



Mineral taxes and the local public goods provision in mining communities



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ARTICLE INFO

JEL classification:

H20
H42
H70
Q32
Q34

Keywords:

Natural resources taxation
Public goods provision
Local governments
Crowding-out

ABSTRACT

Fiscal regimes to the mining industry facilitate the revenue-raising task of resource-dependent economies as they reduce the local tax burden of their residents. Whether these fiscal arrangements translate into a higher allocation of public goods in these economies remains yet unclear. We analyze the effects that local mineral taxation has on the provision of public goods in mining communities using Chile as a case study. We examine the effects of a non-distortionary tax on local concessions using a panel of 345 local governments between 2009 and 2014. To identify the effect, we compare the benefits of the tax on mining localities using two counterfactual groups of non-mining localities. We control for time-invariant and time-variant unobservable factors through both a fixed-effects and an instrumental variable fixed-effects estimator. Results show that the mineral tax increases the provision of only two out of four indicators of public goods. Further evidence suggests that local mineral taxation crowds out other local taxes.

1. Introduction

Fiscal regimes to the mining industry facilitate the revenue-raising task of resource-dependent economies as they reduce the local tax burden of their residents (Stinson, 1977). These fiscal arrangements to resource extractive industries are generally aimed at correcting for some of the negative externalities generated by the resource extraction, or at improving the allocation of public goods through targeting resource rent capture (Hughes, 1975; Emerson, 1982; Andrews-Speed and Rogers, 1999; Otto et al., 2006; Ergas and Pincus, 2014).

The existence of fiscal regimes for mineral taxation, however, is not a guarantee of a higher allocation of public goods within the hosting economies. Mineral taxation can distort optimal extraction paths compromising the flow of future benefits from these levies (Burness, 1976; Conrad and Hool, 1981; Heaps, 1985; Krautkraemer, 1990). Likewise, local governments might be tempted to diminish their efforts in collecting other taxes with a higher political cost (Dobra and Dobra, 2013); or they might fail in either capitalizing resource booms (e.g. Iverson and Maguire, 2000; Atkinson and Hamilton, 2003; Robinson et al., 2006), or managing resource-related transfers from the central government (Brollo et al., 2013; Loayza and Rigolini, 2016). Local leaders might also have fewer incentives to invest in public goods and services (e.g. Hjort, 2006; Papyrakis and Gerlagh, 2006; Caselli and Cunningham, 2009; Hong, 2014), or ultimately, the quality of national

institutions can pervert the primary goals of mineral taxation (e.g. Mehlum et al., 2006; Robinson et al., 2006; Arellano-Yanguas, 2011; Daniele, 2011; Bjorvatn et al., 2012).

This paper addresses this idea by exploring the benefits that local fiscal regimes to the mining industry generate on the local public goods provision in Chilean localities. Chile has a substantial mining sector responsible for a significant part of its economic development. Yet, concerns regarding the social costs that local communities bear due to the mining industry remain unsolved in this nation (Aroca, 2001; Aroca and Atienza, 2011; Rivera and Aroca, 2014). We build upon the current taxation scheme that this country applies to this industry to analyze the effects that a tax on mineral concessions has on the local provision of public goods in hosting communities. In doing so, this paper contributes to the understanding of the local benefits that resource extractive communities of middle-income countries get from mineral taxation.

The mineral taxation scheme used in Chile considers three different levies: a general 19% tax on profits, an *ad valorem* tax on operating income ranging from 0% to 14%, and a non-*ad valorem* property tax on mineral concessions. The latter -hereafter referred to as the “mineral tax”- is the only levy going in direct benefit of localities hosting the extraction, which by law must be allocated towards the enhancement of their residents’ welfare. We evaluate the effectiveness of this policy from the premise that the mineral tax generates no distortions on the ore extraction paths, which allows us to use a partial

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equilibrium analysis.¹ We assume that individuals do not sort across space based on the public goods provision, and therefore, the local supply of public goods is not driven by heterogeneous preferences.² Additionally, we recognize that a cost-benefit analysis is necessary to fully quantify the effects of mineral taxation on local welfare. Instead, our goal here is to identify the immediate effects that this policy instrument has on the provision of public goods as a mechanism to increasing welfare in hosting localities.

Our empirical analysis uses a panel dataset with financial information for 345 local governments from 2009 to 2014. We approximate the level of local public goods using four measures of local public expenditures -expenditures in social, cultural, and recreational activities, and in community services- for which we specify a reduced form equation as a function of the mineral tax, other local revenues, and demographic and socioeconomic characteristics, including fixed effects by local governments to control for time-invariant unobservable effects such as local leadership behavior that might confound identification. For all our econometric specifications, we apply an inertia test on local expenditures, and whenever rejected, we allow dynamics to drive the allocation process by using dynamic panel-data estimation techniques. As the existence of local taxes might not ensure an expansion of local budgets in the case of a differential incidence (Musgrave, 1959), we also explore the possibility that local mineral taxation could be working as a substitute of other local taxes. Crowding-out effects of other local taxes might expose localities to long-term liabilities if resources for clean-up, regulation, or other costs associated with mining activity are not available. We test this idea using a similar reduced form equation of crowding-out effects of the mineral tax on other local taxes.

The exogenous allocation of minerals throughout the country rules out a potential endogeneity between the location of mining firms and local inflows of the tax. Yet, unobservables can still affect local public expenditures and the amount local governments effectively collect from this and other taxes. To address this issue, the empirical strategy also considers an instrumental variable estimation that is robust to time-variant unobservable effects that might simultaneously affect expenditures and revenues. We instrument the mineral tax using the number of minibuses and pickup trucks registered at each location. After including revenues from vehicle registration fees and local governments fixed effects as explanatory variables in our second-stage equation, we have no reasons to expect any sort of correlation between our instruments and unobservables affecting our response variables.

Our identification strategy relies on the comparison of local expenditures across mining and non-mining localities. We use an exogenous rule that arbitrarily labels each locality as either mining or non-mining, based on the importance of the industry to both the

¹ Early research on the taxation of nonrenewable resources agrees on the inter-temporal distortionary effects of a property tax as it generates incentives for a forward-shifting extraction of minerals (Burness, 1976; Heaps, 1985). Later studies, however, question these distortions. Conrad and Hool (1981) show that the distortionary features of property taxes depend on the quality of the ore and its distribution within the reserve. Similarly, Krautkraemer (1990) states that property taxes do not affect transversality conditions and terminal rates of depletion whenever the value of the remaining ore at time t is zero. Thus, when fully depleted, these taxes do not affect the ore extraction path. In any case, the property tax studied here constitute a lump-sum tax whenever the taxable item (i.e. the reservoir's size) is fixed and independent of the extraction decision. In a simplified setting, decisions on the deposit dimension and whether entering the market can be taken jointly, and therefore, optimal decisions on the inter-temporal extraction levels become independent of the deposit's dimension in a static setup. The advantage of having a lump-sum tax is that it allows a direct estimation of its effect on public goods while leaving any potential distortionary consequences on the excess burden or the marginal cost of public funds out of the analysis. For more details see Ballard and Fullerton (1992).

² Previous works for Chile highlight the low migration rates in this country (Soto and Torche, 2004), and the increasing commuting patterns over time of its population (Aroca and Atienza, 2011). Among other things, this reveals the likeliness of Chile's population to live in cities where they were born, instead of having a taste-based sorting across space.

regional economy and local budgets.³ Local governments in a mining region and for which the mineral tax represents a specific proportion of local revenues are part of our treated group of mining localities that we compare against two counterfactual groups: localities in non-mining regions, and non-mining localities in mining regions. As a robustness check, we use a placebo test in which we also compare the effects of the mineral tax across the two control groups.

Results show strong evidence of positive effects of the mineral tax on two indicators of local public goods. For every dollar collected from the mineral tax there are increments of \$0.30-\$0.56 in expenditures allocated to social activities or community services, in per capita terms. In contrast, we find no evidence of effects on either cultural or recreational activities. Positive effects of mineral taxation on public expenditures in social or community services are in line with theoretical conclusions of mineral taxation as a second-best instrument aimed at pricing externalities from mining that distort social optimums in hosting localities. However, evidence of no effects on other local public goods might be suggesting a potential substitution of local taxes. Results from our crowding-out test show that the mineral tax crowds out future collections of the residential property tax. Every dollar collected out of the mineral tax crowds \$0.39 out of the residential property tax during the next period. These findings suggest that local mineral taxation do not necessarily restore material living conditions in hosting cities, but instead compensate their residents by lowering their tax burden.

Our results add to the scarce literature on the abundance of natural resources and the public goods provision at the local level. Dettman and Pepinsky (2016) analyze the effects of resource booms on local public services in Indonesian Papua, and finds no significant impacts on either health or educational services. Hong (2014) studies the local provision of public services in resource-abundant Chinese divisions, concluding that these cities provide fewer public services in education, transportation and housing construction, relative to cities with fewer resources. Our study complements Hong (2014)'s analysis by looking exclusively at the relationship between local mineral taxation, the public goods provision, and crowding-out effects of other local taxes.

The remainder of the paper is divided into five sections. Section 2 delves into the institutional specifics of the mineral tax and local governments. In Section 3 we review our data and in Section 4 we introduce the empirical approach. Section 5 explores the main results and Section 6 concludes.

2. Institutional details

2.1. The mineral tax

The 1983 National Mining Code (NMC) establishes the state ownership of all mineral deposits in Chile, and outlines the mechanisms for the concession of property rights to extractive firms by distinguishing two types of concessions (Congreso Nacional de Chile, 1983). The first one allows companies to explore ore deposits by giving them temporary property rights on the reservoirs over the entire length of the scanning process. The second one allows companies the extraction of the resource, and therefore, it grants companies full property rights not only over the land but also over all the minerals extracted from the deposit.⁴ Exploration claims have a length of up to four years, while extraction claims have an indefinite duration. Currently, a total of 31,183,231 ha is held by these concessions, equivalent to 41% of the Chilean territory (Sernageomin, 2013). Fig. 1 shows the regional evolution in the number of hectares in the

³ Chile is divided into 15 regions, 54 provinces, and 345 local governments.

⁴ The NMC also defines lower and upper bounds for exploration and extraction claims. Between 100ha (247 ac) and 5000ha (12,355 ac) can be allocated to exploration concessions, while a maximum of 10,000ha (24,710 ac) can be assigned to extraction concessions (Congreso Nacional de Chile, 1983).

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