



# OECD Mining Regions: building a network to enhance productivity and well-being

5th and 6th October 2017  
Antofagasta - Chile

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# RESEARCH QUESTION

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Do mining taxes improve the quality of life through public goods/services in mining regions?

...If they cannot, what cost mining regions are paying?

# POTENTIAL ANSWER

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- Even when mining regions receive extra compensation through mining taxes compensation, **there is not significant evidence** to support a equivalent provision of public goods than non mining regions.
- More alarmingly, urban systems shows a **negative gap** not only in standard public goods as recreational and cultural activities, but also in critical variables as public education indicators.

# MINING TAXES AND LOCAL FISCAL REVENUES

According to the Law 19.143: property tax on mineral concessions 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 (Rivera and Paredes, 2017)



|                    |  |
|--------------------|--|
| Tipo Norma         | :Ley 19143   |
| Fecha Publicación  | :17-06-1992  |
| Fecha Promulgación | :05-06-1992  |
| Organismo          | :MINISTERIO DE MINERÍA   |
| Título             | :ESTABLECE DISTRIBUCION DE INGRESOS PROVENIENTES DE LAS PATENTES DE AMPARO DE CONCESIONES MINERAS, A QUE SE REFIEREN LOS PARRAFOS 1° y 2° DEL TITULO X DEL CODIGO DE MINERIA |
| Tipo Versión       | :Única De : 01-01-1993   |
| Inicio Vigencia    | :01-01-1993  |
| Fin Vigencia       | :31-12-1992  |
| Id Norma           | :30510   |
| URL                | : <a href="https://www.leychile.cl/N?i=30510&amp;f=1993-01-01&amp;p=">https://www.leychile.cl/N?i=30510&amp;f=1993-01-01&amp;p=</a>  |

ESTABLECE DISTRIBUCION DE INGRESOS PROVENIENTES DE LAS PATENTES DE AMPARO DE CONCESIONES MINERAS, A QUE SE REFIEREN LOS PARRAFOS 1° y 2° DEL TITULO X DEL CODIGO DE MINERIA

Teniendo presente que el H. Congreso Nacional ha dado su aprobación al siguiente

Proyecto de Ley:

"Artículo único.- Una cantidad igual al producto de las patentes de amparo de las concesiones mineras, a que se refieren los Párrafos 1° y 2° del Título X del Código de Minería, que no constituyen tributos, se distribuirá entre las regiones y comunas del país en la forma que a continuación se indica:

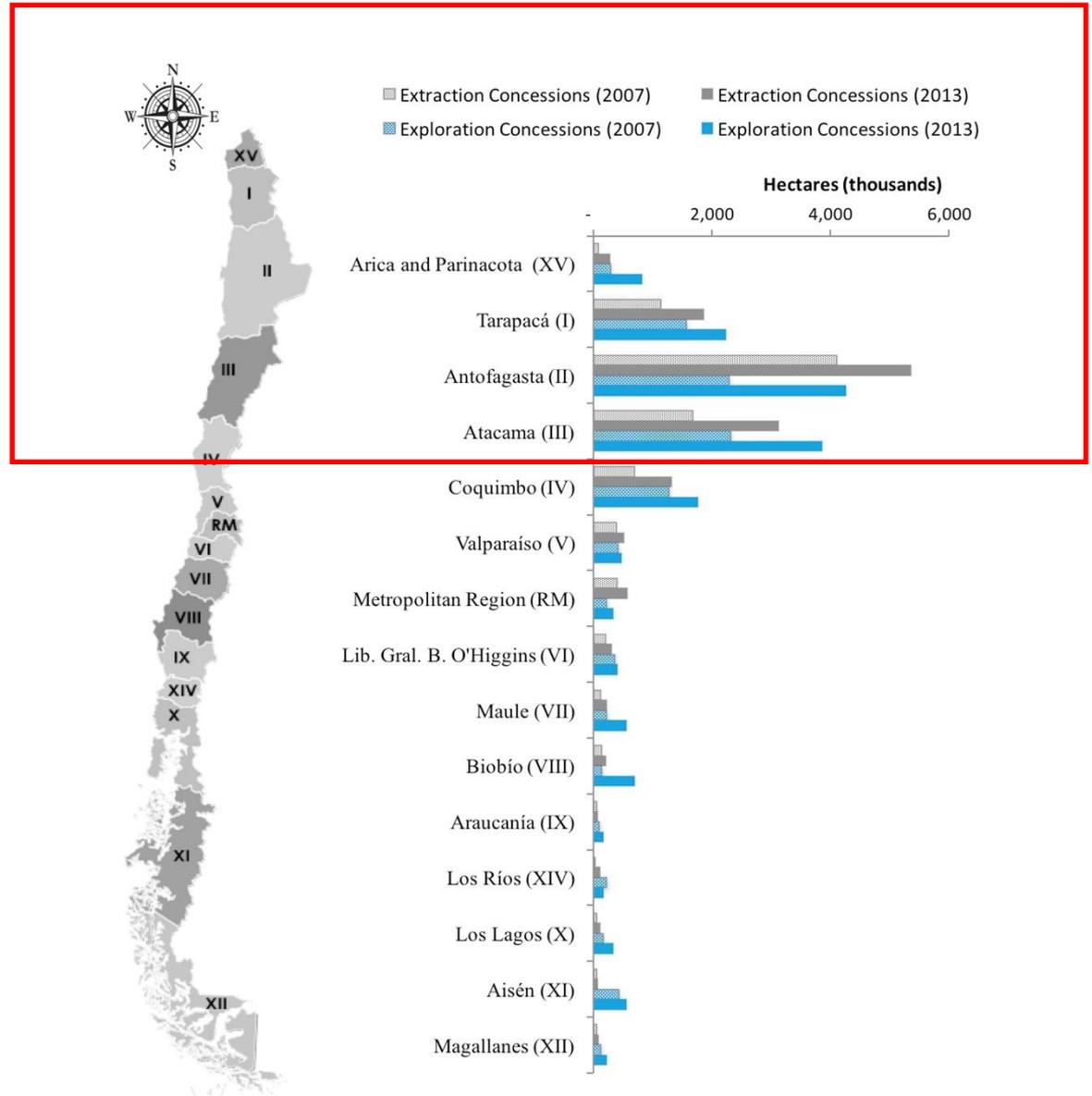
a) 50% de dicha cantidad se incorporará a la cuota del Fondo Nacional de Desarrollo Regional que anualmente le corresponda, en el Presupuesto Nacional, a la Región donde tenga su oficio el Conservador de Minas en cuyos Registros estén inscritas el acta de mensura o la sentencia constitutiva de las concesiones mineras que den origen a las patentes respectivas. y

b) El 50% restante corresponderá a las Municipalidades de las Comunas en que están ubicadas las concesiones mineras, para ser invertido en obras de desarrollo de la Comuna correspondiente. En el caso de que una concesión de exploración o una concesión de explotación se encuentre ubicada en territorio de dos o más Comunas, las respectivas Municipalidades deberán determinar, entre ellas, la proporción en que habrán de percibir la suma igual a la patente correspondiente a la concesión de exploración o a la concesión de explotación

LEY 20033  
Art. 12  
D.O. 01.07.2005  
NOTA

LEY 20033  
Art. 12  
D.O. 01.07.2005

# MINERAL CONCESSIONS BY REGION 2007-2013



# EFFECT I: MINING TAXES AND PUBLIC GOODS

“...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.

## Mineral taxes and the local public goods provision in mining communities

Dusan Paredes <sup>a</sup>, Nathaly M. Rivera <sup>b</sup>

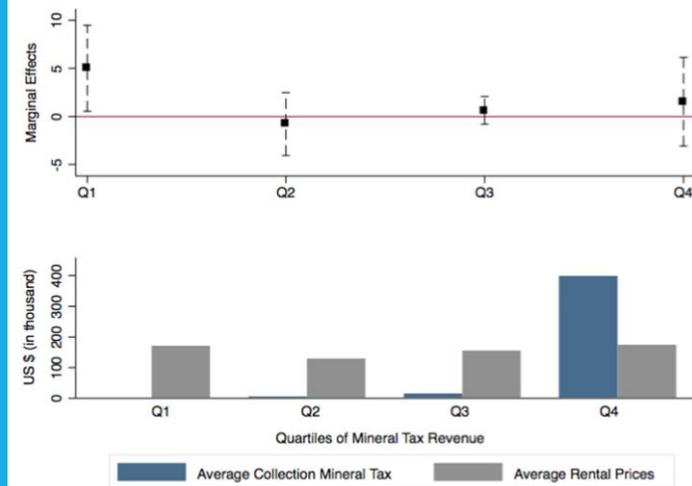
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<https://doi.org/10.1016/j.resourpol.2017.07.007>

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### Highlights

- Fiscal regimes to the mining industry reduce the tax burden of residents.
- We analyze whether these taxes increase public goods within hosting communities.
- Mineral taxation is found to positively affects the provision of some expenditures.
- Further evidence suggests the mineral tax substitute other local taxes.



# EFFECT II: MINING TAXES AND PUBLIC EDUCATION QUALITY

“...This article contributes to cover this knowledge gap with a unique experimental framework proposed by the Chilean tax system. In particular, mining law indicates that municipalities above an exogenous threshold are able to keep this extra income. We use this Regression Discontinuity Design to identify the causal effect in public education indicators of the mining communities. **Our results show that the mining municipalities these have a worse educational performance.** In addition, the levels of spending in public education are not significant, which accounts for the disadvantaged position in relation to the high dependence on extractive activities.

## Manuscript Details

**Manuscript number** JRPO\_2017\_386  
**Title** The impact of mining patents on public education: evidence for mining municipalities in Chile  
**Article type** Full Length Article

### Abstract

Chilean mining municipalities collect a mineral tax to compensate the negative externalities associated with resource extraction. This collection implies a positive marginal impact on local finance to improve the quality of life in the mining communities. However, there is not enough empirical evidence to support this causal mechanism. This article contributes to cover this knowledge gap with a unique experimental framework proposed by the Chilean tax system. Mining law indicates that municipalities above an exogenous threshold are able to keep this extra income. We use this Regression Discontinuity Design to identify the causal effect in public education indicators of the mining communities. Our results show that the mining municipalities these have a worse educational performance. In addition, the levels of spending in public education are not significant, which accounts for the disadvantaged position in relation to the high dependence on extractive activities.

**Keywords** Public education; Mining patents; Public education; Local governments.

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**Order of Authors** Mauricio Oyarzo, Dusan Paredes

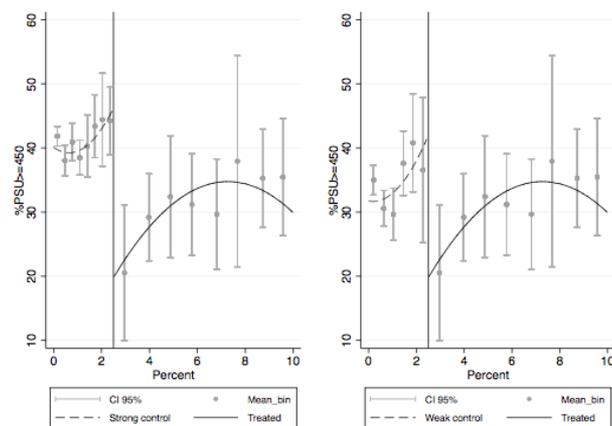


Figure 4. 2nd degree polynomial fit in % PSU ≥ 450, 2010-2016

Source: Own elaboration based on SINIM 2017.

Note: We present only information for 10% in the horizontal axis. The results for higher percent can be obtained from the authors.

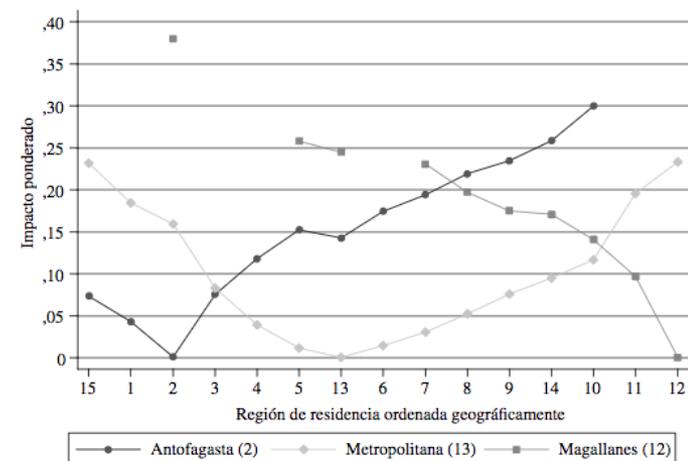
# COST I: INCREASING FLY-IN/FLY-OUT TOWARD MINING REGIONS

“...The importance of Long Distance Commuting (LDC) has increased as a result of the continuous reduction of transport costs. This paper formalizes the relationship between LDC and wage through a job search model where a commuting time variable is included. The paper proposes that LDC be compensated in wage and be increasing in distance, and that the regions which receive more commuters pay a higher premium wage. **The results suggest an average premium of 19% for LDC.** However, the applicable rate depends on the workplace location of each commuter, and thus it might be as high as 40%”

**Comutación de larga distancia en Chile:**  
**Estimando el premio por trabajar muy lejos de casa\***  
*Long distance commuting in Chile:*  
*Estimating the prize for working far away from home*

IVÁN JAMETT SASONOV\*\*  
 DUSAN PAREDES ARAYA\*\*\*

FIGURA 9  
 GRADIENTE DE SALARIOS PARA LAS REGIONES DE ANTOFAGASTA,  
 METROPOLITANA Y MAGALLANES



Fuente: Elaboración propia.

# COST II: INCREASING FLY-IN/FLY-OUT TOWARD MINING REGIONS WITH HIGH-SKILL WORKERS

“...Along with more and cheaper transportation alternatives, the use of FIFO/DIDO systems have importantly increased in last decades around the world, which has translated to FIFO/DIDO systems operating even when already established cities are present in extractive regions. This paper uses the case of Chile, one of the most important mining countries in the world, to explore whether and in what extent these labor systems influence wage compensations. **We find that FIFO/DIDO commuters obtain an average wage compensation of 2.4 per cent per commuted hour.**”

Full Article

## Wage compensation for fly-in/fly-out and drive-in/drive-out commuters\*

Dusan Paredes , Juan Soto, David A. Fleming

First published: 30 May 2017 Full publication history

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\*The authors thank the comments from referees and the Editor. Dusan Paredes acknowledge the financial support from Chilean Fondecyt grant 11121247 'Understanding income inequality persistence and its spatial dimension in Chile' and the Chilean Science Funding CONICYT 'Apoyo a la Formación de Redes Internacionales entre Centros de Investigación 2012' Redes 12- 0047. Early versions of this paper were presented at the 62nd North American Meetings of the Regional Science Association International, the 56th congress of the European Regional Science Association, and the 24th Pacific Regional Science Conference Organisation.

### Abstract

The fly-in/fly-Out (FIFO) or, drive-in/drive-out (DIDO) labour system is a long-distance commuting work arrangement to attract workers towards remote mineral or fossil fuel extraction areas, where they work in shifts and then return to their usual place of residence located in a different region. Along with more and cheaper transportation alternatives, the use of FIFO/DIDO systems have importantly increased in last decades around the world, which has translated to FIFO/DIDO systems operating even when already established cities are present in extractive regions. This paper uses the case of Chile, one of the most important mining countries in the world, to explore whether and in what extent these labor systems influence wage compensations. We find that FIFO/DIDO commuters obtain an average wage compensation of 2.4 per cent per commuted hour.

Wage compensation for FIFO/DIDO commuters

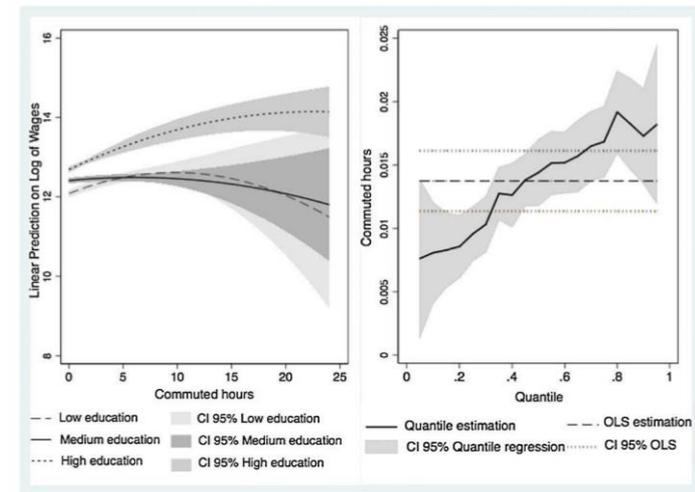


Fig. 3. Interactions effects of commuted hours by educational level and long distance commuting wage compensation  
Notes: Own elaboration based on CASEN 2009.

# COST III: LACK OF ECONOMIC INCENTIVES TO START UP AND ENTREPREUNERSHIP

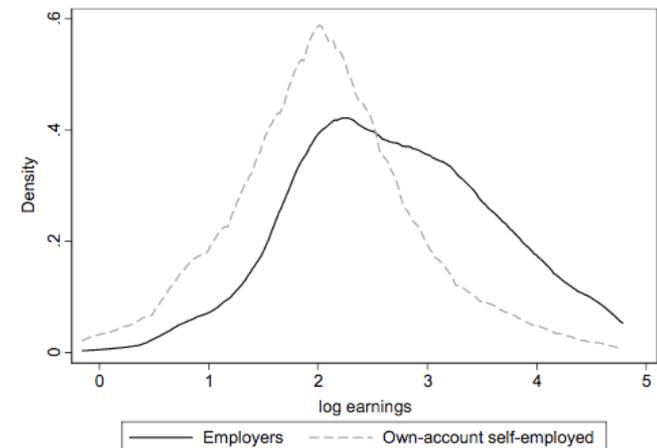
*“The results indicate that while most of the variation in these three outcomes is explained by individuals traits, place-related variables account for a non-negligible share of spatial variation. Second, as suggested by occupational choice theories, the propensity of being in self-employment positively correlates with larger expected earning differentials, but only in the case of employers. This, along with other results, suggests that while employers seem to choose their occupational status, own accounts in Chile seem to respond to factors pushing them into self-employment.”*

## Individual and place-based drivers of self-employment in Chile

Félix Modrego · Dusan Paredes · Gianni Romani



Fig. 1 Rates of self-employment out of agriculture in Chilean municipalities, 2002. Source: Authors based on the 2002 National Population Census



## A methodology to compute regional housing price index using matching estimator methods

Dusan J. C. Paredes

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© Springer-Verlag 2009

**Abstract** This paper proposes a methodology for a spatial cost index of housing that considers spatial heterogeneity in properties across regions. The index is built by combining three different techniques to reduce the spatial heterogeneity in housing: Quasi-experimental methods, hedonic prices and Fisher spatial price index. Using microdata from the Chilean survey CASEN 2006, it is shown that the quasi-experimental method called Mahalanobis metric within propensity score callipers (MMWPS) leads to a significant reduction in the potential bias. The technique matches dwellings of a particular region with other properties of similar characteristics in the benchmark region (Metropolitan region). Once the houses are matched, a hedonic price model is computed, and a regional housing price matrix is created using Fisher spatial price indices. The paper concludes the existence of price differentials for homogeneous houses across regions in Chile.

JEL Classification R21 · C43

## Substitution bias and the construction of a spatial cost of living index<sup>1</sup>

Dusan Paredes Araya,<sup>1</sup> Victor Iturra Rivera<sup>1</sup>

<sup>1</sup> Department of Economics, Universidad Católica del Norte, 0610 Avenida Angamos Antofagasta Antofagasta, 1240000 Chile (e-mail: dparedes@ucn.cl, viturra@ucn.cl)

Received: 15 June 2011 / Accepted: 4 November 2011

**Abstract.** We estimate the spatial substitution bias based on the difference between a price index (PI) and the true cost of living (COL). This bias is computed at three geographical scales, using several fixed baskets and across different expenditures quartiles. Our results show a significant substitution bias for small geographical units. The choice of the base basket is also relevant for the bias estimation. Finally, the spatial substitution bias is larger for upper side of the expenditure distribution due to the heterogeneity in the consumption basket. This exercise shows that the spatial dimension affects the construction of a price index and that the approach of fixed baskets should be carefully considered in the estimation of spatial price differentials.

JEL classification: R21, C36

**Key words:** Housing price index, axiomatic approach, Almost Ideal Demand System



CUADERNOS DE ECONOMÍA, VOL. 45 (MAYO), Nº. 129-143, 2008

## METODOLOGÍA PARA ESTIMAR UN ÍNDICE REGIONAL DE COSTO DE VIVIENDA EN CHILE\*

DUSAN PAREDES  
Universidad Católica del Norte  
PATRICIO AROCA  
Universidad Católica del Norte

*The aim of this article is to develop a methodology for a spatial or regional cost index of housing that considers spatial differentials across regions. Using microdata from the Chilean survey CASEN 2003, it is showed that a spatial or regional housing price index based on the weighted mean or the estimators of hedonic price equations might lead to biased results due to spatial heterogeneity. The potential bias is reduced by matching the houses in a region with a clone in the Metropolitan Region, according to own and neighbors' characteristics using propensity scores. As a result a very different pattern of spatial cost of housing arises. Finally, using a Fisher ideal price index, the paper proposes a spatial or regional cost index of housing that shows price differences for homogeneous houses across regions.*

JEL: R21, C43, C25

**Keywords:** Housing Cost Index, Hedonic Prices Index, Matching Estimator, Spatial Fisher Index.

# COST IV: HIGH COST OF LIVING IN MINING REGIONS

Mining regions are, at least, **20% more expensive** than no mining regions in Chile. This implies a lower purchasing power, higher probabilities for falling down poverty line and real depreciation of any public investment in this regions

## Understanding the resource curse (or blessing) across national and regional scales: Theory, empirical challenges and an application\*

David A. Fleming, Thomas G. Measham and Dusan Paredes<sup>†</sup>

The relationship between resource extraction activity and economic growth has been widely studied in the literature, and the resource curse hypotheses emerged as a theory to explain the effects of resource windfalls on national economies. However, within countries, resource booms and busts can have distinctive effects across local economies, as extractive regions face particular economic consequences unlikely to be observed in nonresource regions. Empirically, most studies analysing the resource curse have relied on cross-country models to estimate effects and inform policy; however, the use of regional – within-country – analysis has gained attention from scholars lately, promoted by two advantages: it avoids unobserved country heterogeneities confounding economic outcomes caused by resources and exploits the subnational quasi-natural experimental conditions generated by endowments. This paper contributes to the resource curse literature by discussing its theoretical causes across scale (regional vs. national effects) and highlighting the empirical challenges involved in the analysis of mining economic impacts across regions. We complement the discussions by econometrically modelling economic growth across nonmetropolitan substate regions of Australia during a period of resource windfalls, finding that in most cases, resources have been a blessing for local economies, although negative effects have also been experienced in parts of the country.

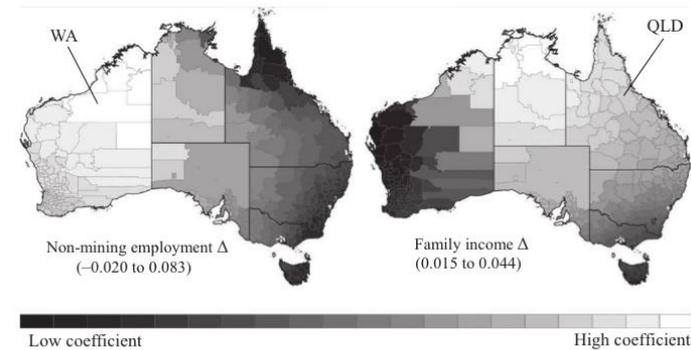
**Key words:** Australia, economic growth, mining boom, natural resource curse, nonrenewable resources, regional development.

# COST V: RESOURCE CURSE AND HETEROGENOUS REGIONAL EFFECTS

“...This paper contributes to the resource curse literature by discussing its theoretical causes across scale (regional vs. national effects) and highlighting the empirical challenges involved in the analysis of mining economic impacts across regions. We complement the discussions by econometrically modelling economic growth across nonmetropolitan substate regions of Australia during a period of resource windfalls, **finding that in most cases, resources have been a blessing for local economies, although negative effects have also been experienced in parts of the country**”

Regional resource curse

635



**Figure 2** Geographically weighted regression (GWR) coefficients of mining employment change in the nonmining employment and family income growth models. Note: Parentheses show ranges of coefficients.

# POLICY DISCUSSION

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- Tax mining collection enough to assure a better quality of governance in local mining counties?
- Is necessary a higher transference from national to local municipalities?
- Is the current institutional design providing the right incentives avoiding substitution effects?



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