The Interaction of RRT with other Government Levies

Current mining taxation in Colombia includes a corporate income tax and a revenue-based royalty, with the royalty being deductible for income tax purposes. How should an RRT interact with these two existing levies on mining business?

RRT and conventional royalties As discussed above, revenue stability concerns suggest that a revenue-based royalty should be preserved as a minimum annual payment from mining, on top of CIT tax liabilities that, ideally, should tax all economic activities in a neutral way. However, present royalty rates for some mining activities are too high and impose severe efficiency costs (see sections 3 and 4 for further discussion). Superimposing an RRT on them, would lead to over taxation and underinvestment in some activities. Thus, the introduction of a mining RRT in Colombia should be accompanied by a reduction of royalty rates to a common minimum across minerals (e.g., 3 percent to 5 percent), which would not impose severe efficiency costs, while preserving a minimum revenue flow to government coffers since production starts in any project. The present complex royalty system in Colombia, with different regimes and rates per mineral (see a full description in Section 3), appear to have little rationale, other than having resulted from past political negotiations. Further it has created major distortions across minerals and between different projects, as Section 4 shows.

Royalty payments may be carried over, along with other RRT losses and uplifted by the prescribed return allowance, so as to be deducted from the ultimate RRT base. Alternatively, the accumulated royalty payments may be credited against the RRT payable in future. In the latter case, the ultimate levy of the government as the owner of mining resources is the RRT, a tax based solely on the resource rent; and the revenue-based royalty functions only as a revenue stabilizer, or minimum payment, during the years when the

RRT payment falls below such a minimum royalty payment. As a consequence, and as will be shown in Section 3, crediting royalties against the RRT would permit a significant gain in terms of allocative efficiency across mining activities, as it would equalize the marginal tax and royalty rate on investments across them.

Deducting a common-minimum royalty on all mining activities from the RRT base would not achieve this goal, though it would certainly reduce present distortions on marginal investments across mining activities. This said, revenue goals would require a higher RRT rate if royalties are credited against future RRT payments instead of being deductible from the RRT base. Thus, for example, estimates presented in Section 4 indicate that, assuming full independence of the RRT and the CIT (see below), the present value of overall mining fiscal revenues in the last two decades would have been similar with a 40 percent RRT that would have allowed full future crediting of a common minimum royalty of 5 percent across mining activities, and a 25 percent RRT that would have made such royalties deductible from the RRT base.

Should the CIT be deductible from a new RRT? A CIT that taxes profits from all economic activities at a common rate is actually taxing mining rents, together with normal returns on capital. In other words, there is a partial overlap of RRT and CIT tax bases¹⁴. Therefore, to avoid additional efficiency cost associated with the overlap of RRT and CIT bases, the revenue authority should allow CIT deduction from RRT base. If this is done, the total marginal tax and royalty rate on mining activities would not depend on the rate of the RRT, as demonstrated in the Appendix and shown in the efficiency estimates in section 4. Otherwise, total efficiency costs would increase with the rate of RRT, creating a tradeoff between revenue and efficiency/competitiveness objectives.

However, allowing CIT deduction from the RRT may unduly complicate tax administration, not only due to bookkeeping requirements but especially because any legal dispute between the tax payer and the tax administration on a CIT assessment would be immediately carried over to the RRT assessment. In addition, for revenue purposes it would require an even higher RRT rate than the one required with an independent (from the CIT) RRT that allows full deduction of royalties. For the example given above with

¹⁴ See J. Mintz and D. Chen, “Capturing Economic Rents from Resources through Royalties and Taxes,” SPP Research Papers, 5(30), October 2012

fully creditable royalties, the RRT rate would have to go up from 40 percent for an independent RRT to around 50 percent for one that allows CIT deductibility. The higher the required RRT rate (for similar revenue objectives) the stronger business and political opposition it may face, and the larger the incentives it would entail towards ‘creative accounting’ and hence the higher the administrative efforts it would imply.

2.2 Taxing Power and Revenue Sharing

Due to the great variety of government fiscal structures across countries, there is no single RRT formula acceptable to all jurisdictions for rent sharing between the miner and the government. For example, in unitary fiscal states such as Norway and the United Kingdom, taxes and royalties, regardless of their statutory structure, are designed and collected by the national government. In such a unitary tax system a form of rent-based tax can be simply an add-on to the general company income tax with a few alterations tailored to the resource industry¹⁵. Obviously, such a simple and rather efficient and effective taxing instrument requires solving difficult issues of tax coordination and allocation of proceeds in federal countries where mineral resources are often owned by the subnational governments. In these countries, inter-governmental revenue sharing is often a headache even without a rent-based tax. Colombia poses an interesting and highly complex intermediate case, as it is a unitary state where mineral resources are owned by the national government, but royalty revenues are fully distributed among subnational entities. Though this poses significant revenue-sharing and political economy issues, to be discussed below, they appear to be less difficult to solve than those arising in federal countries.

A mining RRT would be established by the national Congress in Colombia, as has been the case with conventional royalties. This is a consequence of the fact that Colombia is a unitary republic and ownership of mining resources belongs to the national State. However, Congress may determine that revenues from the RRT be shared between the national government and subnational governments.

¹⁵ For a brief summary of the rent-based taxes in Norway and the United Kingdom, refer to Table 1 in J. Mintz and D. Chen, “Capturing Economic Rents from Resources through Royalties and Taxes,” SPP Research Papers, 5(30), October 2012.

In many other unitary countries royalties are also shared with subnational governments where production is located. Colombia is, however, an unusual case in this respect, as, by recent constitutional reforms, royalty revenues are fully distributed among subnational governments and they are shared between producing and non-producing sub-regional governments. Indeed, the new Constitution adopted in 1991 maintained the share of royalties for producing regions and municipalities that had been awarded by previous laws, and determined that the rest would go to a National Royalty Fund in order to finance regional projects proposed by any subnational government. Later on, a constitutional amendment in 2011 reduced the share of producing regions and determined that the rest of royalty proceeds would be distributed in fixed proportions among all regional governments (Departments), through three different funds, each with its own distribution rule. We compare the current and previous distribution of royalty proceeds in Box 1. This institutional setting complicates significantly the political economy of the proposed reform.

As already mentioned, the establishment of an RRT should be accompanied by a reduction of the traditional royalty rates to a common minimum across minerals (say, 3 percent to 5 percent), to avoid overtaxation of some activities and to reduce the high inefficiency costs of the present regime. The simplest way of achieving this within the particular institutional setting in Colombia would be to establish an RRT as a substitute for the present royalty regime, legally established as the new royalty regime, with a minimum annual payment equivalent to 3 percent to 5 percent of mine mouth value of production. Thus, its revenues would be distributed according to present rules of distribution for royalty revenues, facilitating the support of regional representatives in Congress. However, it seems unlikely that the national Government, which would have to present the draft law and lead the parliamentary discussion¹⁶, would engage in a difficult and potentially costly political debate while not receiving any direct revenue benefits from such an initiative. Even more, if legally deemed a 'royalty,' RRT revenues would in this case be fully deductible from the national income tax (unless the income tax law is simultaneously modified), and might result in a reduction of national government revenues from the income tax for the

¹⁶ And decide to accept or veto the approved bill in the case of a new law, as it has veto powers over tax laws.

most profitable ventures, and in periods of high prices, from what they would have been under the present regime.

-Box 1: Constitutional Reform on Distribution of Royalty Proceeds-

Prior to 2011, the Constitution stated that 80% of royalty proceeds had to go to provincial governments in producing regions (as Direct Royalties), and the remaining 20% to the National Royalty Fund. Direct Royalties were divided between producing municipalities and provincial governments, with shares of 23% and 50% respectively, and port municipalities, with a share of 7%. The 2011 constitutional reform drastically reduced Direct Royalties to 20% of total royalty proceeds (while leaving the distribution between producing municipalities, provinces and ports unchanged), and created independent Regional Royalty Funds for the remaining 80%. Each Regional Royalty Fund is divided into a Regional Compensation Fund which focuses resources on the poorest municipalities, and the Regional Development Fund which aims to finance regional development and infrastructure projects. A three year transitional regime, summarized in the following table, was established to mitigate political opposition to the reform:

Year	2011	2012	2013	2014	2015
Direct Royalties	80%	50%	35%	25%	20%
National Royalty Fund/Regional Royalty Funds	20%	50%	65%	75%	80%

On the other hand, establishing the RRT as a new national levy for present and future concessions, while reducing the traditional royalty rates for both, would be fiercely opposed by subnational governments and regional representatives in Congress, especially by those from producing regions which already saw their share of royalties reduced by the 2011 Constitutional reform.

The way out of this conundrum could be a compromise along the following lines.

- The RRT would be established as a new national levy applying only to new mining concessions. At the same time, royalty rates would be fixed at a common 3 percent to 5 percent for all new mining concessions and their proceeds would be fully credited against the RRT. In other words, the RRT would not apply to existing concessions and these would not benefit from a reduced royalty rate. In this way, subnational governments would not face a reduction of present revenues as a consequence of this legal reform (revenues would of course continue to vary depending on the evolution of prices and production of existing concessions). Additionally, the risk of

excessive taxation of present ventures (which could result from a Congressional decision superimposing the RRT on the present royalty rates) could be avoided.

The new regime could also be applied to extensions of present concessions or expansion of their area of exploitation, by mutual agreement. If so, care should be taken with permitting deduction of recent investments that might not have yet been recovered. Such an option may, however, be administratively very demanding, and its administrative costs and risks must be weighted against potential efficiency and revenue gains, before adopting it.

- The proceeds from the RRT would be shared between the National Government and producing regions. As mentioned above and illustrated in Box 1, these regions suffered an important reduction in their share since 2012. Thus, they would be the most likely to fiercely oppose the reduction of royalty rates, even if they apply only to new concessions, as most producing regions have potential for new mining ventures.

2.3 The Level of the RRT Rate

No literature or RRT study has provided clear criteria for setting a proper level of an RRT rate, let alone explicitly recommending a justifiable RRT rate.

Even if the government accepts the notion of allocative efficiency associated with the RRT (i.e., an RRT up to 100 percent would not distort domestic capital allocation, provided that it allows full deduction of CIT and crediting of royalty payments), we rarely see an RRT rate above 50 percent around the world. The Norwegian government collects a 50-percent “special tax” from its oil industry, which is essentially rent-based and where the industry is provided with a cash refund for tax losses resulting from exploration.

Reasons for avoiding an excessively high RRT rate may include the following:

- a) Actual RRTs can only approximate a ‘pure’ resource rent tax;

- b) Cross-border capital mobility makes competitors' RRT rates an effective benchmark, provided that investors face similar expected rates of return before taxes;
- c) The "efficient risk-sharing" argument (see below) does not support an excessively high RRT rate;
- d) As already mentioned, higher rates may give more incentives to creative accounting, and hence demand more administrative effort and lead to stronger business and political opposition;
- e) The ultimate rate level has to be set as a balance between government revenue needs, investment goals and the government's view of political economy (e.g., on how to grow and distribute the economic pie).

We therefore will not recommend a specific RRT rate but will illustrate the efficiency, competitiveness and revenue implications of alternative rates and structures (see Section 4). Naturally, the ultimate decision regarding the RRT rate will lie in the hands of the government and Congress.

Our analysis below, including both marginal effective tax rate analysis and revenue simulations, indicates that, with a reduced 5-percent revenue-based royalty as the minimum annual payment, being fully creditable from the RRT, a 45-50 percent rate for a RRT that allows CIT deduction, would pass any test of tax efficiency, would maintain competitiveness vis-a-vis other potential destinations of mining investments and produce reasonably more revenue to the government in Colombia in good times. However, as mentioned, such a structure would be administratively demanding and achieving such a high rate may be a hard political sale. With such considerations in mind, the Government and Congress may prefer a lower rate (35 percent to 40 percent) RRT that do not allow for deductibility of CIT payments, even if such a structure would maintain some efficiency and competitiveness costs, though certainly significantly lower than those of the present tax and royalty regime.

2.4 Progressivity and Taxation along the Project/Price Cycle

It is well known that both production-based and revenue-based mining royalties are regressive with respect to profitability because their royalty base includes the cost of mining. That is, for a given production- or revenue-based royalty rate, the higher the profitability (as measured by the price-cost margin), the lower is the equivalent royalty rate based on profit. Therefore, introducing a rent-based tax such as the RRT in addition to the existing revenue-based royalty system would substantially remove such regressivity for the mining industry. This is particularly so if the existing revenue-based royalty is simultaneously reduced when an RRT is introduced. Perhaps more importantly, such a combination would enhance the performance of the tax system along the project cycle (taxing less the initial stages of production, when companies are just recovering their investment, and more mature mines where investments have been recovered) and the price cycle (capturing a larger fraction of profit windfalls in periods of high prices, while taxing less during periods of low prices).

Should an RRT be multi-rated so as to achieve a greater progressivity (and sensitivity to the project and price cycle) corresponding to different levels of profitability? Among the existing mining regimes, we do see such greater progressivity being implemented through a few taxing models. The most complicated model has a progressive rate structure based on prescribed thresholds for profitability. It is marked by multi-tiered pay-out points that are associated with multi-tiered rates of return for netting out the cost of production and multi-tiered RRT rates: the higher the rate of return allowance that marks a pay-out point, the higher is the rent-based tax rate beyond that pay-out point. (The offshore royalty regime in Newfoundland and Labrador, a Canadian province, provides a classic example of such a complex model.) A much simpler progressive RRT structure normally exempts “smaller” miners whose rent, or “excessive profit,” does not exceed a prescribed threshold. (For example, under Australia’s repealed MRRT, annual mining profits below \$75 million were exempted from tax, which is said to have exempted 320 miners from this MRRT¹⁷).

¹⁷ Refer to http://en.wikipedia.org/wiki/Minerals_Resource_Rent_Tax

Whether to enhance progressivity of taxation under an RRT is debatable. On the one hand, given that rent is the profit in excess of any normal rate of return to capital, taxing the rent to its fullest should not scare away investors. Therefore, enhancing progressivity under an RRT which allows deductibility of CIT and full crediting of royalties should be acceptable, since it is far from the government taking away all the rent but instead varies the tax rate based on the level of rent generated by the miners¹⁸. However, in the real world, if we agree that the government is much more risk-averse than the investor, “then efficient risk-sharing requires that the more risk-neutral investors receive all the uncertain return in exchange for payment of some fixed fee to the government”¹⁹. In other words, “risk-sharing considerations argue against progressivity in many lower income countries”²⁰.

An additional argument against a more progressive RRT in many lower income countries is based on administrative efficiency and revenue stability. And, if the Government chooses not to allow CIT deductibility for administrative or political economy reasons, according to our previous discussion, it should definitively not use a progressive rate structure, as in such a case the higher RRT marginal rates will entail efficiency and competitiveness costs due to the interaction of RRT and CIT tax bases.

Last, but not least, our simulations reported in Section 5 indicate that it is very hard to choose ex ante the right profitability thresholds and marginal rates and it is likely that a progressive structure may either end up taxing at either the lowest marginal rate or at excessive marginal rates most of the time.

2.5 The Scope of Ring-Fencing

By concept, ring-fencing is “a limitation on consolidation of income and deductions for tax purposes across different activities, or different projects, undertaken by the same

¹⁸ For an expert discussion on progressive taxation of resource extraction, as a means of reconciling the economic interests of governments and investors, and its limited use, see Bryan Land, “Capturing a fair share of fiscal benefits in the extractive industry,” in *Transnational Corporations*, Vol. 18, No. 1 (April 2009). http://unctad.org/en/docs/diaeiia20097a7_en.pdf

¹⁹ Refer to R. Boadway and M. Keen, “Perspectives on resource tax design,” in P. Danial, et al (edit), *The Taxation of Petroleum and Minerals: Principles, Problems and Practice*, International Monetary Fund, 2010.

²⁰ Idem

taxpayer”²¹. It is commonly accepted that, if there is a tax targeting only mining activity (or any other specific business activity), then such activity should be ring-fenced from other business activities so as to prevent potential revenue loss to the government. The practical concern is of the scope for such a ring-fence: should it be imposed along business lines (i.e., mining vs. non-mining) within the company, or by individual project? Note that our proposal is to apply an RRT only to new mining projects, acknowledging that distinguishing what is ‘new’ is not easy to ascertain in particular situations, eg in a major expansion of an existing project.

The argument for ring-fencing along business lines is mainly an “efficiency” concern. Under this view, overly restrictive ring fencing such as that imposed on individual projects may discourage companies from undertaking further exploration and development activities due to the inability to claim deductions for such activities on new projects. It may also encourage excessive tax planning through transfer pricing (i.e., shifting the cost into and the profit out of more profitable projects from less profitable ones). All these possible actions induced by project-based ring fencing can cause efficiency loss in both mining investment and tax administration.

The argument for project-based ring-fencing is more concerned about “competitive neutrality.” As the argument goes, if the ring fence is around the mining activities rather than based on individual projects, then it would be easy for well established companies to shelter their current rent under the new investment projects, which could effectively place an entry-barrier on newcomers. However, if the to-be-introduced RRT is being applied only to new mining projects (see below), there will not be any “existing” RRT base even for well-established mining companies in the short run.

On the other hand, if the to-be-introduced RRT is to be applied to both new and existing projects, then the rent being generated by the well-established miners is not the perceived profit but has to be calculated by netting out all the accumulated costs in the past plus the prescribed return allowance. Otherwise such an imperfect RRT would be overtaxing existing projects as it would be taxing more than the economic rents.

²¹ Mullins, Peter, “International tax issues for the resources sector,” in Philip Daniel, Michael Keen and Charles McPherson (edit), The Taxation of Petroleum and Minerals: Principles, Problems, and Practice, page 394, International Monetary Fund, 2010.

However, another argument favoring project-based ring fencing also appears to be legitimate: the ring fencing based on a company's overall mining activity may induce excessive mining investment. That is, the company may expand its mining investment only to shelter its otherwise taxable rent.

Therefore, a practical compromise seems to be project-based ring fencing that allows cross-project expensing of unsuccessful exploration expenditures. The usual possible administrative complication that may arise from this approach is to manage the interaction between the company-wise ring fencing for income tax purposes and project-based ring fencing for RRT purposes. This would be another reason in favor of an RRT that is independent of the income tax calculation.

A potential issue arising from project-based ring fencing is how to allocate the company overhead among ring-fenced projects. For simplicity, a presumptive deduction may be provided for overhead costs based on a fixed percentage (e.g., 10 percent) of operational costs.

That said, cases of major expansions would remain a difficult issue, as it is difficult to ascertain to what extent they should be treated as a "new mining project" and how to separate incremental costs and revenues.

2.6 The Rate of Return Allowance

There is a consensus that, for RRT purposes, a return allowance, or uplifting factor, should be provided for accumulated RRT losses up to the point when the RRT becomes payable. The contentious debate is on whether such a return allowance should be based on the risk-free government long-term bond rate or a much higher rate that matches up the weighted cost of capital, or internal rate of return, used by the mining investors for analyzing their investment feasibility.

A well-known proposition in the economics literature²² supports using the risk-free government long-term bond rate as the return allowance for carryover of RRT losses. The argument for this proposition is that, by allowing all mining costs to be fully expensed, the government effectively shares the investment risk in mining. For example, for a 30-percent RRT that allows full expensing of all capital and current expenses, the government effectively shares the 30 percent of the investment risk in exchange for 30-percent of the rent arising from such an investment. In other words, the risk premium from capital asset pricing models is reduced by the factor “one minus the tax rate.”

As an illustration, we can compare two cases in which the RRT losses associated with a mining investment are treated differently but generate the same financial outcome. For simplicity, we assume the mining investment amounts to \$1,000 and is all in fixed capital (i.e., ignoring the intangible assets and recurrent labor cost and other expenses), the RRT rate is 30 percent and the project lasts for exactly two years: investing all the \$1,000 in the first year and receiving total proceeds of \$1,100 in year 2, which includes \$100 in rent income and sale of all the capital assets for \$1,000. We also assume that the government long-term bond rate (LTBR) is 5 percent and the investor’s risk-bearing internal rate of return (IRR) is 10 percent.

In the first case, the government fully refunds the \$1000 mining investment at the assumed RRT rate of 30 percent in the first year and taxes the total proceeds of \$1,100 at the end of the second year. That is, the investor needs to put up only \$700 for the project in the first year but pays \$330 in RRT at the end of the second year; its after-RRT net income is \$70 ($=\$1,100 - \$330 - \700) and the government’s net RRT revenue appears to be \$30 ($=\$330 - \300). In this first case, the investor is happy with the government’s upfront refund and has no reason to require any return allowance. However, if the government long-term bond rate is 5 percent, then the government’s nominal RRT revenue of \$30 at the end of the second year actually nets only \$15 ($=\$330 - \$300 \times 1.05\%$). That is, the \$300 RRT refund provided to the investor at the end of the first year bears a borrowing cost of \$15 to the government through the second year.

²² See, for example, Roger Gordon and John D. Wilson, “Measuring the Efficiency Cost of Taxing Risky Capital Income,” *American Economic Review*, 79(3), 1989, 427-39 and Institute of Fiscal Studies, the Mirrlees Review, *Tax by Design*, chapter 17, 2011, <http://www.ifs.org.uk/mirrleesReview/design>

And in the second case, the government does not provide an upfront refund for the RRT loss of \$300 but lets the investor carry such RRT loss into the second year. In this case, the government can only tax the rent income of \$100 net of a return allowance on the RRT losses carried forward. What should the return allowance be? If the return allowance is the 5-percent LTBR, then the government's net RRT revenue is also \$15 ($=\$100 \times 30\% - \$300 \times 5\%$), which is the same as in the first case. However, if the return allowance is set at the investor's 10-percent IRR, then the government will collect no RRT despite \$100 in rent income accruing to the investor. In other words, the government would be better off by refunding the RRT losses upfront to the investor if it has no cash-flow concerns, which is equivalent to the 6-percent long-term bond rate borne by the government.

In summary, by allowing all mining costs—ranging from exploration, development and depreciable capital to any current expenses—to be expensed for RRT purposes, the government is effectively sharing the investment risk proportionally based on the RRT rate. (This is also the justification that, for a rent-based tax, no financial cost is deductible.) Then what is truly carried over is the government RRT loss that should be compensated only by the government long-term bond rate.

2.7 Proposal for Colombia

Bearing in mind all the above design issues, we would envisage a resource rent tax for countries like Colombia that would include the following key points:

- The RRT base is the accumulated revenue net of accumulated cost of mining, which includes all the current expenses and capital expenditures on both tangible and intangible assets (and, thus, excludes financial costs and revenues);
- The RRT will be applied only to new mining projects;
- The RRT is imposed by the central government with a single tax rate chosen by the Government and preferably with the revenue-based royalty fully creditable against the RRT;

- The revenue-based royalty is preserved for future mining projects with a common rate for all minerals of no more than 5 percent.
- Ideally, for efficiency and competitiveness reasons, the RRT should allow CIT deductibility. But this would require a higher RRT rate in order to obtain similar revenue objectives, which may be less politically viable, and more administratively demanding. The Government may need to trade-off administrative ease and political viability for some efficiency and competitiveness costs.
- The RRT loss, including the carry-over of the accumulated royalty payments, is carried forward at the government long-term bond rate (LTBR);
- The RRT will be ring fenced by project but will allow unsuccessful exploration expenses to be deducted as a cost of successful projects.
- RRT proceeds would be shared between the Central Government and Regional Governments (Departments) and Municipalities where new mining projects are located.

3. Colombia's Statutory Mining Fiscal Regime: A Cross-Border Overview

As in most South American countries, the general tax regime for the business sector in Colombia consists of three main components: a corporate income tax, additional direct taxes that are not linked to profit but are based on a form of either business revenue or asset value, and indirect taxes that are directly imposed on the purchase price of capital goods²³. For the mining industry, a normal additional levy is a mining royalty, which, in Colombia, is based on revenue and differentiated by mining product. In some cases, higher than statutory royalties have been negotiated in concession contracts for large mines.²⁴

Unlike some major South American countries such as Argentina and Brazil, which have hardly changed their tax structure over the past decade, Colombia undertook several major tax reforms in recent years, the last two being implemented in 2007 and 2013 and is presently discussing a new one. These two tax reforms involved only general business

²³ To keep cross-border consistency, we exclude from our METR calculation indirect taxes such as import duties on machinery and equipment, which are beyond the focus of our study.

²⁴ This is the case for the two largest coal mines in the country.

taxation for all industries, such as changes in the corporate income tax rate and base and roll-over and adjustments in the equity tax, which was to be a purely temporary tax²⁵. No reform has been introduced to the fiscal regime targeting only the mining industry, though a constitutional reform altered in a significant way the distribution of royalties, as discussed above. In comparison, Chile and Peru reformed their mining royalty system from being a revenue-based royalty to a profit-based mining tax; although their reforms did not match up with the more desirable RRT cum royalty structure that we outlined in the last section.

In this section, we provide a comparative overview of the statutory mining fiscal regimes between Colombia and its four South American peers: Argentina, Brazil, Chile and Peru. Colombia is the top coal mining country in the continent. It also produces substantial amounts of nickel, gold and other base metals such as iron ore. In comparison, Argentina, Brazil, Chile and Peru are richer in various metallic mining products including both precious and base metals. Since Colombia's mining royalty is differentiated by mining product, we cover all four of its major mining products (i.e., coal, nickel, gold and other base metals) in our comparative review. Table 1 summarizes tax and royalty provisions that are most relevant to these mining products.

Table 1: Corporate Income Tax and Mining Royalty and Rent Tax by Country (2014)

	Colombia	Argentina	Brazil	Chile	Peru
Corporate Income tax	34 percent	35 percent	34 percent, incl. a basic CIT (15%), a surcharge (10%) and a social contribution on net profit (9%).	20 percent, with two notes: (1) an effective 35% tax on after-CIT distribution; and (2) an inflation adjustment.	30 percent, with withholding tax on payments to non-residents: 1) interest: 4.99% 2) dividends: 4.1% 3) capital gains: 5%

²⁵ Introduced in 2002 to finance a presumed temporary increase in military expenditures to confront the serious growing guerrilla and paramilitary public security menace.

Exploration expenditures	Written off within at least 5 years but allow expensing of failed explorations.	Double deductions after production starts.	Amortized within the useful life of the mine.	Expensed	Amortized within the useful life of the mine.
Development Expenditures	Written off in at least five years	Accelerated depreciation in 3 years: 60%, 20% and 20%.	Amortized within the useful life of the mine.	Depreciated like fixed assets (see below)	Amortized within the useful life of the mine.
Depreciation: [yrs-number of years as official useful life, SL-straight line DB-declining balance]	Buildings: 20-yrs; M&E: 10-yrs, with additional 25% allowance for every 8-hour shift; Automobiles & computers: 5-yrs; Both SL and DB are allowed.	Buildings: 2% SL in general; accelerated depreciation within three years available for mining construction: 60%, 20% and 20%; M&E: 33% SL	Buildings: 4% SL; M&E: 10% SL, but the normal rate can be increased by 50% for 2-shift operations and doubled up for 3-shift operations.	Buildings: 2% SL M&E: 11.11% SL, which can be tripled for new or imported M&E; Automobiles : 14.29% SL;	Buildings: 5% SL; M&E: up to 20% SL (incl. vehicles) but no more than that recorded by financial accounting.
Inventory accounting (FIFO = first-in-first-out, and LIFO = last-in-first-out)	All conventional methods including FIFO and LIFO are permitted	Virtually FIFO as the required official procedures result in year-end stock value nearly equal to its market value.	Only FIFO and average-cost accounting are allowed.	With inflation adjustment, FIFO and weighted-average-cost accounting are allowed.	All conventional methods are allowed.

Royalty:	Royalty base: revenue at mine pit; Royalty rate varies by product: Coal - two tiers: Up to 3MT: 5%, > 3MT: 10%; Nickel: 12%; Gold: 4%; Iron/copper : 5%; Deductible for CIT.	Royalty base: “mine head value” that equals the sales value net of direct cost of exploitation (i.e., excluding depreciation of fixed assets). The royalty rate is 3% for coal, gold, copper and iron ore. However, an export tax of 5% (see below) effectively raised the royalty rate to 8%.	Royalty base: sales revenue net of taxes, insurance and freight costs. Royalty rate varies by product: Coal: 2%, Gold: 1%; Copper: 2%; Iron ore: 2%; Deductible for CIT.	Royalty base: the CIT base with certain adjustments; Royalty rate: 0.5%-14%, progressive by sales volume, with the first 12,000 metric tonnes exempted.	Three categories, all based on “operating profit”: (1) Mining royalty payable by all: 1% - 12% (minimum 1% of revenue); (2) Special mining tax by metallic miners: 2%-8.4%, (3) additional special mining contribution by metallic miners with “tax stability agreement”: 4% - 13.2%.
Royalty: <i>Rent-based</i>	N/A	N/A	N/A	N/A	N/A
Other taxes (excluding property taxes)	Industrial and commercial tax; (but the mining industry is exempted	A 5% export tax, and a local levy on gross receipts with the		A stamp duty on debt financing: 0.6%; and an equity-based municipal	N/A

	from this tax); and a “temporary” progressive equity tax, with an effective 1.5% annual rate on companies and individuals with net worth surpassing 5 billion COP (\$2.5 million). (Article 296.1 Tax Code).	tax rate varying by industry and by province; the general tax rate is 1% for primary activities including mining.		license fee: 0.25%-0.5%, payable annually (but capped at 8000 UTM)	
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References:

- (1) For Colombia, various official tax documents.
- (2) For other country-specific corporate income taxation, see Ernst & Young, 2013 Worldwide Corporate Tax Guide (on line) and PFK Chile Tax Guide 2013 (on line).
- (3) For other country-specific mining taxation, see Price Waterhouse Coopers, “Corporate Income Taxes, Mining Royalties and Other Mining Taxes – A Summary of Rates and Rules in Selected Countries,” June 2012 (on line) and John Gravelle, “Mining Taxation - Overview of Recent Trends,” September 2012 (on line).

As shown in Table 1, Argentina has the highest corporate income tax rate (35 percent) and Chile the lowest (20 percent). Between these two extremes, Colombia and Brazil share the second highest CIT rate (34 percent), followed by Peru (30 percent). However, while Colombia’s corporate income tax is final to financial investors, Chile further taxes after-CIT dividends leading to an effective final tax rate of 35 percent on

profit distribution. Similarly, Peru taxes all three types of after-CIT investment income (interest, capital gains and dividends) at various rates of up to 5%, which makes for an effective final tax rate of close to 35 percent on financial investors.

More importantly, the generosity of a given company income tax regime is determined by both the statutory tax rate and the associated tax allowances—including allowances for exploration, development and depreciable capital expenditures, as well as inventory accounting regulations. In particular, a main feature of a company income tax regime applied to the mining industry is how it treats exploration expenditures, since such upfront expenditures can be substantial and may generate externalities that benefit the whole mining industry and even the overall economy²⁶. For example, with the highest corporate income tax rate among all of these countries, Argentina also provides one of the most generous tax allowances for mining: it provides a double deduction for exploration expenses, an accelerated 3-year allowance for mining construction and a 33-percent annual allowance for mining machinery and equipment. Therefore, Argentina appears to have a typical high-rate-narrow-base income tax structure for its mining industry.

In comparison, Colombia allows writing off successful exploration expenditures and development expenditures within at least five years but expensing of the unsuccessful exploration costs; it provides depreciation allowances within a simple classification of depreciation assets by useful lives (i.e., 20-years for buildings, 10-years for machinery and equipment and 5-years for motor vehicles and computers) with an additional 25-percent allowance for machinery and equipment for every additional 8-hour-shift operation. Chile allows full expensing of exploration expenditures and provides an accelerated allowance for machinery and equipment if they are new or imported; this accelerated allowance is equivalent to three times the normal rate based on the officially prescribed useful life. Both Brazil and Peru require exploration and development expenditures to be amortized over the useful life of the mine. As for depreciable assets, Brazil provides an accelerated depreciation allowance for M&E according to the number of operational shifts (e.g., double the normal allowance for a 3-shift operation), a practice similar to, but more generous than, that in Colombia. In contrast, Peru sets the maximum depreciation

²⁶ For an in-depth discussion, refer to J. Mintz and D. Chen, “Capturing Economic Rents from Resources through Royalties and Taxes,” SPP Research Papers, 5(30), October 2012.

allowance based on taxpayers' financial accounting, which helps minimize tax-induced misallocation of investment in depreciable assets.

With respect to the royalty system, the five countries can be divided into two groups: one with a conventional revenue based royalty system and the other a profit-based mining tax. The first group includes Argentina, Brazil and Colombia, and these countries have very different royalty structures. In Colombia, the royalty rate varies widely by product: 5-percent for coal with production under 3 million tonnes and 10-percent otherwise (though concession contracts for the largest mines go up to 12 percent), 12-percent for nickel, 4-percent for gold (and silver), and 5-percent for other base metals including copper and iron ore. In contrast, Argentina has a standard royalty rate of 3 percent, but it also collects a 5-percent export tax on mining products, which effectively raises its revenue-based mining royalty to 8 percent. In contrast to these two cases of heavy royalties, Brazil's mining royalty is 2 percent for most mining products and 1 percent for gold.

Chile and Peru belong to the second group that features a mining tax based on operational income. The operational income or profit under their mining taxes is similar to the corporate income tax base but with certain adjustments; and the tax rate is structured progressively in both countries. In Chile, the mining tax regime exempts 12,000 metric tonnes of fine copper with a marginal tax rate ranging from 0.5 to 4.5 percent for sales between 12,000 and 50,000 metric tonnes and from 5 to 14 percent for sales over 50,000 tonnes. In Peru, the mining tax system consists of three parts: a general mining royalty applicable to all mineral products ranging from 1 to 12 percent, a special mining tax ranging from 2 to 8.4 percent applicable to all metallic mining products, and an additional mining contribution ranging from 4 to 13.12 percent payable only by those companies that have a tax stability agreement with the government. As a result, the combined mining tax rate in Peru is up to 12 percent for coal and up to 33.52 percent for those metallic miners that have a tax stability agreement in force.

The contrast between the conventional revenue based royalty system and the other profit-based mining taxes is self-evident. The conventional revenue-based royalty system is insensitive to mining profit because the royalty base includes the cost of mining. For a given royalty rate, the lower the profit margin, which is often associated with a lower

commodity price, the higher is the effective royalty rate based on profit. Therefore, a revenue-based royalty is commonly acknowledged to be regressive. Such regressiveness is bound to be more serious when the royalty rate is generally high (e.g., the aggregated 8-percent rate in Argentina), or when a higher royalty rate is imposed on a commodity with a lower profit margin (e.g., the 10-percent or higher royalty rate applied to the large coal miners in Colombia). On the other hand, as discussed earlier, we are not convinced that the fine-tuned progressiveness in the profit-sensitive mining taxes in Chile and Peru is fully justified, at least, with respect to administrative efficiency.

As for other taxes based on either assets or gross revenue, Colombia imposes the highest tax burden through its equity tax based on a company's net worth. This equity tax was introduced in 2002 as a supposedly temporal measure to finance counter-insurgent military strategies. It was originally levied on equities surpassing 3 billion COP with a flat tariff of 1.2 percent. In 2011, however, it was extended to equities above 1 billion COP, with a progressive tax rate up to an annualized rate of 1.2 percent for net equity exceeding 5 billion COP; and a 25 percent surtax was introduced to net equity exceeding 3 billion COP. Currently, fiscal authorities are posing a second roll-over for another 4-year period of 2015-2019. It is also noteworthy that this equity tax is not deductible for CIT purposes, which is unusual in other countries collecting such a type of asset-based tax. The other two countries that impose such other taxes in general are Argentina and Chile. Argentina collects a 1-percent gross-receipts tax and Chile a 0.6-percent tax on the part of assets financed by debt, both of which are deductible for CIT purposes.

In summary, among the five South American major mining countries, Colombia appears to have a rather high royalty rate by product, a middle level of company income tax and the highest asset-based tax. We will further assess Colombia's tax efficiency, competitiveness and revenue performance in the next section.

4. Colombia's Mining Fiscal Regime: An Assessment of Efficiency, Competitiveness and Revenue Performance

To evaluate the impact of Colombia's tax/royalty regime on the mining industry in terms of its efficiency and competitiveness, we apply marginal effective tax and royalty rate

analysis. The marginal effective tax rate (METR) is a well-established analytical tool for measuring the tax impact on capital investment²⁷. The METR is calculated as the tax portion of the cost of capital, which includes both tax and non-tax costs. While the non-tax cost includes mainly financing cost (and replacement cost in the case of depreciable assets), the tax cost consists of all taxes payable net of tax allowances and credits. Therefore, the METR is often said to be a tax wedge between the gross-of-tax rate of return to capital and the net-of-tax rate of return to capital. And this tax wedge provides a gauge for assessing a given tax system with respect to its efficiency: a tax system is said to be efficient or neutral when the METR is identical across all types of capital assets and all industries; under such an efficient or neutral tax system, there would be no tax-induced investment to favor a specific type of asset or a specific industry. Also, if a country has a much higher METR than others with which it competes in attracting investments, it will be in a competitive disadvantage with respect to the allocation of marginal flows of investment.

Unlike other analytical tools that also measure the “tax wedge” without an underpinning in economics²⁸, the METR analysis is constructed on the basic theoretical assumption of profit maximization by firms. The assumption that firms are profit-maximizers provides a starting point for calculating METR, which occurs when marginal revenue equals marginal cost. Since it is only the marginal cost, rather than marginal revenue, that is observable, METR is evaluated as the effective tax cost as a share of marginal cost (net of economic depreciation), which is also the pre-tax rate of return on capital. For example, if the pre-tax rate of return on capital (i.e., the tax-inclusive cost of capital) is 20 percent at the profit-maximizing point, and the post-tax rate of return on

²⁷ For the classic introduction to the METR concept and methodology, see R. Boadway, N. Bruce and J. M. Mintz, “Taxation, Inflation, and the Effective Marginal Tax Rate in Canada,” *Canadian Journal of Economics* 17(1): 62-79, 1984, and M. A. King and D. Fullerton, “The Taxation of Income from Capital: A Comparative Study of U.S., U.K., Sweden and West Germany,” Chicago: University of Chicago Press, 1984.

²⁸ Two such analytical tools that are popular for assessing tax impact are the average effective tax rate (AETR) and the project-based calculation of tax cost. Calculating AETR is based on taxes *paid* as a proportion of pre-tax profits, which are subject to economic and financial performance over a given time period. Therefore, it is not a reliable indicator for future policy design. The limitation of project-based calculation of tax impact on capital investment, although a forward-looking measure, lies in its requirement for discrete assumptions on investment size, internal rate of return, and the length of mine life; it is therefore suitable only for a single firm decision rather than providing general guidance to policy design.

capital (i.e., the tax-exclusive cost of capital) is 10 percent, the METR is 50 percent. Thus, the effective tax rate on income of the last dollar invested (that is, at the profit-maximizing point) would be 50 percent.

By including mining royalty as a part of tax cost (or more accurately fiscal cost) to investors, the marginal effective tax rate becomes the marginal effective tax and royalty rate (METRR). However, the slight change in name does not alter the classic concept of METR discussed above. We use METRR and METR interchangeably in this paper depending on whether the mining royalty is involved or not.

Our METRR analysis focuses on the legislated fiscal regimes and ignores individual fiscal agreements between mining investors and the government, such as those in force for the two largest coalmines in Colombia, which by contractual agreement pay higher than statutory royalties. We cover nine industries for Colombia including mining and eight non-resource industries: public utilities, construction, manufacturing, wholesale trade, retail trade, transportation and storage, communications, and other services. In our cross-border METRR comparison, we focus on the mining industry.

Also note that our METRR calculations and analysis cover only the large corporations. This is mainly because mining operations normally require substantial upfront capital investment that is affordable only by large corporations. Moreover, Colombia does not provide a distinctive corporate income tax regime for small business except for an initial 2-year tax holiday and a subsequent 3-year tax reduction (25-percent). Such rate-schemes are inefficient and even ineffective since start-up firms are often not profitable in initial years and hence do not have to pay income tax regardless of whether there is a tax holiday or tax reduction²⁹.

4.1 Tax Efficiency within Colombia

By tax efficiency within Colombia, we mean tax neutrality among investment expenditures across different types of assets and different industries. This tax neutrality

²⁹ For more in-depth discussion of this issue, refer to Jack Mintz, “Corporate Tax Holidays and Investment,” in *The World Bank Economic Review*, Vol. 4, No. 1 (Jan., 1990), pp. 81-102, [Oxford University Press, www.jstor.org/stable/3990028](http://www.jstor.org/stable/3990028)

may be translated into a similar level of METR across different types of assets and industries. For example, if all investment projects across different industries incur a similar tax cost at the margin, as measured by METR, then we judge the overall tax system to be reasonably neutral or efficient. In other words, dispersion in METR across different types of assets and different industries indicates tax inefficiency; and the wider the METR dispersion, the less efficient is the overall tax system. In the meantime, by estimating the METR associated with each fiscal levy, or itemized METR, one can attribute the tax distortion to individual fiscal levies so as to pinpoint specific tax issues and potential fixes.

Table 2 presents the aggregated and itemized METRR impact of individual tax and royalty attributes. The METRR for mining is the simple average of the METRRs across all the mining products, including both large and small coalmines, nickel, gold and other base metals. More detailed METRR by mining product for Colombia is presented in Table 3. We also assume that mining, manufacturing and processing firms operate in three shifts, implying they can claim a tax depreciation allowance at 1.5 times the regular official rate (Table 1).

Table 2 Marginal Effective Tax Rate on Capital Investment in Colombia: 2014

	Mining**	Public utilities	Constr.	Manuf.	W. Trade	R. Trade	Transp.	Com.	Other Services	Weighted average
Base Case 2014*	32.9	16.8	19.1	20.2	18.4	19.4	18.7	30.0	21.8	21.1
If only one of the following taxes applies:										
Mining Royalty	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Income Tax	12.6	15.4	16.8	17.7	16.5	17.7	16.7	27.3	19.3	18.6
Municipal I&C Tax	0.0/2.4***	1.9	3.1	3.4	2.6	2.3	2.8	4.8	3.6	3.3
Reference: impact of the equity tax										
<i>Aggregated METR</i>	44.6	31.5	33.4	35.4	32.2	33.2	34.5	43.3	36.6	36.1
<i>If only the equity-tax applies</i>	11.5	15.2	15.7	16.7	14.9	15.2	16.7	18.2	16.8	16.3

* Excluding the supposedly “temporary” equity tax, of which the METR impact is presented in the bottom panel of this table.

** The numbers for mining involving mining royalties are a simple average across all mining products including large and small coalmines, gold, nickel and other base metals; otherwise, the METR for mining is identical across all mining products.

*** The non-zero number indicates the possible METR impact of the municipal industrial and commercial taxes should miners not be exempt from this tax.

As table 2 shows, among all the government levies and for all the industries but mining, corporate income tax is the main contributor to the METR, equity tax is the close secondary contributor and municipal industrial and commercial tax a distant third.. For the mining industry, the mining royalty is the main contributor to the METRR, followed by CIT and the equity tax.

Mining royalty. Compared with the highest METR for non-resource industries, which is 30 percent for communications, the average METRR for mining (32.9 percent) is almost 3 percentage points higher. When considering only the mining royalty, the METRR is 21 percent. More importantly, as shown in Table 3, behind this simple average METRR associated with mining royalties, there is a very wide METRR variation across the major mining products from 5.7 percent for gold to 36.5 percent for larger coal miners.

Table 3 METRR (in percent) by Mining Product, Policy Options

	Coal	Nickel	Gold	Other Base metals	Simple Average
Aggregate	30.9/49.1	38.9	18.3	27.2	32.9
Royalty only	18.3/36.5	26.3	5.7	14.6	21.1
<i>Reference:</i>					
- <i>The statutory royalty rate by product</i>	5%/10%	12%	4%	5%	
- <i>The profit margin by product</i>	12%	20%	31%	15%	
- <i>Equivalent profit-based royalty rate</i>	42%/83%	60%	13%	33%	
- <i>The relative GDP share by product</i>					

This wide METRR variation among mining products is solely caused by the existing royalty system. That is, the royalty is not only revenue-based and hence insensitive to profitability but also provides a rate differentiation by product with little justification. As presented in Table 1, the statutory royalty rate ranges from 4 percent for gold to 12 percent for nickel. By taking into account our estimate of profit margin by product, which ranges from 12 percent for coal to 31 percent for gold, the equivalent profit-based royalty rate ranges from only 13 percent for gold to over 80 percent for coal. Therefore, the large coal miners bear the highest METRR of 49 percent while gold miners only bear a METR of 18 percent.

Corporate income tax. By looking at the simulation that singles out only the corporate income tax, the METR for the mining industry (12.6 percent) is well below the average across all industries (18.3 percent), and that for the communications industry (27.3) is well above the average.

To better understand such wide cross-industry METR dispersion, Table 4 provides the METR breakdown by asset type and by industry. As the table shows, on average, depreciable assets are the highest taxed among the five major types of capital, followed by land and inventory (9.7 percent for both), mine development (5.3 percent) and exploration (-2.3 percent).

Table 4 METR on Capital Investment in Colombia, including only Corporate Income Tax, by industry and asset type (2014)

	Mining	Public utilities	Constr	Manuf.	W. Trade	R. Trade	Transp.	Com.	Other Services	Weighted average
Depreciable assets	26.9	18.3	22.4	20.7	23.9	24.2	17.8	28.2	21.5	21.8
Land	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Inventory	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Non-E&D Aggregate	22.5	15.4	16.8	17.7	16.5	17.7	16.7	27.3	19.3	18.6
Exploration	-2.3									
Development	5.3									
Aggregate	12.6	15.4	16.8	17.7	16.5	17.7	16.7	27.3	19.3	18.6

There are two main factors behind this METR dispersion among different types of assets. One is the tax allowance that deviates from the actual cost of capital, including financing cost and economic depreciation rate, and the other is the inflation rate, which can exacerbate tax distortions. For example, for capital invested in land and inventory, the only non-tax cost is their real financing cost, and the tax deduction for the nominal interest rate helps reduce this financing cost. Therefore, the higher the inflation rate, the lower is the real financing cost and hence the lower is the METR for land and inventory.

As for depreciable assets with varying useful lives, the METR for a given class of depreciable assets can be high (low) because their official useful life is longer (shorter) than the actual useful life and hence their tax depreciation allowances mismatch the actual economic depreciation rates to greatly varying degrees. Such mismatch of useful lives is more possible in Colombia since all the depreciable assets are roughly classified into only three groups while the reality is more diverse. For example, machinery and equipment used by the communications industry requires rapid technology advancement and hence may have a much higher economic depreciation rate compared to the tax depreciation allowance determined by their 10-year official life. In contrast, gas pipelines used by the public utilities industry may last more than 10 years and hence may enjoy a more generous tax depreciation allowance than their economic depreciation rate requires. As shown in Table 4, the METR for depreciable assets used by communications is the highest among industries while that for public utilities is the second lowest. In the meantime, any positive inflation

rate can reduce the present value of the tax depreciation allowance and hence increase the METR for all depreciable assets as a whole.

The METRs for exploration and development assets—minus 2.3 percent and 5.3 percent respectively-- are the lowest among all the five types of assets. This is because both exploration and development expenditures can be written off within five years, which is much shorter than the period over which they are depleted given that the minimum average life of a productive mine is around 10 years³⁰. Note that a negative METR does not mean a cash-handout to the investor but a tax loss at the margin that, in reality, can be used to offset tax liability arising from intra-marginal investment projects or carried over to offset future tax liabilities.

With this insight into inter-asset tax variation, it becomes straightforward to see why the mining industry is the lowest taxed under the corporate income tax system, as measured by the METR of 12.6-percent: it is because over 40 percent of mining capital is invested in exploration and development, which are the lowest taxed assets among all.

Among non-mining industries, communications is the highest taxed with a METR over 27 percent. This is mainly because over 90 percent of the capital assets used by the communications industry are depreciable assets (of which 90 percent are machinery and equipment), which are the highest taxed assets among all.

For all the other industries, the rule of thumb is that, the higher is the share of capital used by an industry in a type (or types) of assets that incur a higher METR, the higher is the overall METR for that industry.

³⁰ Note that allowing exploration expenditures to be fully written off as they occur, regardless of their success, is not an unusual practice. The argument for fully expensing exploration expenditures is because they are “akin to research, to the extent that such activities are essentially about information and knowledge acquisition. There are typically thought to be spillovers associated with the generation of information and knowledge. These spillovers mean that the information discovered or acquired by one firm generates information, and therefore uncompensated benefits, to others. Without government grants or tax preferences, (return from) information and knowledge acquisition would be too low, since businesses do not fully appropriate social returns on their investments. This provides a policy rationale for subsidizing knowledge acquisition, which becomes a typical justification for the R&D tax credit that is available to all corporations. A similar point may be made with regard to exploration (but perhaps not development) in the resource sector.” That is, the discovery (or not) of certain natural resources in a particular region most certainly make public information to the Government and to other investors that incur no cost for acquiring such information. (Refer to J. Mintz and D. Chen, “Capturing Economic Rent from Resources through Royalties and Taxes,” SPP Research Papers, 5(30), October 2012, page 7

The municipal industrial and commercial tax. The municipal industrial and commercial tax (MICT) is levied on gross revenue and hence is modeled like a gross-receipts tax. It is a direct reduction in business revenues, which is akin to increasing the cost of capital at the margin (where marginal revenue equals marginal cost). Therefore, the higher the cost of capital without MICT, the higher is the cost of capital with MICT and hence the greater is the METR impact of MICT; and vice versa. Since the cost of capital is greater for depreciable assets (buildings and machinery) than that for non-depreciable assets (land and inventory), industries that use depreciable assets more intensively are affected more significantly by the MICT, and vice versa. Therefore, when considering only the municipal industrial and commercial tax (Table 2), from which the mining industry is exempted, the communication industry appears to be the most heavily taxed because its capital is more heavily allocated to depreciable assets than non-depreciable ones (94:6), followed by “other services” (79:21) and manufacturing (70:30). At the other end of the spectrum, wholesale trade and retail trade appear to be less heavily taxed because around 50 percent of their capital is allocated to non-depreciable assets such as inventory and land.

The equity tax. By including the equity tax, which is supposed to be temporary in spite of several reinstallments, the weighted average of the overall METRRs across industries increases by almost 15 percentage points, from 21.6 percent to 36.1 percent. There are mainly two reasons for such a significant METR impact arising from the equity tax. First, the 1.5-percent tax rate (including the 25-percent surtax) is excessively high. And second, this tax is neither deductible for nor creditable against the income tax. To our knowledge, very few countries around the world still levy such a capital-based tax on an annual basis, with either a much lower rate or a much narrower tax base³¹. And this kind of tax as levied in other countries is always deductible for income tax purposes.

It is noteworthy that the equity tax appears to have a less significant impact on mining (11.5 percentage points) than on non-mining investment (ranging from 15 to 18 percentage points). This is mainly because a large share (over 40 percent) of mining investment is allocated to exploration and development that can be written off within five

³¹ Examples known to us include Ecuador (0.15 percent), Luxemburg (0.5 percent), Pakistan (0.01 percent) and Switzerland (ranging from 0.001 to 0.525 percent); and Russia and Uzbekistan levy a higher tax (2.2 percent and 3.5-percent respectively) but their tax bases are much narrower.

years, which is much faster than the allowance for depreciable assets used by most non-mining industries. This implies that a much smaller portion of mining capital can be counted as taxable equity compared to that in non-mining industries. Therefore, the METR impact of the equity tax is less significant on mining than on other industries.

In summary, the main observations concerning Colombia's tax efficiency based on our METRR analysis are the following:

First, the revenue-based mining royalty appears to be rather high. This is particularly true for the coal mines, for which the rather low profit margin of 12 percent equalized the general 10-percent royalty rate based on revenue to an over 80-percent royalty based on profit. Not to mention the royalty for the largest coal miners is contractually set at 12 percent.³² As the owner of natural resources, the government is entitled to collect royalty from mining activities in addition to collecting general income taxes. This rationale, however, does not prevent policy makers from searching for optimal approaches including an optimal royalty rate for long-term rent maximization, which is in the interest of both the mining industry and the public good.

Second, the corporate income tax system can be improved by lowering the tax rate and better matching the tax depreciation allowance with the economic depreciation rate for depreciable assets. The former would encourage more capital investment in the country and the latter could significantly alleviate the existing inter-asset and inter-industry tax distortions.

And finally, the other non-profit-based taxes such as the revenue-based Municipal Industrial and Commercial Tax and the net equity tax can discourage capital investment in general, particularly investments on machinery and equipment that bear higher costs of capital than non-depreciable assets such as inventory and land. Therefore, any action taken by policy makers to alleviate such profit-insensitive levies will encourage capital investment in Colombia.

³² However, in the METR calculations we used only the statutory rate of 10% for large projects

4.2 The Cross-Country METRR Comparison for Mining

In the globalized free-market system that allows capital to cross borders freely, business taxation is one of the main factors that affect capital allocation among jurisdictions that share a similar non-tax environment, including political stability, institutional settings, labour quality, infrastructure and natural resources. Within this context, the METRR analysis can provide a gauge for assessing the relative tax competitiveness that influences capital investment across borders.

Table 5 presents the METRR by mining product across countries. We focus on the impact of corporate income tax and mining royalties and ignore any other revenue- or asset-based taxes.³³ We also assume all the miners run three shifts so that the tax consequence can be evaluated consistently across the border based on the statutory provisions (Table 1).

In Table 5, we provide three cases: (1) including only the corporate income tax (CIT), which is the same for all mining products; (2) including both CIT and the mining royalty; and (3) including only the mining royalty. The latter two cases are modeled for each of the four main mining products in Colombia: coal, nickel, gold and other base metals including iron ore and copper. Note that for Chile and Peru, the only two countries having a profit-based and progressive mining tax, we apply the highest mining tax rate applicable so as to compare Colombia METRRs to their maximum counterparts in other countries. As a reference, we also include the other three top coal exporting countries—Australia, Russia and South Africa-- in the Table for their METRRs associating with coal mining.

³³ As shown in Table 2, the METR impact of the current 1.5-percent equity tax on Colombia's mining investment is 11.5 percent on average. Our simulation shows that the METR impact of Argentina's 1-percent gross-receipts tax is about three percentage points and that of Chile's 0.6-percent tax on debt financing less than one percentage point.

Table 5 Marginal Effective Tax Rate (in percent) on Capital Investment in Mining, by Product and by Country (2014)^a

	Colombia	Argentina	Brazil	Chile ^c	Peru ^d	Australia ^e	Russia ^f	South Africa ^g
CIT only	12.6	-20.7	10.1	5.2(9.6)	14.9(17.2)	11.4	5.6	14.8
Coal (PM = 12%)^b								
<i>Aggregate</i>	30.9/49.1	24.5	20.4	11.2(15.7)	19.8(22.2)	48.8	5.6	41.0
<i>Royalty only</i>	18.3/36.5	29.2	7.3	1.0-6.1	0.4-5.3	36.5	NA	25.6
Nickel (PM=20%)^b								
<i>Aggregate</i>	38.9	NA	17.7	NA	NA	NA	NA	NA
<i>Royalty only</i>	26.3	NA	4.4	NA	NA	NA	NA	NA
Gold (PM = 31%)^b								
<i>Aggregate</i>	18.3	-1.8	14.9	11.2(15.7)	28.7(31.0)	NA	NA	NA
<i>Royalty only</i>	5.7	11.4	1.4	1.0-6.1	3.1-14.7	NA	NA	NA
Other base metal (PM = 15%)^b								
<i>Aggregate</i>	27.2	16.7	19.0	11.2(15.7)	28.7(31.0)	NA	NA	NA
<i>Royalty only</i>	14.6	23.4	5.8	1.0-6.1	3.1-14.7	NA	NA	NA

^a Refer to Table 1 for statutory provisions concerning income tax and mining levies.

^b PM stands for “profit margin,” which is relevant only to the revenue-based royalty regimes in Colombia, Argentina and Brazil.

^c For Chile, the aggregated METRR includes the highest mining tax rate of 14 percent while the METRR associated with “royalty only” covers the range of royalty rates from low to high. Also note that the higher number in brackets for “CIT only” or “aggregate” cases includes the withholding tax on after-CIT distribution to financial investors.

^d For Peru, the aggregated METRR includes the highest mining tax rate by product: 12 percent for coal and 33.2 percent for gold and base metals; and the METRR associated with “royalty only” covers the range of royalty rates from low to high. Also note that the higher number in brackets for “CIT only” or “aggregate” cases include the withholding tax on after-CIT distribution to financial investors.

^e For Australia, we apply a 29-percent CIT rate and an average of a 10-percent state royalty rate.

The following observations may be drawn from Table 5:

First, considering only corporate income taxes, Colombia’s METRR (12.6) appears to be the second highest but close to the middle point among its South American peer

countries. Peru's highest METRR (15.1 percent) is mainly due to its less generous tax allowance compared to all the other countries. As a sharp contrast, Argentina presents a negative METRR arising from its excessively generous tax allowance for all types of mining assets (refer to Table 1). Note that a negative METRR indicates a tax subsidy at the margin but does not mean a cash handout from the government. Instead, it implies a tax loss at margin that can be utilized to offset the overall or future tax liability within the company.

Second, by taking into account the mining royalty and focusing on coal mining, Colombia has the highest METRR (36.5 percent) associated with its 10-percent royalty (for production volume of over 3 million tonnes. This ranks Colombia similarly with Australia for its royalty burden on coal but higher than South Africa and its South American peers. It is fair to observe, however, that Australia and South Africa are direct competitors with Colombia in coal, while other South American countries are not, due to their considerably lower reserves and lower quality of coal. As mentioned above, given a rather low profit margin for coal (i.e., 12 percent), a 10-percent royalty rate based on revenue is equivalent to an over 80-percent tax on profit.

Also note that Colombia's aggregated METRR for large coal miners (over 49 percent) is considerably higher than that for South Africa and slightly higher than that for Australia. In comparison, the METRRs for coalminers in the other four South American countries are substantially lower. Argentina's METRR associated with mining royalty is the second highest in South America for coal mining because of its effective royalty rate of 8 percent, combining its 3-percent mining royalty and 5-percent export tax on mining products.

Third, as between the two major nickel-mining countries, Colombia's royalty burden as measured by METRR (26.3 percent) is more than six times that of Brazil (4.4 percent). This is not surprising given that Colombia's royalty is 12 percent for nickel compared to the 2-percent royalty in Brazil. As shown in Table 3, with a 20-percent profit margin for nickel, the 12-percent revenue-based royalty is equivalent to a 60-percent profit-based tax.

Fourth, for gold (and silver), Colombia's METRR associated with the royalty (i.e., 5.7 percent) is either the second lowest in South America if we consider only the highest mining tax rates in Chile and Peru, or the second highest if we consider only the lowest

mining tax rates in Chile and Peru. Brazil ranks the lowest because of its lower royalty rate (1 percent for gold) compared to that in Colombia (4 percent for gold). Peru appears to have the highest METRR (14.7 percent) corresponding to its highest possible mining tax rate (33.52 percent) applied only to the metal miners having a tax stability agreement in force. For other metal miners in Peru, the METRR could be as low as 3 percent if the lowest combined mining tax rate of 7 percent is applied. Argentina's high METRR (11.4 percent) is associated with its effective 8-percent royalty based on revenue (see above). Therefore, the METRR for gold mining in Colombia ranks roughly in the middle given the wide range of mining tax rates applied in Chile and Peru.

Fifth, for the base metals such as copper and iron ore, and if we consider only the mining levies, Argentina's METRR is the highest (23.4 percent) due to its rather high tax rate (8 percent) based on revenue, combining the mining royalty and mining export tax; Colombia's METRR (14.6 percent) is very close to Peru's upper limit of its METRR range (3.1-14.7 percent). This is because, when taking into account the estimated 15-percent profit margin for the base metals in general, the 5-percent revenue-based royalty in Colombia is equivalent to a 33.3-percent profit-based mining tax, almost the same as that of the maximum mining tax rate (33.5 percent) for base metals in Peru.

And finally, regardless of their METRR levels, Chile and Peru tie the government mining levies directly to mining profit. Through these entirely profit-sensitive levies, the governments share with the investors both the downturn risk and upturn windfalls and the investors therefore are able to make investment decisions with greater certainty in profit sharing while riding the market fluctuations. In contrast, Colombia, along with Argentina and Brazil, still relies solely on the conventional revenue-based royalty, which can cause wide variation in royalty cost across different mining products and severe tax regressivity along with commodity market fluctuation, as shown below. Obviously, a revenue-based royalty is less efficient compared to a profit-based royalty; and it is even worse compared to a rent-based tax as shown in our further METRR simulations in Section 5.

4.3 Revenue Performance: comparing with the Peruvian and Chilean royalty systems

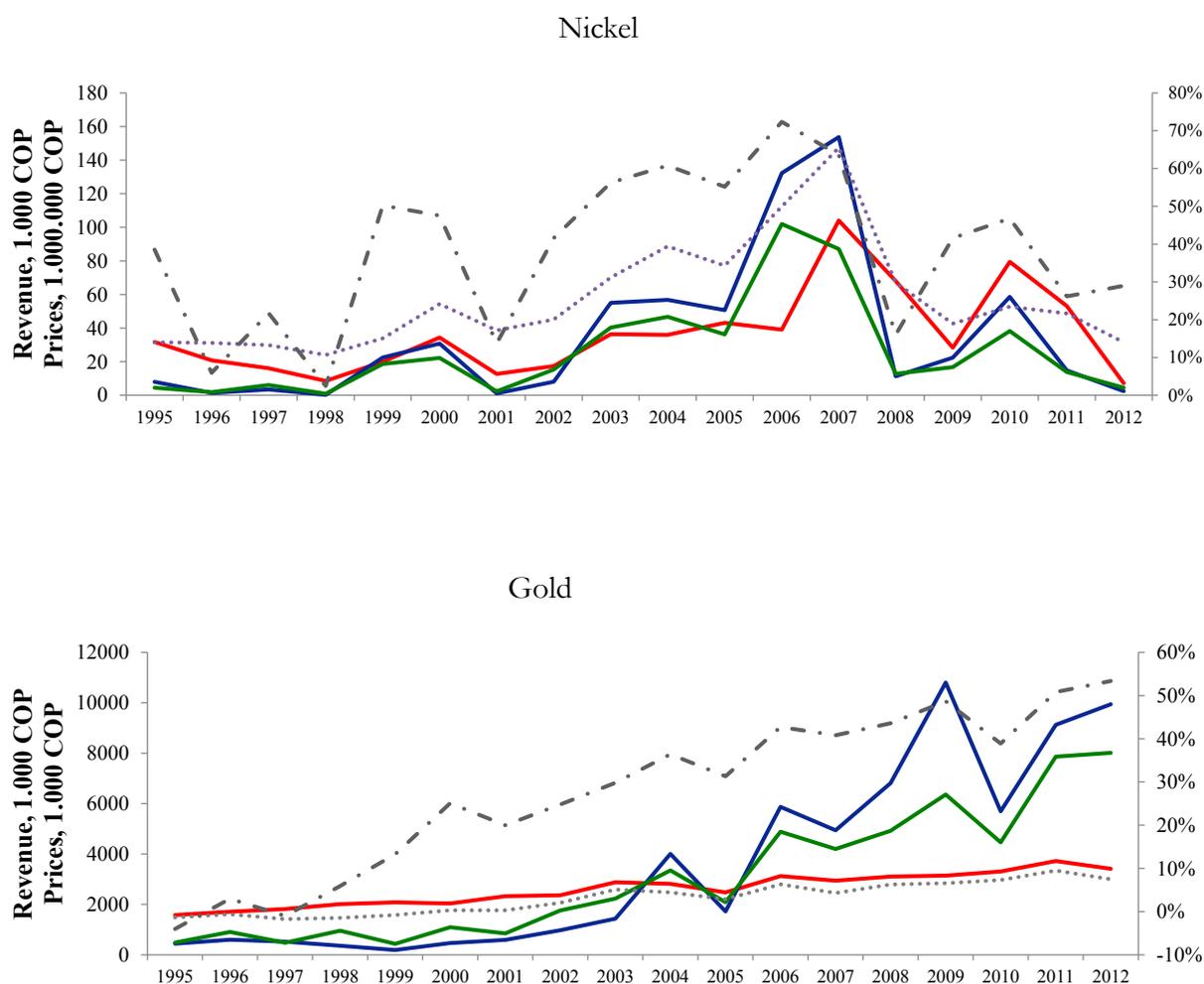
We showed in Section 2 that a complementary criteria for assessing a mining fiscal system is its capacity to bring substantial revenues for the Government from highly profitable projects (those with higher intra-marginal rents) and in periods of high prices, when most mining projects obtain exceptional profits, while avoiding overtaxing marginally profitable mines or most mining activities in periods of low prices. As mentioned, conventional gross-revenue based royalties, such as those in force in Colombia, fare especially bad in these regards. We illustrate here this point by comparing the revenue performance of the Colombian royalty regime during the 1994-2012 period (for which we have detailed financial data for the largest Colombian mining companies) with what would have happened if the profit sensitive current Peruvian and Chilean royalty regimes had been in force. Companies for which we were able to collect the required data for that period include Cerromatoso, which accounts for all nickel production and exports in Colombia; the three largest coal companies (Cerrejón, Drummond and Prodeco), that account for 80 percent of coal production and 93 percent of coal exports; and Mineros de Colombia, that account for 7 percent of gold production. Thus, with the exception of gold, whose production is highly atomized in Colombia, our simulations cover all or most of tax collections from the mining industry.

A caveat is in order before presenting our results. These simulations are purely illustrative, as they do not take into account how companies would have reacted to alternative tax regimes; e.g., they are not proper counterfactuals. As the efficiency costs of the Chilean and Peruvian alternatives examined are lower than for the present Colombian tax regime, investment, production and profits, might have been larger, and thus our estimated revenues for these alternative regimes should be considered a lower bound.

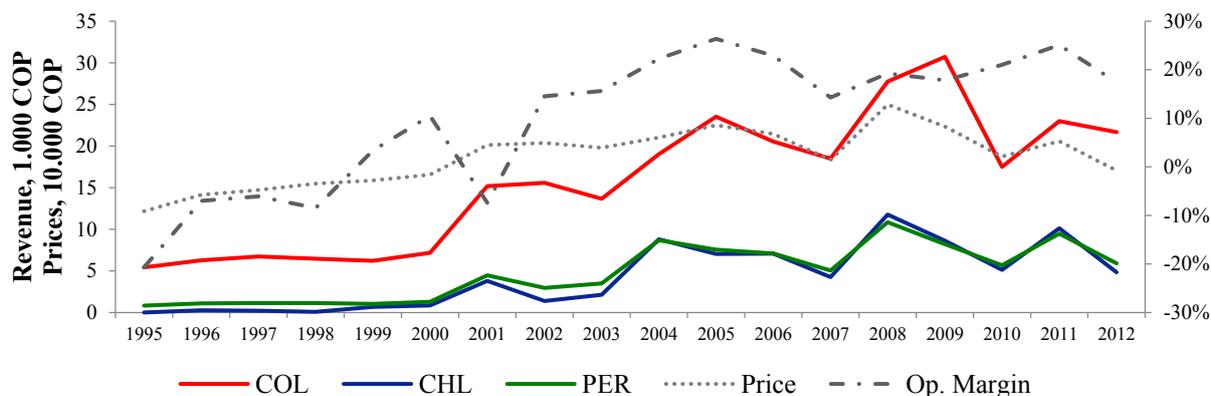
Figure 1 compares the actual royalties paid by Oz Troy or Ton produced by the largest Colombian gold, nickel and coal mines from 1995 to 2012, with what would have been paid if the Peruvian and Chilean regimes (for large production mines) had applied to them, under the assumption that production decisions would not have changed. This figure shows clearly that, as expected, the application of both the Chilean and Peruvian

regime would have captured a significantly higher fraction of the windfall that took place between 2003 and 2012 in the case of gold, and between 2003 and 2007 in the case of nickel, while taxing the companies less in periods of lower prices, in the case of these two commodities. On the contrary, both regimes would have taxed less the large coal companies during the whole period.

Figure 1: Comparing the Colombian, Chilean and Peruvian Regimes. Revenue per ton.



Coal



As a consequence, as shown in Table 6 the present value of tax revenues would have been significantly higher with the Peruvian and, especially, with the Chilean regimes in the case of gold; would have been similar (when applying the Chilean regime) or lower (when applying the Peruvian regime) for nickel and they would have been significantly lower in the case of coal.

**Table 6 Percent Value of royalty revenues (1995-2012): Colombian,
Chilean and Peruvian regimes**

Gold

	Colombia	Chile	Peru
Present Value Mining Revenue	352,778,739	706,470,883	568,044,717
Percentage change in PV	0%	100%	61%
Progressivity with price	0.0007	0.0040	0.0028
Progressivity with profit margin	0.03	0.19	0.14

Nickel

	Colombia	Chile	Peru
Present Value Mining Revenue	8,503,532,086	8,674,809,054	6,287,555,738
Percentage change in PV	0%	2%	-26%
Progressivity with price	0.5703148	1.2777748	0.8130981
Progressivity with profit margin	0.09	0.33	0.22

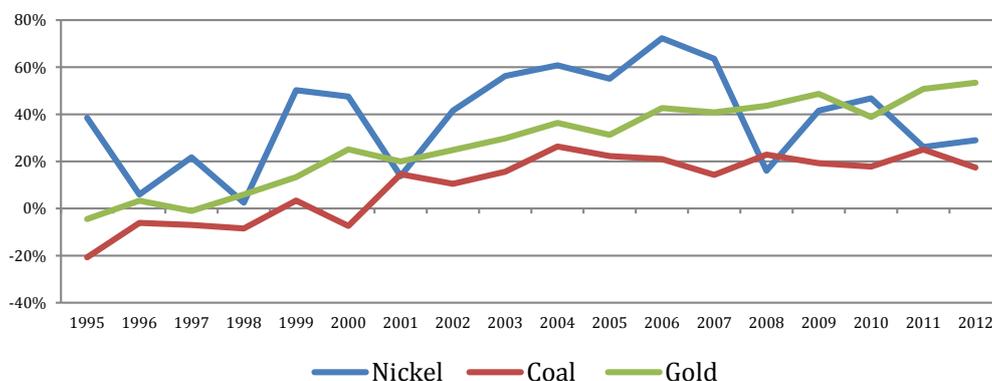
Coal

	Colombia	Chile	Peru
Present Value Mining Revenue	41,830,289,877	12,936,513,679	13,509,957,179
Percentage change in PV	0%	-69%	-68%
Progressivity w/ prices	0.2062	0.0961	0.0850
Progressivity w/margins	0.42	0.20	0.18

Figures are expressed in 2012 COP and were carried forward using a real discount rate of 6%

The sharp differences observed by minerals are related to the fact that operational margins in coal are significantly lower than in gold and nickel (Figure 2), while royalties have been much higher for the two largest coal mines, and lower for gold.

Figure 2: Operational Margins for large nickel, gold and coal mines in Colombia.



In summary, these results indicate that, because of the fact that the Colombian royalty regime is insensitive to operational margins, it failed to capture a significant fraction of the high profits that took place in gold during 2003 to 2012 and in nickel during 2003 to 2007, while probably having overtaxed the companies in periods of low prices, especially in the case of the two largest coal projects.

Therefore, Colombia's sole reliance on a revenue-based royalty system needs to be reformed to be sensitive to both the investors' desire for profit maximization and the government's need for revenue. In the next section, we will propose some changes to Colombia's mining tax/royalty system to make it more efficient while generating higher revenue to the government from highly profitable projects and in periods of high prices.

5. Assessment of Reform Options

For economic efficiency, we propose a rent-based tax targeting only the rent generated from mining in new projects. However, as discussed in Section 2, we need to preserve a revenue-based royalty to ensure a minimum revenue flow for public finance since the start of production and in periods of low prices. But we also need to reduce this royalty to minimize its distortive impact among and within mining sectors and encourage capital investment in Colombia's mining industry as a whole. And finally, as discussed earlier, the revenue-based royalty may be made deductible for RRT purposes or creditable

against RRT. Our preference is to make royalty creditable against the RRT so that the ultimate mining levy is solely based on the rent.

Further, as discussed in Section 2, the RRT can be established as a fully independent tax from the CIT, or else CIT payments can be made deductible from the RRT base. While the second option fares better in terms of efficiency and competitiveness, it does pose significant administrative problems and may be politically more difficult to apply given that it requires a higher RRT rate in order to generate similar levels of revenues (see below). We present efficiency (METRR) estimates and revenue simulations for both options, in order to facilitate decisionmaking by Government and Congress.

The process carried out in formulating our RRT options combined the METRR and the revenue simulations in an iterative manner: For every possible RRT option, the METRR simulations are aimed at assessing efficiency implications while bearing in mind cross-border competitiveness, and the revenue simulations evaluated revenue impacts. Through this process, we ranked the multiple options by their efficiency, competitiveness and revenue consequences. Ideally, we would like to add a third tool, a computable general equilibrium (CGE) model that can further simulate possible dynamic reactions by the direct and indirect economic players to our proposed RRT options so as to help policy makers better assess the overall economic outcome of these options. Unfortunately, building this additional modeling tool is beyond the scope of this paper.

It is also noteworthy that both our METRR and revenue simulations are not without some critical problems. For example, although the METRR analysis and simulations provide a good indicator for tax efficiency and competitiveness, our non-tax parameters are based on the past statistics available, which do not provide a perfect resemblance of the future, to say the least. In particular, we estimated the mining profit margin by product based on past data. As pointed out repeatedly in this paper, for a given revenue-based royalty rate, the METRR can vary wildly among different products because the profit margin varies widely by product. Since the profit margins for all mining products are bound to change in unpredictable directions due to the unpredictability of the commodity market and variation in mining conditions, for a given product across different mines, any METRR impact associated with a given royalty rate may deviate significantly from our current METRR

estimates. Therefore, these estimates should be taken only as a proxy for the efficiency and competitiveness effects of alternative designs.

As for our revenue simulations, with no access to official aggregated revenue data by sectors, we had to use the best publicly available data from some major representative mining firms in Colombia. Unfortunately, these firm-based datasets cover only the period of 1995-2012 that includes a very high price period (2003-2012) but do not cover the period of high initial investments. Therefore, our revenue simulations may result in overestimates of the possible revenue increase associated with various RRT options, even as they do not take into account positive reactions of investment and production decisions that would have been induced by a less distortionary fiscal regime.

5.1 Efficiency and competitiveness effects of proposed changes: The METRR estimates

Our METRR simulations presented in Table 7 are aimed at illustrating how our proposed alternative mining fiscal systems can eliminate or alleviate present METRR dispersion among mining products (and reduce their present differences with those of other activities) while preserving or improving Colombia's mining tax competitiveness.

Furthermore, since the existing revenue-based royalty is the main distortionary factor, as shown in Table 5, it is clear that we need to eliminate the excessively high royalty rates such as the 10-percent for large coalmines and the 12-percent for nickel for future projects. Therefore, we set the 5-percent royalty rate, which is currently applied to small coalmines and base metals other than nickel, as the baseline for our royalty rate. It would be desirable to reduce this 5-percent royalty rate further if it were not for revenue concerns, as discussed below.

Table 7 presents our METRR simulations for the three major RRT options that appear to be the most desirable. These options are generated jointly with the revenue simulations, of which the outcomes are presented in Table 9. These three RRT options are:

- Option A: the revenue-based royalty is creditable against the RRT, and there is no interaction between RRT and CIT despite some overlap between their tax bases.

- Option B: the revenue-based royalty is deductible from the RRT base, and there is no interaction between RRT and CIT despite some overlap between their tax bases.

- Option C: the revenue-based royalty is fully creditable against the RRT and, to avoid possible overlapping, the CIT payment is made deductible from the RRT base.

Table 7. METRR Simulations for RRT Options

Option A: Royalty is creditable against RRT, and no interaction between RRT and CIT			
	RRT=30	RRT=35	RRT=40
	%	%	%
Coal	23.3	26.1	29.4
Nickel	23.3	26.1	29.4
Gold	23.3	26.1	29.4
Other base metal	23.3	26.1	29.4
Option B: Royalty(=3%) is deductible for RRT, and no interaction between RRT and CIT			
	RRT=20	RRT=25	RRT=30
	%	%	%
Coal	29.7	31.7	34.0
Nickel	25.3	27.4	29.7
Gold	23.1	25.1	27.5
Other base metal	27.5	29.5	31.9
Option C: Royalty is creditable against RRT, and CIT is deductible for RRT purposes			
Coal		12.6	
Nickel		12.6	
Gold		12.6	
Other base metal		12.6	
Reference: Current system			
Coal (PCM = 12%)		40.0	
Nickel (PCM = 20%)		38.9	
Gold (PCM = 31%)		18.3	
Other base metal (PCM = 15%)		27.5	

Under Option A-- when the revenue-based royalty is creditable against the RRT, and hence the RRT becomes the ultimate government levy specifically targeting the mining

industry-- all mining investment would bear the same tax cost under a given RRT rate across all mining products. However, the estimated METRR increases with the RRT rate (from 23.3 percent with a 30-percent RRT to 29.4 percent with a 40-percent RRT), due to the interactions with the CIT, as there is a partial overlap of the bases for these two taxes. As a consequence, if revenue goals dictate the need for a high RRT rate, competitiveness with other mining countries might be impaired. In other words, when the royalty is creditable against the RRT, the government decision in choosing a preferred RRT rate would be based on the tradeoff between its current revenue needs and the desired competitiveness against countries that compete with it for mining investments, and, consequently, to long-term revenue prospects.

In contrast, under Option B when the revenue-based royalty is deductible from the RRT base, the picture is much more complicated. First, for any combination of a given royalty rate and a given RRT rate, the METRR varies by product in the opposite direction to which the price-cost margin varies (e.g., the METRR associated with the 30-percent RRT ranges from 27.5 percent for gold to 34 percent for coal), bearing in mind that gold is the most profitable product and coal the least profitable based on the latest decade of mining history. This is the same story as that resulting from the current system but to a much lesser degree due to the introduction of RRT for which the royalty is deductible.

Finally, Option C preserves the advantage of option A, of eliminating distortions among mining activities, but in addition the METRR would be much lower (12.6%) and would not depend on the RRT rate. Thus, the tradeoff between competitiveness and revenue that characterizes Option A would disappear. However, as discussed in Section 2, this option is administratively more demanding and, as shown below, would require a higher RRT rate for a similar revenue goal, which would further put strains on the administration and can make the adoption of the RRT politically more difficult.

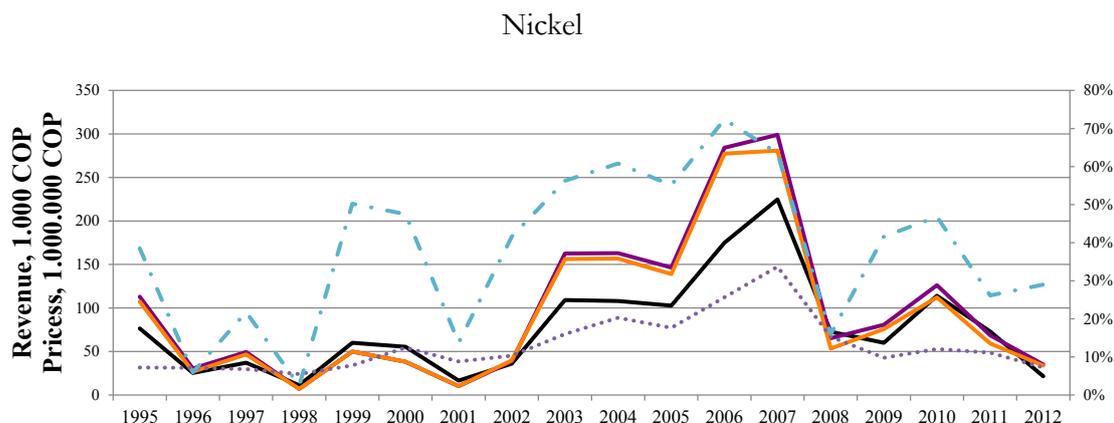
Assessing revenue performance of alternatives

We present below simulations of how total mining revenues would have behaved in the 1995 to 2012 period, if Colombia had enacted since 1995 a Resource Rent Tax on net operational cash flow minus net investments and an uplift rate of 6 percent (equivalent to

the Government long-term bonds rate) for accumulated losses, again under the assumption that production decisions would not have been altered. We begin by simulating a 30 percent RRT rate under the assumption that the RRT and the CIT are independent (neither deductible nor creditable against each other). We consider two levels of royalty rates (a reduced flat 3 percent or 5 percent rate across all minerals and contracts), which would be deductible from CIT as at present, and two alternative treatments for royalty payments under the RRT: (1) royalty payments are deducted as any other cash flow expense; (2) royalty payments are creditable against payable RRT (or act as a minimum RRT payment). The corresponding formulas for these two cases can be seen in the Technical Appendix.

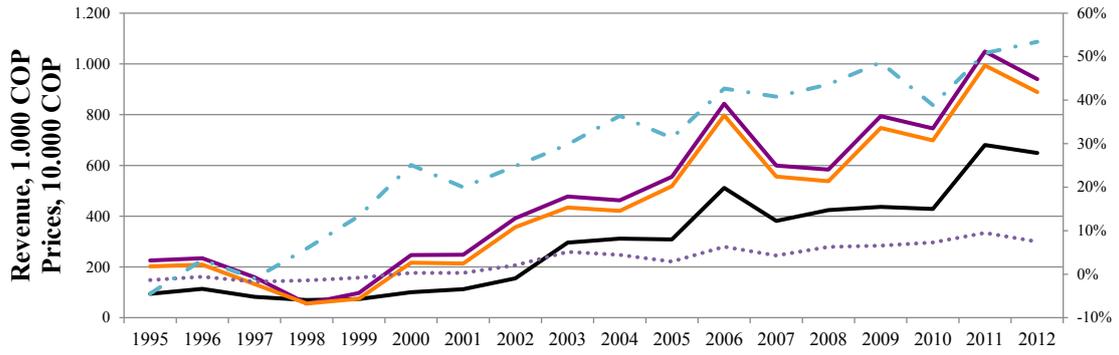
Figure 3 compares the actual total taxes (royalties and income tax) paid by ton or troy ounce produced by the largest Colombian coal, nickel and gold mines from 1995 to 2012, with what total taxes (RRT, royalties and income tax) would have been if an RRT had been in operation with creditable reduced royalties (at 3% for all minerals). Again, these estimates do not take into account the probable larger investments, production and cash flows that would have been obtained under the alternative RRT cum lower royalty's regimes. Hence our estimated revenues under the alternative RRT cum reduced royalty regimes should be considered a lower bound for the period under review. Table 8 summarizes the increases in Present Value of total revenues during the period, for all cases considered, under these restrictive assumptions.

Figure 3: Total revenues per production unit³⁴ introducing RRT alternatives

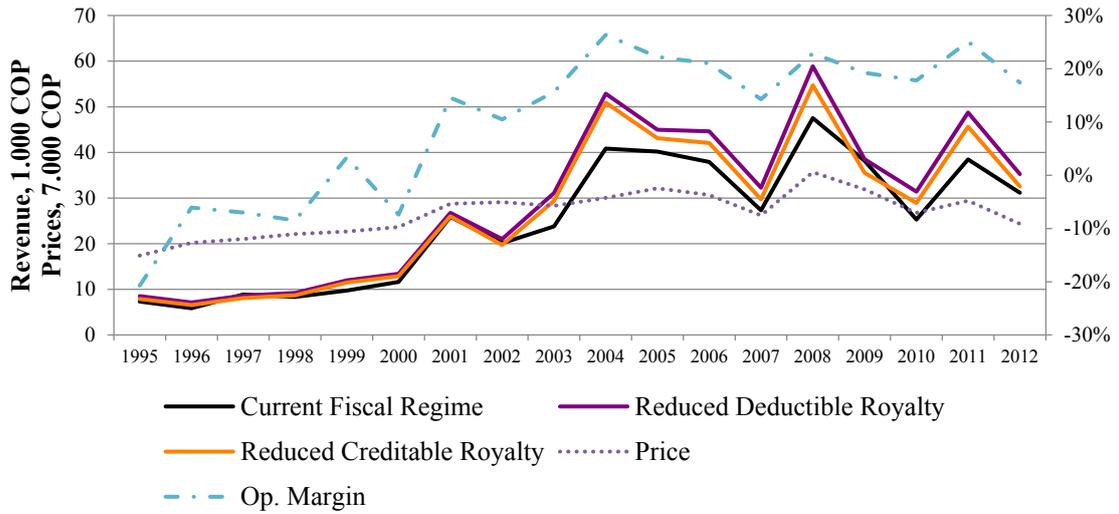


³⁴ Coal and nickel in tons, gold in troy oz.

Gold



Coal



- Current Fiscal Regime
- Reduced Creditable Royalty
- Reduced Deductible Royalty
- ... Price
- - - Op. Margin

Table 8 Present Value* of total fiscal revenues: 30% rate RRT alternatives

	<u>Sectorial change in revenue under different regimes</u>			<u>Total Revenue** (Three Sectors)</u>			
	Coal	Nickel	Gold	Resource Rent Tax	Corporate Income Tax	Royalty	Total
	Current fiscal regime	0%	0%	0%	0	17,76	20,90
RRT with deductible reduced royalty	17,41%	31,00%	67,11%	18,95	22,86	5,10	46,91
RRT with creditable reduced royalty	-5,05%	19,05%	53,19%	16,27	22,86	5,10	44,23
Sectorial Operating Margin***	20,48%	31,92%	43,62%				

**Present values were calculated using a 6% real discount rate*

***Figures are expressed in 2012 COP billions*

**** 5-year average*

Main results can be summarized as follows: the present value of total revenues would have been larger in all minerals, as a consequence of a significantly higher capture of the high rents obtained during the 2003-2012 period. Increases would have been, of course, higher in the cases in which royalties are deductible from the RRT, in comparison to the cases in which they are fully creditable against it.

Revenue increases would have been significantly larger for gold than for nickel, and more modest for coal. These differences by subsector reflect once more that gold is probably undertaxed in Colombia, while royalties for large coal contracts are high, when judged either by international standards or relative operational margins, as already observed above.

A word of caution on these results: The fact that we obtained higher Present Value of revenues in all simulations with a 30-percent RRT cum reduced royalties, is probably highly period specific for two reasons. First, prices and operational margins were unusually high from 2003 up to 2008 for the three minerals, and even higher from 2009 to 2012 for

gold and coal. Second, all the large mining companies in Colombia upon which these simulations are based, made their initial investments long before 1995. As a consequence of both factors, results would have probably been very different if we had had access to data on operational cash flows, investments and royalties since they started exploration and development of their first mines. Further, due to these facts, results for the 1995-2012 period with an uplift rate of 12 percent, including a 'risk-adjustment' factor, do not change much, as shown in the Annex. Such a result would have been quite different if we could extend the simulation back to 1980 to cover the high initial development investments.

Nonetheless, what the simulations show beyond doubt, is that an RRT cum reduced royalties would have captured a much higher fraction of windfall earnings, in comparison with what the present regime did, while at the same time significantly reducing efficiency costs, as shown in the previous section.

In Table 9 below we present estimates of present value revenue increases for the period 1995-2012 with different RRT rates depending on the treatment of royalty payments (whether deductible or creditable) and CIT payments (independent or deductible). Simulations presented were based on a reduced royalty rate of 5 percent, as those with a 3 percent RRT rate required excessively high RRT rates for obtaining similar revenue effects. From these results, and taking into account only revenue objectives, authorities might consider keeping a common royalty rate of 5 percent and introducing either a 25 percent-30 percent CIT-independent RRT with deductible royalty payments, or a 35 percent-40 percent CIT-independent RRT with fully creditable royalty payments, or a 45 percent-50 percent RRT with fully creditable royalty payments and deductible CIT payments. However, as shown in Table 7 above, while the second case would give between a common 26.1 to 29.4 METRR for all minerals (for a 35 percent or 40 percent RRT rate, respectively), the second one would give much higher METRRs and with a significant variation across minerals. Thus, between these two options, and combining efficiency and revenue concerns, we would recommend a 35 percent-40 percent rate RRT with fully creditable royalty payments. When considering option 3, Table 7 showed that we would obtain a 12.6 percent METRR for all mineral activities, independent of the RRT rate. Thus, combining efficiency, competitiveness and revenue objectives, this would indeed be a much superior alternative. However, as said before, it would be administratively considerably more demanding and the

higher required rate for revenue purposes (45-50 percent instead of 35 percent-40 percent) could make it more difficult to be politically accepted.

Table 9 Simulated increases in the Present Value* of revenues during 1995-2012 if alternative designs of RRT had been in place

Gold

	Independent CIT		Deductible CIT (Op.C)	
	RRT Rate	PV revenue increase	RRT Rate	PV revenue increase
Royalty is deductible (Op.A)	20%	42,75%	30%	44,62%
	25%	54,93%	35%	53,05%
	30%	67,11%	40%	61,48%
Royalty is creditable (Op.B)	30%	53,19%	40%	51,62%
	35%	66,23%	45%	61,20%
	40%	79,26%	50%	70,78%

Nickel

	Independent CIT		Deductible CIT (Op.C)	
	RRT Rate	PV revenue increase	RRT Rate	PV revenue increase
Royalty is deductible (Op.A)	20%	13,05%	30%	11,71%
	25%	22,03%	35%	16,96%
	30%	31,00%	40%	22,64%
Royalty is creditable (Op.B)	30%	19,05%	40%	15,99%
	35%	27,93%	45%	22,26%
	40%	36,80%	50%	28,54%

Coal

	Independent CIT		Deductible CIT (Op.C)	
	RRT Rate	PV revenue increase	RRT Rate	PV revenue increase
Royalty is deductible (Op.A)	20%	-0,47%	30%	-2,87%
	25%	12,20%	35%	1,59%
	30%	17,41%	40%	6,05%
Royalty is creditable (Op.B)	30%	-5,05%	40%	-0,99%
	35%	0,68%	45%	3,82%
	40%	6,42%	50%	8,63%

** Figures are expressed in 2012 pesos and were carried forward using a real discount rate of 6%*

Dealing with Revenue risks

In this section we illustrate some revenue risks inherent in the proposed system. Figure 4 illustrates what would have happened with the present value of revenues of the three largest coal companies if different alternatives of an RRT would have been in place. These companies pay similar royalties per ton today, but quite different CIT per ton (Figure 5). While Firm A tax liabilities would have increased in all cases with an RRT, Firms B and C would have had a significant reduction in total payments when royalties are reduced. It is hard to understand why firms with similar royalty payments per ton, and relatively similar costs of production, would pay so different CIT and RRT per ton, unless there are problems with tax enforcement that allow wide differences in transfer prices³⁵ or other accounting practices affecting reported operational margins.

Figure 5 also shows that the absence of ring fencing would not have been a serious problem in the case of Firms A and B (as they manage each essentially one large project, though through more than one subsidiary and concession contract), while it would have significantly reduced RRT and overall tax liabilities in the case of Firm C, which has several smaller projects in operation.

³⁵ In several interviews it was suggested that low transfer prices to trading companies in tax havens are a common practice in some companies.

Figure 4: Increases in Present Value of total tax payments with some RRT alternatives. Taxing Companies per subsidiary or per consolidated groups

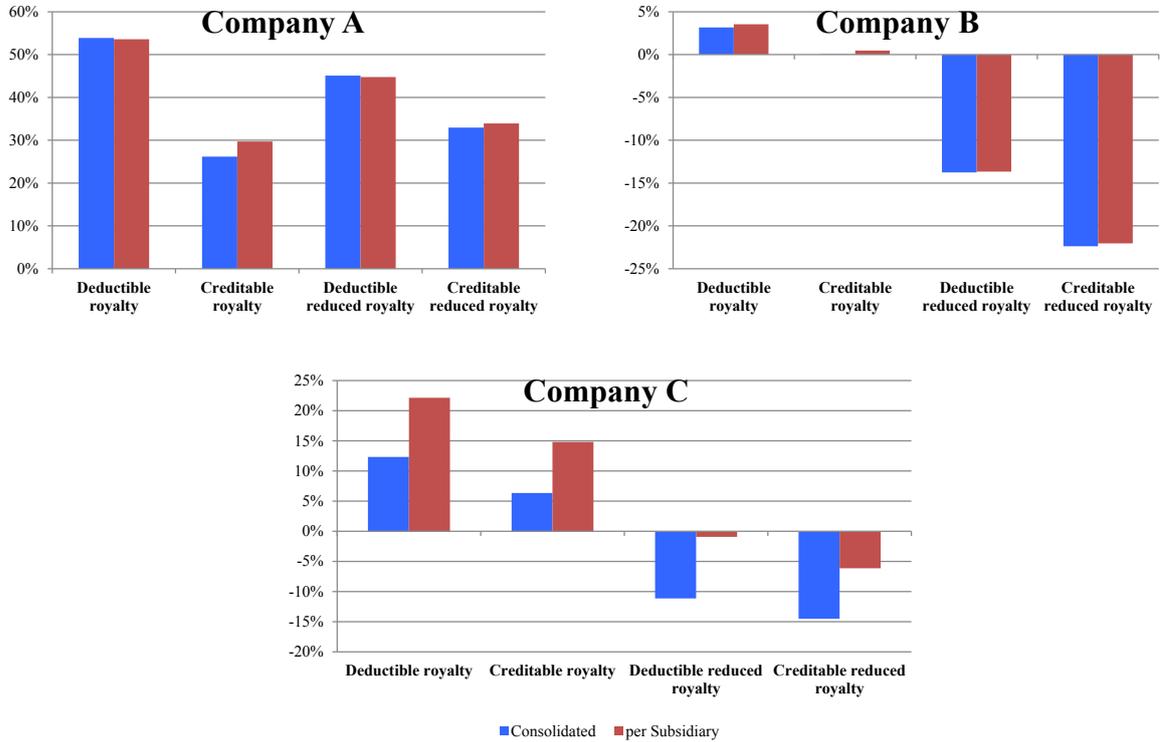
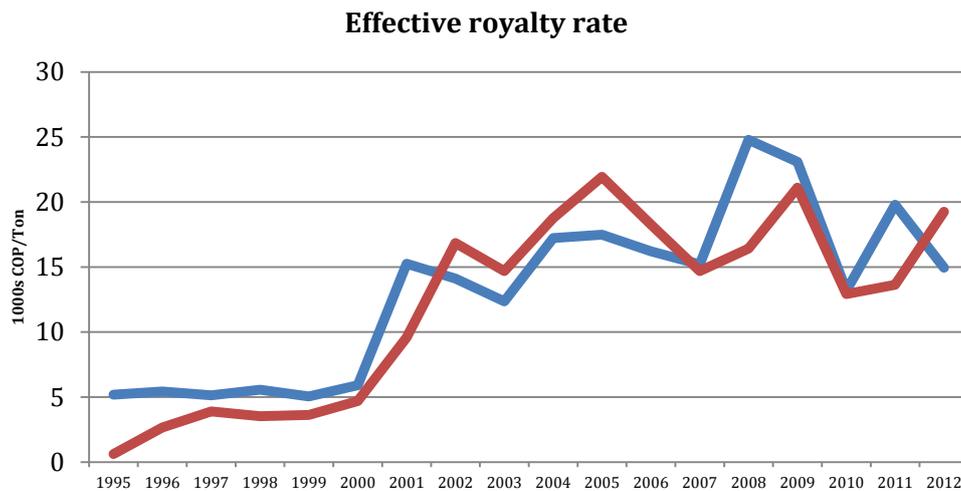
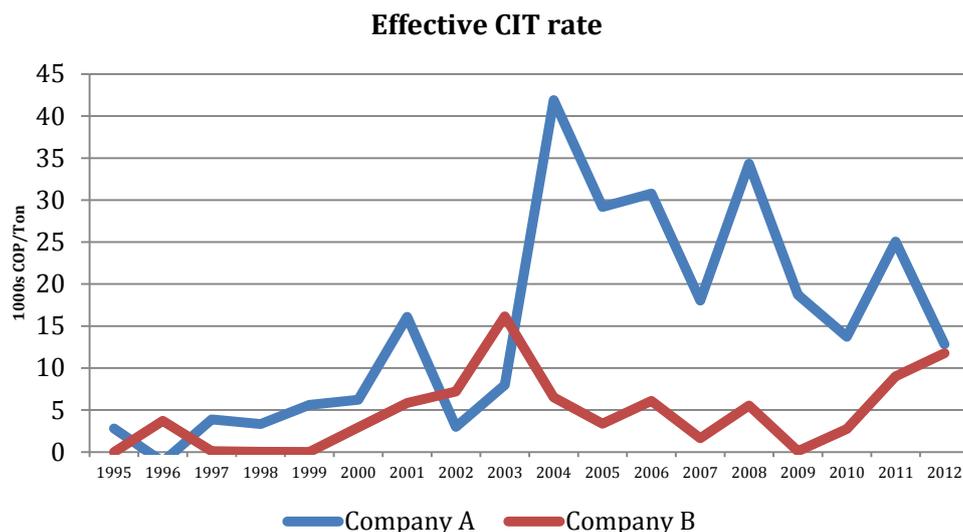


Figure 5: Effective Royalties and Corporate Income Tax per ton paid by the similar companies.





6. Conclusions and Recommendations

The main conclusion of this paper is that, by introducing a Resource Rent Tax, and reducing royalty rates to a common 5 percent across minerals, the Colombian mining tax regime could gain significantly in efficiency and in competitiveness with other mining countries, while at the same time augmenting significantly fiscal revenues during price booms (when operational margins increase sharply), especially from the most profitable mining projects. Though mining fiscal revenues would diminish in periods of low prices, it appears that such a reduction would be more than compensated by their increase in periods of high prices. A cautionary note is in order, though: the tax authority needs to be able to better control transfer pricing and other accounting practices that affect both CIT and RRT collections, as otherwise the reduction in royalties (where those problems are presently less of an issue, as discussed in Section 2) may imply a significant tax liability reduction for companies that engage in such practices.

As for RRT design issues, we would suggest that authorities consider either a 35-40 percent CIT independent RRT with fully creditable royalty payments or a 45 percent-50 percent, RRT with fully creditable royalty payments and deductible CIT payments. Both options would avoid efficiency distortions on investment across minerals and improve competitiveness with other countries, while capturing significantly higher revenues in good

times and from highly profitable mines. These two alternatives present a trade-off between efficiency/competitiveness effects (being significantly superior for the second option) and administrative/political concerns, being less significant for the first option.

Ring fencing by mining project would be desirable, as otherwise some companies may in the future significantly reduce the RRT payments from mature mines when developing new mines, which could lead to inefficient over-investment decisions and would put them in a competitive advantage vis-a-vis other companies. However, we would recommend permitting expensing of unsuccessful exploration expenditures in order to promote higher exploration investments (which may have positive informational externalities associated with them). Ring fencing by mining project would, however, complicate even further the administrative complexities of the second option discussed in the previous paragraph and raise a difficult issue in cases of large expansions of existing projects.

We would further recommend using a 'risk-free' uplift rate for accumulated RRT losses, given that, by design, the Government shares risks with private investors under an RRT regime. This said, it is likely that companies will lobby for a higher 'risk-adjusted' uplift rate, as they have done elsewhere, but the Government should be aware that such a choice is not a rational one (as explained in Section 2) and may significantly reduce RRT proceeds from new projects.

The most difficult issues in the Colombian context would be of a political economy nature, given that royalty revenues are fully allocated to subnational jurisdictions including both producing and non-producing ones. Thus, a reduction in the royalty rate could be fiercely opposed by representatives in Congress from large coal and nickel producing areas³⁶, unless the RRT proceeds are also fully allocated to subnational Governments. In the latter case, however, the National Government may not have enough incentives to push forward a reform that would be in any case politically contentious. The way out of this conundrum could be a compromise along the following lines:

- The RRT would be established as a new national levy applying only to new mining concessions. At the same time, royalty rates would be fixed at a common 5

³⁶ The royalty rate would not be lower than at present for base metals, gold and small coal mines.

percent for all new mining concessions and their proceeds would be credited against the RRT. In this way, subnational governments with large nickel and coal mines would not face a reduction of present revenues as a consequence of this legal reform. The new regime could also be applied to extensions of present concessions or expansion of their area of exploitation, by mutual agreement. In such cases, full accounting of the rent—the accumulated cash flow net of all the mining cost including all the capital investment associated with such extension or expansion should be required.

- The proceeds from the RRT would be shared between the National Government and present producing regions, as these regions have already suffered an important recent reduction in their share (since the 2011 reform) and, thus, would be the most likely to oppose the reduction of royalty rates. Moreover, most present producing regions also have potential for new mining ventures (for instance La Guajira or Cesar), and hence would be the most interested in such a sharing provision.

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