Limited evidence for mining-induced regional development

A case study on Mexico, Peru and Chile

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The question how mining affects economic development has been a topic of hot debate in both academia and policy. We investigate whether claims hold that raw material extraction activities directly and indirectly stimulate the economic performance of mining regions and their surrounding areas. A panel-structure spatial econometric model is applied that allows isolating mining-induced growth effects. Evidence from 32 Mexican, 24 Peruvian and 16 Chilean regions over the period 2008-2015 indicates that there is no general positive stimulus of mining activities on economic growth.

Global metal ore extraction has doubled within the last twenty years, largely due to China and other emerging economies becoming international economic players in the early 21st century. But not only the geographies of global material use have shifted, also the patterns of resource extraction have increasingly concentrated. Many developing countries have been integrated into the world economy as providers of raw materials and in doing so negative environmental and social effects of international consumption were peripheralised. This study therefore draws to mining economies of the Global South, selecting Mexico, Peru and Chile for our case study. According to UN IRP global material flow data [1], these three countries contributed a significant 14% share to global metal ore extraction in 2017, with Chile (7%) being the primary extractor (Figure 1).

The links between mining and regional economic development

Mining has often been related to development as a constitutional starting point of a series of economic and social changes. The assessment of its economic effects is crucial for answering urgent questions such as where and how resources are accessed and mineral revenues distributed.

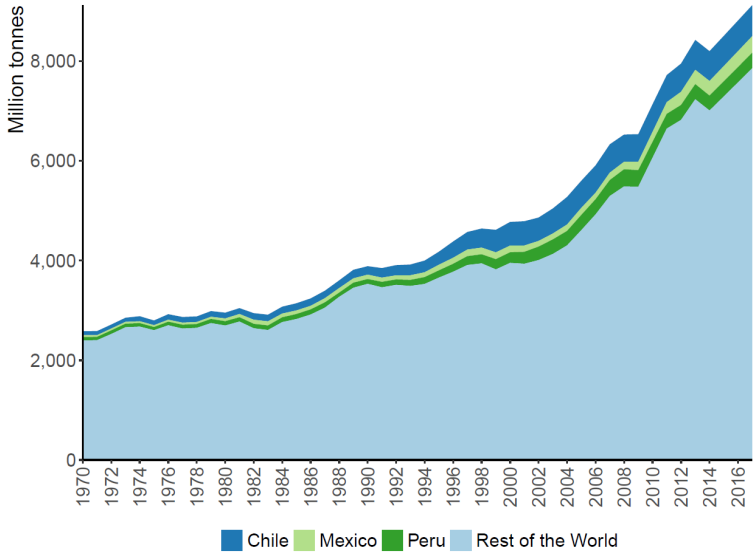

Figure 1: Global metal ore extraction 1970-2017

The question how mining affects GDP has, however, been a topic of hot debate in both academia and policy. Most prominently, it is the mining industry itself claiming that the extraction of metal ores would directly and indirectly stimulate the economic performance of mining regions and their surrounding areas [2,3]. This opinion is closely tied to the concept of mining clusters, which is centred on the idea that linkages between multinational corporations and local firms, local employment creation and knowledge spillovers are drivers of regional development. In this study, we investigate whether these claims hold.

Limited evidence that mining would drive local income

Aggregating mine-specific data on metal ore extraction [4] at the respective regional level and comparing it to short- and medium-run regional GDP growth rates [5] yields first empirical evidence regarding the relationship between mining intensity within regions and their respective economic development. Figure 2 shows that there are different dynamics in Mexican, Peruvian and Chilean regions regarding the correlation between economic growth and extraction intensity. While no clear correlation is evident for Mexico, there appears to be a negative relationship for the two Andean countries.

However, the two scatter plots only indicate correlations between two regional characteristics and do not allow drawing conclusions about causality. In order to isolate the effect of extraction intensity, we employ a panel-structure Spatial Durbin Model [6] incorporating spatial spillovers as well as potential heteroskedasticity due to country-specific characteristics in the data. The study exploits a panel of 32 Mexican, 24 Peruvian and 16 Chilean regions over the period 2008-2015. In doing so, it relates mine-specific data on extraction intensity to regional economic impacts, controlling for further growth determinants such as initial income and the regional industrial mix.

Our results do not support the existence of major causal relationships. Obtaining mainly insignificant average impact estimates, neither our short-, nor our medium-run models depict clear evidence

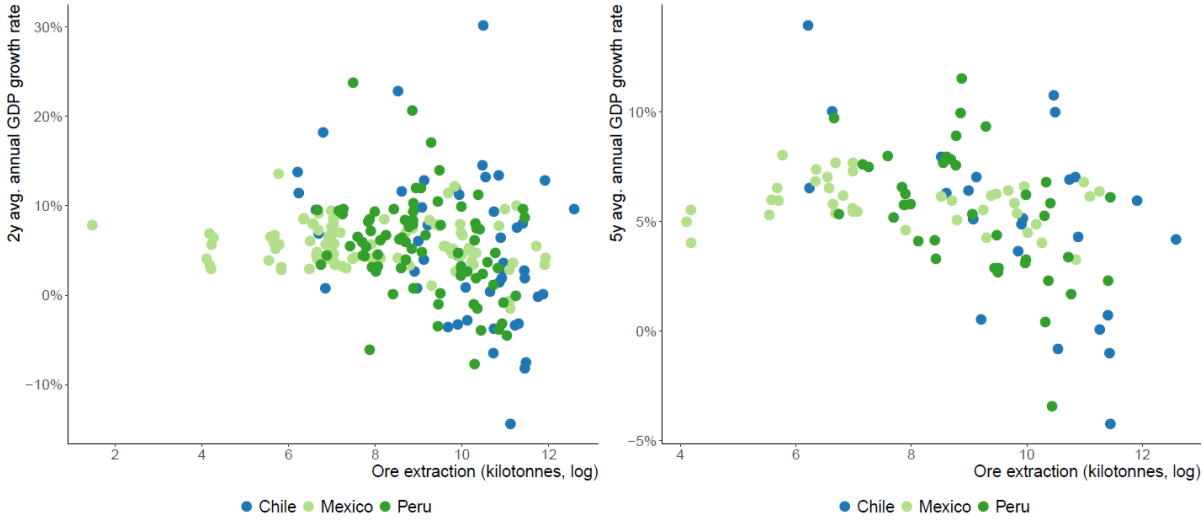

Figure 2: Sub-national aggregated ore extraction versus average annual regional GDP growth rates

that mining intensity would serve as a determinant for regional economic growth. Allowing different slopes for each country in our model, we can only find positive effects for Mexico, while our estimations for Chile and Peru yield negative but statistically insignificant coefficients. No statements can be made regarding the average mining intensity over all three countries, which is most likely due to different country characteristics and impact directions cancelling each other out. Popular arguments raised by the mining industry that the extractive sector would trigger positive impulse for regional economic development hence cannot be verified.

Capital intensity, loose links to local suppliers and profit outflows

What are the reasons that mining, which certainly proves immensely financially profitable for some multinational corporations, does not translate into regional economic growth? Our findings support narratives that mining regions themselves do not benefit from their wealth in natural resources, because on the one hand mining is considered as rather capital than labour intensive. Therefore, it does not particularly foster regional employment, thus hindering the creation of regional economic multipliers. On the other hand, multinational corporations often withdraw profits from the regional economy, instead of reinvesting them in a regional context.

The direction and extent of economic development in mining regions decisively depends on the structure of export-oriented agglomerations that are created around large-scale mining projects [7]. These structures can be either closer to what is called a mining enclave or to a mining cluster. While clusters are characterised by a broad range of local supplier firms, strong regional linkages and the development of new local industries as well as a substantial labour market and knowledge spillovers from multinational corporations to regional firms, opposite characteristics apply for mining enclaves. Ideally, mining clusters would develop since they promote regional economic development. According to our results, only Mexico tends to have managed creating clusters, while no significant dynamics of mining regions with regard to economic growth are found for regions in Peru and Chile.

Lastly, we want to stress the need for an integrated view on economic, environmental and social spheres. The global trend of rising consumption of products and services not only increasingly drives the extraction of raw materials, including that of metals and minerals, but also relates to a wide range of environmental and social concerns. This study focused on economic implications and found that no clear patterns arise that link ore extraction to regional economic development. What our empirical model does not incorporate yet is endogeneity between economic activity, environmental impacts and social dynamics. Mining activity can, for example, effect society and natural systems, which in turn has economic implications. A closer assessment of these links is a topic for future research.

Citation

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