Economics, Markets and Applications Abstracts

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High Strength Copper-Magnesium Wires

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Abstract

Targets of development of precipitation hardened Cu99Mg-wires are UTS beyond 850 MPa accompanied by high electrical conductivity of min 50 % of IACS. In addition to these basic properties demands of many applications can be fulfilled if wire and bars of such alloys are characterized by improved thermal stability in combination with practicable ductility. Based on high degrees of cold reduction processing of P-free but Zr-containing CuMg-Alloy compared to conventionally alloyed CuMgP and Corson-type alloys like magnesium containing CuNiSi reveal higher mechanical strength. Microstructure is well characterized by means of SEM Methods ECCI and EBSD. Fibre textures expressed in ODF´s of wires drawn with logarithmic deformation degrees > 2 were determined. CuMg-, CuZr-precipitates and a-Zr contribute to an increase of strength and improve softening behavior. Achieved property combinations were compared to standardized low alloyed and particle hardened Cu-materials by Ashby maps.

Mining royalties, Reserves and Production: A Framework to Assess the Impact on Copper Deposits

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Abstract

Increasing metal prices creates political pressure for countries to modify their mining tax regimes. It is common that the temporal inconsistency problem arises when managing rents from extractive industries as cycles are ubiquitous. Nevertheless, the public debate usually masks three different views on mining taxation. First, an economic efficiency view that aims to increase the value created from developing a deposit. Second, a tax collection view that aims to maximize the fiscal contribution while balancing a proper development of deposits. Third, the corrective view that expects to use tax measures to deter mining activity. Each one of these views generates different tax schemes to ensure reaching their policy goals, but usually without clarity of their full impact on mining decisions. In our paper, we develop and implement a model to put these three views in the perspective of developing a mineral deposit. We take advantage of real copper porphyry models and a pit optimization software to quantify the impact that taxation schemes have on mining decisions regarding reserves, mine size, net present value and fiscal contribution. We also assess how different costs; copper prices and ore geometries affect the investment decisions when mining royalties are placed. In this sense, our main contribution is to provide a methodological framework for policymakers to assess the impact of royalties in their countries.

Royalty design in copper mines: How mining variables affect taxation?

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Abstract

A general review from the literature of nonrenewable resource taxation is that social, economic, and political institutions are unique for every country, limiting a general approach towards the optimal design of mineral royalties. Complementary, mining variables related to location, geology and maturity of investment are distinctive of every operation and are uniquely combined in every country. In this sense, tax instruments attempting to efficiently tax Ricardian rents should take into account country level characteristics.

The main goal of this work is to analyze and quantify the impact of main mining variables on the effective tax rate in the copper industry. The main mining variables representing mining operations are related to operational costs, depreciation, and financial costs. These variables should represent different technologies, longevity, and stage of investment influence the expected government take of mining. Additionally, we expect to explore how different royalty types affect the effective tax rate in the presence of these particular mining variables. We will develop the analysis through a case study methodology, taking Chile as a reference country, estimating the effective tax rate under different tax scenarios.

The analysis contributes to make a better fit between tax instruments and mining realities, with the goal of achieving an optimal intertemporal tax design.

Productivity in the Chilean copper mining industry: review of its evolution over the last decades and specific indicators of recent years

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Abstract

The copper mining industry has historically been a pillar of the Chilean economy and its development, in terms of GDP contribution, tax revenues, exports, employment, and investment. However, its contribution relies heavily on the competitivity of companies, for which their productivity is fundamental.

Through last years, several studies have shown a strong decline of the Chilean copper mining industry's productivity. One of the most widely used methodologies for estimating productivity is the Total Factor Productivity (TFP) -or Solow residual- which explains the growth in production that is not due to the increase in related factors, such as capital and labor.

This work will estimate the TFP between 2004 and 2020 for a representative sample of the large-scale copper mining industry in Chile, including, besides work and labor, other relevant variables: energy consumption (as a proxy for the intensity in the use of the equipment), ore grade (related to the quality of the deposit), stripping ratio (as a measurement of the effort needed to extract the mineral), processed mineral (as input for production), and metallurgical recovery (as a measurement of the efficiency of the process).

Additionally, indicators of labor and equipment productivity of recent years will be calculated and analyzed.

It is expected that this works contributes to the effort for controlling and improving the productivity of the Chilean copper mining industry.