

Is There Evidence for a Subnational Resource Curse?

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SUMMARY

This paper examines the evidence of a subnational resource curse. Natural resource extraction can have positive effects, generating profits, tax revenue for government, and economic linkages to other sectors. In contrast, extraction can also have negative economic, environmental and social consequences, including changes in local relative prices that might crowd out other productive activities; deforestation; pollution and degradation; and the potential for social dislocation and displacement. This paper evaluates the evidence for how these effects accrue to the subnational economy and whether government policy can lead to positive development impacts while balancing the challenge of costs borne locally.

There is limited evidence to show a net negative economic impact at the subnational level—there does not appear to be a “subnational resource curse.” However, most studies reviewed engage in a partial analysis, focusing on one or several channels of effect. Here, the evidence points to both positive and negative effects of extraction borne at different levels and by different groups. For instance, profits and taxes often accrue outside resource-rich regions, whereas many of the negative effects, such as the project environmental footprint, are spatially concentrated. There are, therefore, important questions about the ability of governments to mitigate harm while maximizing development benefits from extraction, and furthermore how government can manage distributional consequences.

Studies point to a potential danger of large transfers to local government, including increasing public spending, creating local price inflation and crowding out traded sectors from resource-rich regions. Taken together, there appears risk of a potential “Peruvian disease”—a term we coin for the effects of a booming public sector on the local economy, as a corollary to the macroeconomic “Dutch disease” arising from the booming resource sector.

INTRODUCTION

Investigations on the existence of a resource curse or blessing have typically examined overall national experiences and cross-country comparisons of GDP and growth rates. A growing body of literature now seeks to understand the within-country effects of resource extraction and to examine whether there exists an equivalent “subnational resource curse,” defined as an overall net negative economic impact in resource producing regions.

ABOUT THE SERIES

To help members of communities in extractive areas advance their social and economic development, NRGi is pioneering subnational approaches to planning and management of natural resource wealth. To learn more please visit: resourcegovernance.org/subnational.

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This paper examines this question critically and seeks to draw out the policy implications and a future research agenda.

Extraction projects can generate positive economic spillovers—sometimes in the form of local jobs or increased demand for goods and services—and generate profits and government revenues that can spur other forms of economic activity. The magnitude of these effects relative to the scale of investment or rents generated by projects themselves is still unclear. While citizens typically expect sizeable local spillover effects, the projects are characterized by capital intensity and enclave models of operation. Therefore, the chief source of benefits at a national level are typically profits—which accrue to (often-remote) shareholders as well as taxes, accruing mostly to central government.

Concerning regional effects, the primary channels identified include investment spillovers and backward and forward market linkages, as well as fiscal transfers to local government. The evidence for positive effects of the latter appears mixed. Revenues accruing at a regional level may support improved regional economic performance if the regional government spends them effectively, but early studies suggest that mismanagement may hamper this goal. The studies raise questions about the ability of local government to spend large flows of natural resource revenue effectively, or whether they may be channeled into wasteful capital projects and bloated public sector payrolls, precipitating a crowding out of private activity.

Beyond economic channels the picture is even less rosy. Studies indicate that the environmental and social consequences of resource extraction can be negative, while a disproportionate burden of the costs may be borne locally. Pollution from mining may lower agricultural productivity and reduce the welfare of proximate residents. Furthermore, projects can concentrate negative social effects such as prostitution, the spread of HIV and other sexually transmitted diseases or an increase in crime rates in producing towns.

Overall, there appears insufficient evidence to support the existence of a subnational resource curse, defined as an overall net negative economic impact in resource-producing regions. There is, however, little doubt that many of the costs of extraction—typically environmental or social—accrue mostly locally, and their effects can be most severe when these areas are rural, poor, or confronted by limited public good provision or compensating financial flows. On the other hand, there is evidence for strong positive economic spillover effects in resource-producing regions. When coupled with the significant rents and economic returns extraction can generate nationally, governments may be equipped with the resources to mitigate, manage and redress the costs of extraction borne by the “losers,” often those most proximate to extraction. The challenge comes in ensuring this process is managed effectively.

There are various policy implications that stem from the findings reviewed in this paper. First, enclave capital-intensive projects offer few opportunities for large-scale job creation, even with strong local employment requirements, although a shift to local procurement appears to yield modest welfare gains for very large mines.

Second, local government may struggle to manage resource revenues effectively or ensure they don't go missing. Caution should therefore be exercised in the design of any revenue-decentralization policies, in particular those favoring resource-rich regions. Attention should particularly be paid to the potential magnitude of transfers, local government's capacity to spend, and the distributional consequences for the rest of the country.

There is limited evidence to show a net negative economic impact at the subnational level—there does not appear to be a “subnational resource curse.”

Third, tax revenue remains a key source of potential benefits for a nation arising from extraction. However, taxes typically accrue to central government. Important questions remain about spending priorities and their effectiveness, including how well governments can manage the expectations of residents in resource-rich regions who may seek a disproportionate share of the revenues (and therefore benefits) at the expense of spending choices that might yield a higher social rate of return.

Fourth, negative impacts at the local level, particularly impacts that are environmental and social in character, create a strong imperative for careful mitigation practices. If handled poorly, governments may come under pressure to apply revenue sharing policies that favor resource-rich regions to the detriment of otherwise important public good provisions or redistributive objectives. This can be because favoring resource-producing regions in terms of fiscal transfers can be seen to compensate for failing to redress damages directly. However, it can overwhelm local government, thus reducing spending efficiency and undermining other objectives, such as favoring income-poor regions or seeking out spending options with high social rates of return.

After providing a background and definition of the “subnational resource curse” in the following section, we then review the literature on the diverse impacts of extraction at the subnational level, summarize the main findings, and discuss what the evidence from these works tells us about the existence of a subnational resource curse. Next, we consider the mechanisms that might explain why some localities face symptoms of the curse, according to evidence from existing literature. Then we explore the public policies that could prevent or address these mechanisms of the “subnational resource curse.” The final section considers the remaining research gaps.

BACKGROUND

Whether natural resource wealth can have a negative impact on economic growth and development is fiercely debated in the literature. The so-called “resource curse” has been investigated by a large number of empirical studies conducted since the 1980s.¹ These studies have proposed a variety of potential mechanisms through which resource wealth may negatively affect a country’s economic performance, including the adverse macroeconomic consequences of resource extraction and trade, real exchange rate appreciation and deindustrialization, political rent-seeking, corruption, and mismanagement of government revenues, among others.²

However, the existence and inevitability of a resource curse is still an open question. Data shows that not all resource-rich countries perform worse than resource-poor ones,³ while other studies focus on how some countries have significantly benefitted from resource windfalls, such as the United States.⁴ Some studies argue that institutional quality determines whether a country will fail to benefit from its resource wealth.⁵

- 1 Sachs, J. D., and Warner, A. M. *Natural resource abundance and economic growth*, NBER Working Paper 5398. (National Bureau of Economic Research, 49, 1995). Auty, R.M. *Resource abundance and economic development*. (Oxford University Press, 2001). Papyrakis, E., and Gerlagh, R. “The resource curse hypothesis and its transmission channels,” *Journal of Comparative Economics* 32.1, (2004): 181-193.
- 2 For a detailed overview of the potential causes of the resource curse identified by existing studies, see Van der Ploeg, F. “Natural resources: curse or blessing?” *Journal of Economic Literature*, 492 (2011): 366-420.
- 3 Alexeev, M., and Conrad, R. “The elusive curse of oil,” *The Review of Economics and Statistics*, 91.3, (2009): 586–598.
- 4 Michaels, G. “The long term consequences of resource-based specialization,” *The Economic Journal*, 121.551 (2001): 31-57.
- 5 Collier, P., and Goderis, B. “Commodity prices, growth, and the natural resource curse: reconciling a conundrum,” CSAE Working Paper Series (University of Oxford, 2007).

The mechanisms of the hypothesized resource curse are typically characterized as macroeconomic phenomena, manifesting through price volatility, real exchange rate appreciation and deindustrialization; or linked closely to the governance of the whole country, manifesting through rent-seeking, elite capture, corruption and civil conflict. To date, most research has focused on aggregate or cross-country experiences.

However, new studies examine the consequences of resource wealth for the local economy, either via the uneven distribution of costs and benefits, or as potential channels for symptoms of the resource curse at the national level. Indeed, some causes of the resource curse could be avoided by the national government, but may happen anyway as a consequence of local governments' actions in areas where resources are exploited.⁶ This effect is likely to be compounded when resource wealth is geographically concentrated or where fiscal transfers return a proportion of rents to governments of resource-rich regions.

Why study the existence of a subnational resource curse?

Studies of within-country effects of resource wealth can help guide policymaking in several ways.

First, the effects of resource wealth are of policy interest due to its scale. The extraction of oil, gas and mineral resources is associated with spatially concentrated production that can have significant consequences for the locality where it occurs. Extractive projects can generate high inflows of capital and labor, significant revenue and profit generation, and the potential for social and environmental damage. Furthermore, resource booms can create high expectations among local residents of improved economic conditions, thus increasing the political pressure for job creation and revenue distribution to resource-rich regions. Companies can also come under intense scrutiny from local populations and shareholders to deliver benefits beyond the mine-gate. Historical accounts of gold rush towns and oil rich regions demonstrate the profound changes in economic activity that can be prompted by resource wealth. However, such accounts leave open the question as to whether long-term consequences are likely to be positive or negative.

Second, there are specific policy considerations around the trend toward greater fiscal federalism or decentralization. Momentum for fiscal federalism is particularly acute in resource-rich countries where political bargaining often focuses on the sharing of government revenues from resources. Governments must therefore grapple with questions about how to decentralize, and the potential consequences of returning a share of resource revenues to local government in resource-rich regions. In Latin America, Indonesia and Nigeria, for example, these trends have been in place for over a decade.

Third, resource wealth can help tackle spatial and income inequality. Increasing evidence suggests that within-country effects of resource wealth can give rise to divergent outcomes and may form an important transmission channel for any aggregate resource curse. The interaction of resource wealth and decentralized fiscal autonomy can exacerbate divergent regional growth experiences. Governments need to understand these interactions to either mitigate them or grasp the consequences of political bargains that favor resource-rich regions over resource-poor regions.

6 van der Ploeg, F. "Natural resources: Curse or blessing?" (2011).

In addition to the underlying policy motivations for studies on the effects of resource wealth within countries, new data and methodological techniques have made robust empirical examination of these questions possible. The preponderance of cross-country comparative studies has associated limitations in terms of validity of identification and the robustness of any causal inference from patterns in the data. Within-country studies of the resource curse have advantages. For example, they can allow for comparison within the same broad institutional setting and constant variation arising from cross-country difference including data collection approaches, and look at different political and historical contexts, as well as other unobserved factors such as cultural traits. Furthermore, they allow us to examine disaggregate mechanisms by which resources affect economic development heretofore hard to examine.

What is the subnational resource curse (or blessing)?

A broad definition of the resource curse, including its effects at the subnational level, is described as “*the whole set of unintended consequences that originate from resource extraction activity and trade that can end up negatively affecting the economic development of regions hosting the resources extraction industry or the entire country.*”⁷

This definition is a useful starting point to consider the various impacts or consequences of the activity itself, including socioeconomic impacts on the economy (such as migration) and environmental impacts that affect the economic development of the area. Consideration of the wide range of potential effects and the evidence are reviewed through the lens of a “net negative” economic impact. One notable drawback to this approach is that not all effects of extraction will manifest in changes in GDP or economic welfare. Future research is required to produce more holistic accounting for costs and benefits. However, the analysis presented here is restricted to effects ultimately measurable in economic terms.

The second important distinction in this study from the conventional “resource curse” definition is the concern with within-country effects of resource extraction, regardless of whether they add up to a net negative effect at the national level or not. Instead, the concern here is whether the impact to the region of study is a net negative, looking across a variety of economic, social and environmental factors. This would imply that for a subnational resource curse to exist, any economic gains are more than offset by economic damage, social disharmony or environmental harm that manifest in the local economic performance. Furthermore, it would imply that resource-rich regions perform worse than the overall trend for the country—in other words, that resource extraction is shown to do overall economic harm at the subnational level.

The costs and benefits of extraction at the subnational level can accrue in several ways: via direct project-level channels such as pollution or employment, via revenue transfers to local government, via regional favoritism in spending policies, or by spillovers from resource-related investments. The effects could increase regional disparities, create localized welfare losses, or otherwise damage economic development.

The three channels through which extraction has an impact on resource-rich regions, are: via the extraction activity, via the revenues generated by the extraction which are spent at the subnational level, and via regional spillovers.

7 Measham, T.G., and Fleming, D.A. “Disentangling the natural resources curse: National and regional socioeconomic impacts of resource windfalls,” paper presented at the Agricultural and Applied Economics Association 2013 Annual Meeting, (Washington, DC, 2013).

OVERVIEW OF EXISTING LITERATURE ON SUBNATIONAL IMPACTS OF MINING AND HYDROCARBON PROJECTS

There are several ways in which extractive projects can have an impact on subnational regions. These impacts can be categorized according to the source or channels of impact: the direct impacts of the projects, the indirect impacts from the spending of resource revenues (often by subnational governments) and finally the regional spillovers from producing to other regions, including infrastructure and other supply side responses to resource wealth.

Each of these sources can cause positive or negative impacts to subnational areas. This paper describes these impacts and the factors that explain impacts at the subnational level. From the literature review presented in this section, different types of impacts have been identified. These relate to the changes in outcomes evaluated by the different studies included in the literature review. In particular, there are impacts on the economic growth of subnational areas, impacts on welfare indicators and public service provision, impacts on subnational labor markets and on conflicts, among others.

The literature review categorizes by the source of impact. This approach is taken because one objective of this paper is to disentangle the effects of each source of impacts, thus showing the most adequate policies to target each of them.

Direct impacts: socioeconomic effects of activities of mining and hydrocarbon projects

In this study, direct impacts refer to the effects that take place as a result of the extractive project activities. This includes job creation, purchases from local companies and social spending by companies for the local communities, among others.

The impacts of extractive projects on local areas around a mine or oil field have been extensively written about in case studies, which describe the effects on local economies as well as social and environmental impacts. Examples of such studies include those produced by the International Council on Mining and Metals (ICMM) in different mining areas. They carry out “close-up” studies of particular projects and their impact on the region where they are located. These studies have been conducted in Chile (the region of Antofagasta), Brazil (the region of Sudeste do Pará) and Peru (the region of Ancash).⁸ They describe impacts such as poverty reduction and indirect employment (direct employment is found to be limited), as well as negative impacts consistent with “booming town effects” such as increased prices of local consumption goods, increased crime rates and prostitution, among others. Similar impacts are described for the oil and mineral producing regions in Colombia, where inflation, unemployment and inequality is found to be higher than in non-producing regions.⁹

Extractive projects can affect subnational regions through impacts on the economic growth of subnational areas, welfare indicators and public service provision, subnational labor markets and conflicts.

8 See ICMM Case Studies: “Chile: The challenge of mineral wealth: using resource endowments to foster sustainable development”, (2007), and “O setor de mineração no Brasil: fortalecimento institucional para o desenvolvimento sustentável”, (2013).

9 Bejarano, E. *Minería y Petróleo: Del Daño Al Riesgo y Del Riesgo a Una Oportunidad Estratégica De Cambio*. Bogotá, Colombia: Fundación (AVINA, 2015).

The largest number of case studies assessing the impact of different projects at the local level have been developed in Australia.¹⁰ These studies provide evidence of both positive and negative socioeconomic effects of extraction, especially with regards to increases in local income and employment and increased dynamism of small businesses, as well as housing-related problems and health issues.

In general, case studies that look at the areas surrounding extraction sites provide evidence of positive economic impacts in the form of increased household income, employment and backward linkages with local businesses. However, few studies have been able to separate the impacts of migrants moving to the area because of perceived opportunities of extraction, versus the impact on those local to the area already. The negative impacts surveyed in these studies relate more to social and environmental impacts (e.g., crime, prostitution, pollution of soil, water). However, the results of this kind of study are specific to the area and context of the mining or hydrocarbon project of interest and are therefore not adequate to make generalizations about the existence of a resource curse at the local level or any other causal inferences.

A growing number of research papers have sought to use a variety of econometric techniques and new datasets to assess the within-country effects of resource extraction more systematically.¹¹ Many of the existing comparative works on the subnational effects of resource extraction come from the United States and Canada and focus more widely on the state or county level, not just the mine's close surroundings. Various studies provide evidence for poor economic performance in resource-rich regions.¹² Analysis of panel data available for the 50 U.S. states and over 3,000 counties shows that resource extraction has a negative impact on subnational economic growth. A more recent study uses a U.S. county level panel dataset of oil and gas production to find growth rates in producer counties increases less than those in non-producer counties, also pointing to a resource curse at the county level.¹³ On the other hand, other papers have not found evidence of negative effects of extraction at the county and state level.¹⁴ Indeed, Michaels (2011) finds evidence that oil booms have long term agglomeration benefits to resource producing counties, even after oil production has ceased.¹⁵

- 10 See: Rolfe, J., Ivanova, G. and Lockie, S. *Assessing the social and economic impacts of coal mining on communities in the Bowen Basin: summary and recommendations*, Rockhampton, Bowen Basin Mining Research Communities Exchange (Central Queensland University, 2006). Rolfe, J., Miles, B., Lockie, S., and Ivanova, G. "Lessons from the social and economic impacts of the mining boom in the Bowen Basin 2004-2006", *The Australasian Journal of Regional Studies*, 13.2 (2007): 134. Brereton, D., C. Moran, et al. "Assessing the cumulative impacts of mining on regional communities: an exploratory study of coal mining in the Muswellbrook area of New South Wales," Brisbane, Centre for Social Responsibility in Mining, Centre for Water in the Minerals Industry, (University of Queensland, 2008). Mayes, R. "Living the resources boom: toward sustainable rural communities," Working Paper Series, Issue 11, Perth, Western Australia: Alcoa Foundations Conservation and Sustainability Fellowship Program, (Curtin University of Technology, 2008). Evans, N., and Sawyer, J. "The mining boom: challenges and opportunities for small business in regional South Australia," *The Australasian Journal of Regional Studies*, 15.3 (2009): 355. Measham, T.G., and Fleming, D.A. "Disentangling the natural resources curse: national and regional socioeconomic impacts of resource windfalls," (2013).
- 11 Cust, J., and Poelhekke, S. "The local economic impacts of natural resource extraction," *Annual Review of Resource Economics*, Vol. 7, (2015).
- 12 For example, Papyrakis, E., and Gerlagh, R. "Resource windfalls, investment, and long-term income," *Resources Policy*, 31, (2006): 117-128. James, A., and Aadland, D. "The curse of natural resources: an empirical investigation of U.S. counties," *Resource and Energy Economics*. 33 (2011): 440-453.
- 13 Allcott, H., and Keniston, D. *Dutch disease or Agglomeration? The local economic effects of natural resource booms in modern America*, NBER working paper 20508, (2014).
- 14 Boyce, John R., and J. C. Herbert Emery. "Is a negative correlation between resource abundance and growth sufficient evidence that there is a "resource curse"?" *Resources Policy* 36.1 (2011): 1-13. Michaels, G. "The long term consequences of resource-based specialization," (2011).
- 15 Michaels, G. "The long term consequences of resource-based specialization," (2011).

Within country effects in the U.S. are not conclusively positive or negative, but there is mixed evidence. In contrast, studies in Australia find a positive impact of resource extraction. Evidence suggests mineral wealth has improved socioeconomic indicators, including regional income in several regions.¹⁶

In Canada, research on the subnational resource curse has focused on a particular channel through which resource extraction affects economic performance of Canadian regions: a subnational manifestation of the Dutch disease. Indeed, in resource-rich regions, the booming sector (the extractive sector) may displace the tradable goods sector. Several studies look at the existence of a Dutch disease across federations and provinces in Canada and whether factor mobility, mainly interprovincial or international migration of workers, can mitigate or reverse these symptoms.¹⁷ These studies find that Dutch disease mechanisms also take place at the regional level and that inflow of migrants mitigates this effect. This is because migrant workers ease pressure on relative prices; for example they can meet the labor demand from other economic sectors that would otherwise face labor shortages when workers move to the extractive sector that pays higher wages. It is important to note however that it is ambiguous whether the long-run implications of the regional variant of Dutch disease of the kind examined here are negative. As Corden and Neary theorize, Dutch disease harms economic performance under circumstances where it reduces the competitiveness of productivity-enhancing exporting industry and therefore can displace it from the country.¹⁸ Under the regional variant, if resource wealth causes exporting industry to merely relocate to neighboring regions the overall national economic consequences of this crowding-out are unclear and could even be positive.

Looking beyond the U.S., Australia and Canada, the picture is similarly mixed. A cross-province study in China also tackles the issue of the Dutch disease at the subnational level. Through a panel data set of Chinese provinces, Xiaobo Zhang et al. show, “Chinese provinces with abundant resources perform worse than their resource-poor counterparts in terms of per capita consumption growth.”¹⁹ They argue that one of the transmission channels is a variant of the Dutch disease, manifested at the provincial level, since they find a rise in the local prices of non-tradable goods as a result of the resource boom and damage to the competitiveness of local firms. They also identify the system of property rights on natural resources as a relevant transmission channel, which implies that “most gains from the resource boom have been captured either by the government or state owned enterprises.” In other words, the system of property rights – the Chinese state has the exclusive property rights over natural resources, as well as the fact that the state-owned companies exploit the major projects – has led to a situation where revenues generated by the extraction of natural resources have not been shared with local populations and extraction has not resulted in increased local consumption or income. Separate evidence shows a resource curse in Chinese producing provinces and crowding out of R&D and education expenditures as the channel that leads to lower economic growth in these provinces.²⁰

16 Hajkowicz, Stefan A., Heyenga, Sonja and Moffat, Kieren. “The relationship between mining and socio-economic wellbeing in Australia’s regions”, *Resources Policy*, 36, issue 1, (2011): 30-38.

17 Beine, M., Coulombe, S., and Vermeulen, W.N. “Dutch disease and the mitigation effect of migration: evidence from Canadian provinces” *The Economic Journal*, (2014).

Raveh, O. “Dutch disease. Factor mobility, and the Alberta Effect: the case of federations” *Canadian Journal of Economics*, 464, (2012): 1317–50.

18 Corden, W. M. and Neary, J.P. “Booming sector and de-industrialisation in a small open economy” *The Economic Journal*, Vol. 92, No. 368, (1982): 825-848.

19 Zhang, X., Xing, L., Fan, S., and Luo, X. *Resource abundance and regional development in China*. IFPRI Discussion Paper 00713, (2007).

20 Zuo, N., and J. Schieffer. “Are resources a curse? An investigation of Chinese provinces,” Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting 2014, (Texas, 2014).

In Peru, a growing number of studies have found evidence of a positive impact of mining activities on family incomes and expenditures at the local (district) level, but no significant impact on other welfare indicators.²¹ More recently and with new census data available, Ticci and Escobal argue that “populations living in new and non-mining areas have experienced no statistically different changes in welfare and housing conditions and in access to basic services.”²² Other studies have found that the positive impact on income is restricted to urban districts, but not on rural districts²³, while others find it is significant in districts near the mine, but fade as districts get farther away from the mine.²⁴ Another interesting finding of this research is that mining has increased inequality across and within districts in Peru. This was also a result in Australia, although in the Australian case inequality initially increased, but then decreased as the level of mining activity became higher.²⁵

Among the studies of single projects, the most prominent in the literature is the study of Newmont’s Yanacocha mineral project in northern Peru.²⁶ The paper investigates whether gold extraction benefits local communities in the region of Cajamarca in districts near the site of extraction and others further away. The authors also explore the economic mechanisms through which benefits accrue. They find a positive relationship between the mine and real income levels of the local population and identify the mine’s demand of local inputs as the main transmission channel.

Elsewhere, this approach is extended to examine the economic footprint of industrial mines across Indonesia, finding on average a 15-kilometer economic radius of effect, with a shift to service sector employment—and away from traded manufacturing and agriculture—in response to a resource boom.²⁷ This shift is also found to take place in mining communities in Africa where both men and women leave the agricultural sector and shift to manual labor and service sector employment.²⁸

In India, Asher and Novosad find that districts with abundant mineral resources have smaller manufacturing and retail sectors.²⁹ However, when they study the effect of mineral price booms, they find that they lead to growth in all sectors of the economy within a 50-kilometer radius of the mining site, which would contradict the existence of localized Dutch disease. However, in a smaller radius, price booms are found to cause declines in the service sector, but growth in the agricultural sector.

In summary, as with studies at the national level, evidence of the existence of an economic resource curse at the subnational level is inconclusive. Resource projects drive some job creation and increased demand for goods and services. To the

21 Arellano-Yanguas, J. “Aggravating the resource curse: decentralization mining and conflict in Peru,” *Journal of Development Studies*. 474, (2011): 617-38.

22 Ticci, E. and Escobal, J. *Extractive Industries and Local Development in the Peruvian Highlands*. Quaderni del Dipartimento di Economia Politica E Statistica n. 693. (Università di Siena, 2013).

23 Zegarra, E., Orihuea, J.C, and Paredes, M. *¿Minería y economía de los hogares en la sierra peruana: impactos y espacios de conflicto*. Documentos de Investigación dt51, Grupo de Análisis para el Desarrollo (GRADE), (2007).

24 Loayza, N., Mier y Teran, A., and Rigolini, J. “Poverty, inequality, and the local natural resource curse,” (No. 7226). Discussion Paper Series, (Forschungsinstitut zur Zukunft der Arbeit, 2013).

25 Reeson, A.F., Measham, T.G., and Hosking, K. “Mining activity, income inequality and gender in regional Australia,” *Australian Journal of Agricultural and Resource*, (2012).

26 Aragón, F.M., and Rud, J.P. “Natural resources and local communities: evidence from a Peruvian gold mine,” *American Economic Journal: Economic Policy*. 5(2), (2013): 1-25.

27 Cust, J. *The spatial effects of resource extraction: mining in Indonesia*, (2015).

28 Tolonen, A and Kotsadam, A. *African mining, gender, and local employment*, World Bank Policy Research Working Paper No. 7251, (2015). <http://ssrn.com/abstract=2599860>

29 Asher, Sam and Paul Novosad. “Digging for Development: Natural resource wealth, mining booms and local economic development,” 2013.

extent that local price increases enhance the welfare of local residents, the welfare implications appear positive. However, resource-rich regions face challenges to increase their economic growth and welfare of their population and therefore divergent growth experiences are likely.

The cross regional and cross project empirical studies reviewed suggest one of the strongest mechanisms through which resource extraction positively affects subnational units is through the “spending effect,” i.e., increased local demand for labor, goods and services. However, they also find a variety of negative impacts that offset this benefit. For instance, increased migration puts pressure on public service provision and reduces coverage. Also, Dutch disease-type symptoms appear to stymie the local manufacturing or agricultural sector, in favor of increased activity in the booming resource sector and the non-traded sectors. Unlike the Dutch disease phenomena at the national level, such dynamics are not necessarily negative for a country, but instead represent a reallocation of capital and labor in response to the resource boom.

Indirect impacts: effects of resource revenue spending by subnational governments

When referring to indirect impacts, the focus is on the impacts caused by the spending of revenues from mining or hydrocarbons extraction which are spent by government. In most cases studies have focused on spending by subnational government, due to identification issues, but conceptually indirect impacts could also accrue via centralized spending choices.

As a result of the worldwide trend to decentralize fiscal revenues from mining and hydrocarbons through intergovernmental transfers or revenue sharing formulas, a number of studies on the subnational impacts of these revenues have emerged.

Latin America has been one of the regions where the decentralized distribution of fiscal revenues from the extractive sector has been a strong trend for approximately a decade. Therefore, many of the studies available on this issue come from this region, or early examples such as Indonesia.

In Brazil, two important empirical studies focus on the impacts of oil windfalls on living standards and also on political variables.³⁰ Both studies find no significant impacts on welfare measured by housing quality and quantity, supply of educational and health inputs, road infrastructure, and others. In some cases they even find that municipalities that receive oil revenues are worse off in these indicators than those that don't receive them. Indeed, Caselli and Michaels find no significant impacts on education or health supply in resource rich municipalities and explain that, although public service provision does increase, it does so less than would be expected from the rise in oil revenues, which points to deviation of funds or corruption.³¹

30 Caselli F., and Michaels, G. “Do oil windfalls improve living standards? Evidence from Brazil,” *American Economic Journal: Applied Economics*, 51, (2013): 208-38. Monteiro, J., and Ferraz, C. Does oil make leaders unaccountable? Evidence from Brazil's offshore oil boom, (2010).

31 Caselli F., and Michaels, G. “Do oil windfalls improve living standards? Evidence from Brazil,” 2013.

Regional and local governments in Colombia have received oil and mining (coal) royalties for a few decades, and with the increase in international prices between 2004 and 2014, these transfers rose significantly. Widespread accusations of mismanagement of these revenues spurred a reform of the royalty system in 2011. In this context, studies were developed to examine the impact of royalties spent at the regional and local level on regional growth, educational attainment, health and public infrastructure, compared with other regions.³² Royalties from oil were found to have a negative impact on growth at the regional level and a weak positive impact at the local level. On the other hand, royalties from coal are found to have a positive impact on growth at both levels.

One study of Peru, in addition to assessing the direct effects of a mining project, evaluates the indirect effects of mining revenues spent in the districts around the Yanacocha mine, but finds that the effects of the latter are negligible.³³ Other research in Peru finds that mining and hydrocarbon revenues transferred to producing local governments generate symptoms of a within-country Dutch disease.³⁴ These resource revenues, which are earmarked for investment, are mostly spent on infrastructure projects that in the short term employ a significant portion of the local population at wage levels significantly above other sectors of the local economy. This has created a shortage of workers for the local agricultural sector, as well as local hikes in prices of consumer goods. The local government in these cases serves as the key employer in the local economy, instead of the mining company.

In contrast to the previous studies cited above, which find either no effects or negative impacts from resource revenues spent by subnational governments, Cust and Rusli uncover a weakly positive effect on short-run economic performance in resource-rich districts in Indonesia.³⁵ They estimate the economic effects on Indonesian districts and municipalities of two sources of spillovers: the direct spillover from extraction activity, and the fiscal spillovers from local government spending associated with revenue windfalls from extraction activity. They conclude that the main source of economic gain is local government spending of resource revenues. A separate study finds positive effects of mining revenue transfers on the reduction of poverty and inequality in mining districts in Peru, which differs from Aragon and Rud's findings.³⁶

In summary, although the number of studies looking at the impact from government spending of resource revenue is still limited, in general these studies find weak or negative effects of resource revenues on regional socioeconomic performance.

32 Perry, G., and Olivera, M. *Natural resources, institutions and economic performance*, Working paper. Fedesarrollo, (2009).

33 Aragón, F.M. and Rud, J.P. *Mining, pollution and agricultural productivity: evidence from Ghana*, (2012).

34 Monge, C. and Viale, C. Local level resource curse: the "Cholo disease" in Peru, Working Paper. Natural Resource Governance Institute, (2011). <http://www.resourcegovernance.org/sites/default/files/SubnationalResourceCurseresearchDRAFT.pdf>

35 Cust, J., and Rusli, R.D. *The economic spillovers from resource extraction: a partial resource blessing at the subnational level?* EGC Report, (2014).

36 Zambrano, O. Robles, M. and Laos, D. *Global boom, local impacts: mining revenues and subnational outcomes in Peru 2007-2011*. Inter-American Development Bank, IDB Publications (2014).

Regional spillovers

Resource extraction is typically capital and infrastructure intensive. The scale of inward investment and the pattern of investments can have significant spillover effects and even be the driver of agglomeration economies at the regional level. Recent work suggests resource-related infrastructure can be a driver of trade linkages. Resource-driven transport links can improve connections out of the country but typically to distant markets (e.g., via ports) rather than to neighboring markets.³⁷ Furthermore, resource extraction can have long-run implications for the growth and specialization of regions, shaping the structural composition of the economy. In Michaels study of the long-run effects of oil production on the U.S. economy at the subnational level, he finds an overall net positive economic effect that persists beyond the lifetime of oil fields and resource wealth in the region.³⁸

DISCUSSION OF MECHANISMS FOR A POTENTIAL SUBNATIONAL RESOURCE CURSE

The papers surveyed above, as well as others, look at the mechanisms that may explain why resource-rich localities can perform worse than others in economic terms. Six main mechanisms are cited in the literature: mismanagement and corruption, conflicts, local price distortions, shifts in employment away from agriculture and manufactures, socio-environmental damages and degradation, and, finally, migration of workers in the extractive sector. These mechanisms relate to the direct impacts of the extractive projects and to the resource revenue spending channel.

The first explanation relates to the resource revenue spending channel: mismanagement of revenues. This refers to either the revenues being used in projects that don't respond to needs of local populations, or to overinflated payrolls. This can be due to lack of capacities or lack of responsiveness and accountability.³⁹ Ardanaz and Maldonado also argue that the scale of resource revenue transfers is important when it comes to the effect of these transfers on the quality of public sector provision. They find that local governments in Peru that receive significant transfers were more efficient in using these windfalls than those that received small transfers.⁴⁰

On the other hand, corruption or misappropriation of resource revenues can also occur by subnational governments. For instance, "missing money" in Brazil is suggested as a crucial factor for why the full effect of the oil windfalls is not felt in terms of welfare gains.⁴¹ For Brazilian municipalities, studies find that oil windfalls that increase municipal budgets lead to an increase in corruption since there is more room for corrupt officials to appropriate the revenues without this being evident to voters.⁴²

37 Steven Poelhekke and Roberto Bonfatti. *From mine to coast: transport infrastructure and the direction of trade in developing countries*, OxCarre Research Paper 107. (Oxford Centre for the Analysis of Resource Rich Economies, 2013).

38 Michaels, G. "The long term consequences of resource-based specialization," *The Economic Journal* 121(551) (2011): 31-57.

39 Arellano-Yanguas, J. "Aggravating the resource curse: decentralization, mining and conflict in Peru" (2011).

40 Ardanaz, Martin, and Stanislaio Maldonado. *Natural Resource Windfalls and Efficiency of Local Government Expenditures: Evidence from Peru*, (2014).

41 Caselli F., and Michaels, G. "Do oil windfalls improve living standards? Evidence from Brazil," (2013).

42 Brollo, F. et al. *The political resource curse*, Working Paper 15705, (2010). <http://www.nber.org/papers/w15705>

The second explanation of a negative effect of resource extraction suggests a proliferation of conflict that in-turn decreases local welfare. Dube and Vargas find in the case of the oil sector in Colombia that an increase in oil, coal and gold prices results in an increase in conflict at the municipal level.⁴³ The authors explain that increases in prices do not generate an increase in local wages, but instead generate appropriable rents, which cause conflicts among local actors (including armed groups) that seek to obtain a portion of these rents. Similar evidence is found in Africa within the mining sector.⁴⁴ Indeed, there are many resource-rich African countries where mining and oil have fueled violent conflict and civil war. Some examples are mineral wealth in the Democratic Republic of Congo, violence related to oil in the Niger Delta, as well as diamond mining in Sierra Leone and other countries in the Mano River area.⁴⁵

Additionally, extractive projects can also generate conflicts directly because they cause land use changes or because they require access to water or land used for agriculture. An interesting aspect in Peru is the higher incidence of conflicts in districts where mining has taken place in the past and also takes place in the present.⁴⁶

Conflicts also emerge as a result of resource windfalls spent by subnational governments. Arellano argues that, for the Peruvian case, mining and hydrocarbon revenue transfers to subnational governments create a new kind of social conflict related to how these revenues are used.⁴⁷

Resource extraction is associated with projects that can have significant environmental footprints—whether via water usage and potential pollutants, forest clearance or other risks of spillage or contamination. Aragon and Rud demonstrate that mining can have polluting effects on the surrounding region, harming agricultural productivity and therefore household incomes.⁴⁸ Similarly, concentrated resource extraction activity can attract social problems driven by in-migration, high relative wages and long periods spent away from home. Added together, many commentators worry that these costs may be too high, and that extraction should not go ahead.

The existence of a mine or oil extraction site, as well as the revenues from these activities spent by subnational governments, can create local price hikes due to increased demand for local goods and services. This affects some sectors of the local population that are not linked to the extractive sector directly or indirectly—their wages do not increase, but they have to pay higher prices, which results in lower welfare levels. Other sectors that benefit from the increased economic activity generated by the mine or by the expenditure of windfall revenues might be unaffected by this price hike.

43 Dube, O., and Vargas, J.F. "Commodity price shocks and civil conflict: Evidence from Colombia," *The Review of Economic Studies*, 80.4, (2013): 1384-1421

44 Berman, N. et al. *This mine is mine! How minerals fuel conflicts in Africa*. OxCarre Research Paper 141. (Oxford Centre for the Analysis of Resource Rich Economies, 2014).

45 Mahler, A. *Nigeria: A prime example of the resource curse? Revisiting the oil-violence link in the Niger Delta*. GIGA working paper. (German Institute of Global and Area Studies, 2010.) https://giga.hamburg/de/system/files/publications/wp120_maehler.pdf

Carpenter, L. *Conflict minerals in the Congo: blood minerals and Africa's under-reported first world war*. Working paper (2012). <http://web.mit.edu/12.000/www/m2016/pdf/Congo.pdf>

Maconachie, R. *Diamond mining, governance initiatives and post-conflict development in Sierra Leone*. BWPI Working Paper 50, (University of Manchester, 2008).

46 Orihuela, J. C., C. Huaroto, and M. Paredes. *Escapando De La Maldición De Los Recursos Naturales a Nivel Local: Conflictos Socioambientales y Salidas Institucionales*. (Perú: CIEC y PUCP, 2013).

47 Arellano-Yanguas, J. "Aggravating the resource curse: decentralization, mining and conflict in Peru" (2011).

48 Aragón, F.M. and Rud, J.P. *Mining, pollution and agricultural productivity: evidence from Ghana*, (2012).

Extractive projects and windfall revenues spent locally can cause a shift in employment from the agricultural or manufacturing sector to the extractive sector or to public investment projects financed by resource windfalls. This causes labor shortages in non-extractive sectors that experience contractions in the absence of high labor mobility. This effect, as a result of mining and hydrocarbon revenues, is found in resource-rich municipalities in Peru.⁴⁹ Movement away from agricultural employment is also found in mining communities in Africa.⁵⁰

One further mechanism that can limit the benefits from resource extraction at the local level is the movement of mine workers. Indeed, most of the workers that benefit from the relatively high wages paid by the extractive companies come from outside the producing area and commute regularly from their nearby cities, so limited amounts of this additional income remains in the immediate proximity of the mine. Therefore, the extractive activity does not generally benefit the local population, but only the main cities or urban areas from where workers come from. Evidence of this phenomenon is found in the mining region of Antofagasta in Chile and is the result of the lack of qualified workers at the local level.⁵¹ This can be defined as part of a lack of an enabling business environment; since the company cannot have access to the necessary human resources it needs to operate. For those drawn into a region due to a resource boom, the bust can be painful. Evidence from the U.S. demonstrates that the labor market consequences of a bust can exceed the gains made during a boom.⁵²

The enabling business environment can also refer to the existence of local companies that can provide the extraction project with the inputs it demands. However, in many local areas where extractive companies operate, there are no local companies that can supply these inputs or those that supply cannot do so at the necessary scale. For instance, in Peru, Aragon and Rud's study of the Yanacocha mine finds a positive impact on income levels of the local population due to the demand for local inputs from the mine.⁵³ But this positive impact is possible because of the particularities of the area: prior experience with the mining industry which has seen local markets develop and able to provide goods and services demanded by this industry, together with an explicit policy shift by the company to procure locally.

In summary, mechanisms such as corruption and conflict, as well as local price and labor market distortions and lack of an enabling business environment, can lead to subnational resource curse symptoms. Mitigating these conditions can help alleviate net negative impacts of resource wealth at the subnational level.

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49 Monge, C. and Viale, C. Local level resource curse: *The "Cholo disease" in Peru*, (2011).

50 Tolonen, A and Kotsadam, A. *Anja, African mining, gender, and local employment*, (2015).

51 Aroca, P., and Atienza, M. "Economic implications of long distance commuting in the Chilean mining industry" *Resources Policy*. 363, (2011): 196-203.

52 Black, Dan, Terra McKinnish, and Seth Sanders. "The economic impact of the coal boom and bust." *The Economic Journal* 115.503 (2005): 449-476.

53 Aragón, F.M., and Rud, J.P. "Natural resources and local communities: evidence from a Peruvian gold mine," *American Economic Journal: Economic Policy*. 5(2), (2013).

POLICY IMPLICATIONS

The three sources through which extraction has an impact on resource-rich regions, as described in the previous sections, are: via the extraction activity, via the revenues generated by the extraction which are spent at the subnational level and via regional spillovers. Furthermore, there are a variety of mechanisms that might determine why some subnational areas face resource curse symptoms from the existence of extractive activities.

There is evidence to suggest policy and company action can enhance the positive local employment and welfare effects of resource extraction. Policy action can also seek to manage and mitigate mechanisms of negative effects. For example, if a revenue sharing formula concentrates resource revenues in resource-rich regions, governments should be mindful of the potential need for offsetting fiscal policy to manage potential spatial disparities or under-funding in economically poor regions that may not have resource wealth.

Evidence from the studies reviewed suggests transfers of revenue to local government can pose significant revenue management and spending challenges. The management challenge can be mitigated if policy includes measures to ramp up funds gradually while capacity to spend is improved. Furthermore, central government should consider policies that support local government efforts to bank unspent funds rather than create requirements to spend in full each fiscal year; and volatility from world prices can be buffered by support from the central budget and stabilization funds. In several countries, subnational governments have created stabilization funds to hold and manage these flows across multiple years, most notably in the U.S. (Alaska) and Canada (Alberta).⁵⁴

Where governance challenges are factors in mismanagement of local funds, measures may be taken to mitigate the potential for *missing money*. Enhancing the accountability of subnational transfers, such as establishing adequate checks, balances and transparency of transfers can increase the hazard associated with engaging in corruption and increase the scrutiny of spending choices.⁵⁵ Evidence of this is found by Ferraz and Finan in Brazil, since reports of corruption had a significant negative impact on the probabilities of reelection of the incumbent.⁵⁶ Furthermore, through experiments conducted in 93 villages in the district of Blora, Indonesia, it was found that when windfall revenues were available and transparency was low, citizens were less willing to engage and hold governments accountable.⁵⁷ This suggests that higher levels of transparency can have a positive impact on citizen participation and monitoring of resource revenue spending by government.

The resource wealth management challenge faced by national governments may be reflected in challenges at the subnational level. Efforts to mitigate local price increases from a booming resource sector may be necessary to avoid crowding out of other productive sectors in the regional economy. Furthermore, local government may seek to use resource revenue as an opportunity to diversify the economy

54 Further details and case studies are available at: <http://www.resourcegovernance.org/natural-resource-funds>

55 See forthcoming paper by Varsha Venugopal and David Manley on Revenue sharing considerations.

56 Ferraz, C. and Finan, F. *Exposing corrupt politicians: the effects of Brazil's publicly released audits on electoral outcomes*, (2011).

57 Paler, L. *The subnational resource curse: causes, consequences and prescriptions*. (Prepared for the Open Society Institute Local Government and Public Service Reform Initiative (LGI) and Revenue Watch Institute, 2011). <http://www.resourcegovernance.org/sites/default/files/SubnationalresourcecurseliteratureDRAFT.pdf>

away from a dependence on commodity exports. Strategic investments in public infrastructure or targeted support to other sectors are all options governments must consider carefully and evaluate with the same caveats used in national-level industrial policy.

RESEARCH AGENDA

The literature reviewed suggests there is mixed evidence on the existence of a resource curse at the subnational level. These studies do suggest, however, that there are important conditions, such as local government capacity, institutional strength to prevent or address conflict, or the enabling business environment, that might mediate the direction of the economic effects associated with a resource curse. This section identifies areas where further research is needed.

Political trends toward fiscal decentralization

Both developed and developing countries are adopting fiscal decentralization. This is the case in resource-rich countries where the pressure for returning some proportion of taxes generated to resource-rich regions is often hard to resist. Fiscal decentralization raises important policy questions, not least since the evidence suggests mixed or negative economic outcomes are associated with early experiences of fiscal transfers to resource-producing regions. Additional research is needed to answer questions such as, do such transfers lead to enhanced growth or welfare? Can they exacerbate spatial and income inequalities across countries? Indeed, it might be the case that when local institutions are strong and have high capacities to manage resource revenues and their volatility, transferring a portion of these revenues can lead to improved socioeconomic outcomes at the local level. Research that looks into the relationship between the quality of local institutions and the effects of decentralization of resource revenues is one area identified as a “gap.”

Aside from institutional quality and capacity, there may be other factors that determine the effective management of resource revenue transfers to subnational governments. A recent NRGi paper examines the different ways to manage resource revenue effectively at the local level.⁵⁸ The role of transparency and citizen participation, for instance, is a possible determinant that needs to be assessed further. A separate report examines different ways to improve transparency of extractives governance at the local level.⁵⁹ A next step could be to link types of transparency mechanisms to the accountability outcomes, in order to determine what types of initiatives are most effective.

Another topic that would benefit from additional research is specific revenue sharing arrangements. A forthcoming NRGi-UNDP report takes stock of revenue sharing efforts in different countries and the considerations required when designing such a system.⁶⁰ Additional research is needed to respond to questions such as: are there arrangements that have relatively more positive results than others, for instance, arrangements which allocate larger portions of revenues to the smallest administrative unit around the mine or those which allocate a larger portion to a higher level of government (state, region, county). In addition, research

There are important conditions, such as local government capacity, institutional strength to prevent or address conflict, or the enabling business environment, that might mediate the direction of the economic effects associated with a resource curse.

58 Bauer, A. *Subnational oil, gas and mineral revenue management* (Natural Resource Governance Institute, 2013). <http://www.resourcegovernance.org/analysis-tools/publications/subnational-oil-gas-and-mineral-revenue-management>

59 Iwerks, R. and Venugopal, V. *It takes a village: Routes to local-level extractives transparency* (Natural Resource Governance Institute, 2016). <http://www.resourcegovernance.org/analysis-tools/publications/it-takes-village-routes-local-level-extractives-transparency>

60 See forthcoming paper by A. Bauer on revenue sharing considerations.

should look at whether revenue sharing arrangements that allocate a share of revenues to non-producing areas as well as producing ones perform better than those that only focus on producing areas.

The relative scale and impact of local effects versus of channels

Several studies that have measured the localized welfare consequences or economic spillovers of resource extraction, have found these to be statistically significant and positive but in highly geographically concentrated space: a 15-kilometer radius around mine sites, for example, according to a study on the average labor market effects of industrial mining in Indonesia.⁶¹

Given the capital intensive and spatially concentrated nature of resource extraction, it is not clear *a priori* that the potential economic benefits accruing to the local population would be large. In contrast, extraction of scarce subsoil resources is often rent-generating, implying that a significant flow of revenues to government may follow. Here, the benefits at the local level may be modest, while the taxes generated for the population at large may be considerable. This raises important challenges for governments including distributional choices, and pressure may come to enhance the local benefits, such as via local employment requirements, at the implicit cost of foregone tax revenues. Key unanswered questions are around the potential scale of job creation from the resource sector, versus the job creation effects of spending tax revenues elsewhere; and the relative opportunity cost of policies to enhance local spillovers, such as through encouraging local procurement which might mean foregoing some tax revenues due to decreased profitability.

Current literature has little to say on the comparative magnitudes of the local, regional and national channels of effect, nor the extent to which taxes may be foregone in order to enhance local benefits. Further investigation could help policymakers navigate these difficult choices.

Local Dutch disease versus “Peruvian disease”

Evidence in countries that implement revenue sharing with subnational governments, such as Peru and Indonesia, suggests that local governments that spend these revenues can become a major source of labor demand for inputs at the local level. This can cause local relative price distortions and the crowding out of alternative traded goods sectors, especially agriculture and manufacturing.

Should we be more concerned by the impact of a booming public sector, compared to the conventional crowding-out concerns that accompany a booming resource sector? Is there such a thing as a “Peruvian disease”?

The first thing to consider is the source or cause of the hypothesized Dutch disease effect. In the Dutch disease literature, the cause of relative price distortions is usually the “booming sector,” (specifically the hydrocarbons or mining sector). In the subnational variant of the Dutch disease model in countries with major transfers of revenue to resource-rich regions, the cause may include the booming resource sector and the local government spending of resource revenues. In short, the indirect impacts of extraction—a “booming public sector”—may also fuel Dutch disease effects where local government is faced with rapidly expanding budgets relative to the size of the local economy.

61 Cust, J. *The spatial effects of resource extraction: Mining in Indonesia*, (2015).

Second, standard Dutch disease effects from “booming” resource sector can also occur at the subnational level. Indeed, some of the works reviewed in the previous sections focus on within-country Dutch disease and if interprovincial migration offsets these effects.⁶² The two variations of Dutch disease can even take place simultaneously within a local unit. For example, the local agricultural sector could face price inflation within the jurisdiction due to the mining company’s demand of goods and services, and at the same time face a shortage of labor and increased labor costs from demands by workers of public infrastructure projects built by the subnational government with resource revenue transfers. Where transport costs are high, as in many developing countries, this only worsens the negative impact on local non-tradable sectors.

Finally, there are certain conditions where factor mobility may mitigate the development of the Dutch disease from the extraction activity, but not from the spending of resource revenues by the local government. In the first case, the mining company can hire workers from further afield to cover their demand. Whereas local governments often hire only locals for their projects and also fix salaries using public sector pay scales, regardless of the supply of labor. This was observed in mining districts in Peru. As a result of this local public policy, if workers from other regions migrate to this district to work in those projects, they will not be hired by the local government and the increased labor supply will be unable to reduce salaries accordingly.

In summary, both types of within-country Dutch disease effects may take place and the policies that might effectively correct one type might not work on the other. There is therefore a need to disentangle both effects.

We refer to the second effect as the “Peruvian disease.” However, to verify whether the Peruvian disease is entirely different, further research is needed. Two specific focuses of this potential research could be: i) if the Peruvian disease only occurs in countries where a significant share of resource revenues are allocated to producing districts (or other small local units) and, ii) if Peruvian disease only takes place in local areas where the agricultural sector is the largest (or only) alternative sector in the local economy. Namely, if the local area has a strong manufacturing sector, does the Peruvian disease occur? On this issue, it is also important to look further into the relative importance of the positive local effects of increased employment and rising wages compared to the negative effects, as well as the consequences of the changes in the local labor market once the boom is over.

62 Beine, M., Coulombe, S., and Vermeulen, W.N. “Dutch disease and the mitigation effect of migration: Evidence from Canadian provinces,” (2014). Raveh, O. “Dutch disease. Factor mobility, and the Alberta Effect: the case of federations,” *Canadian Journal of Economics*. 464, (2012): 1317–50.

CONCLUSION

Studies that evaluate the within-country impacts of resource extraction, regional spillovers and spending of resource revenues spent by subnational governments do not provide consistent or convincing evidence of a subnational resource curse.

However, they do show that there are a number of mechanisms that explain why some resource-rich areas can perform poorly or worse than expected given the extent of economic activity and value associated with extraction. Evidence includes mismanagement and corruption of resource revenue windfalls, the impact of relative price and labor market distortions due to imperfect capital mobility and the lack of an enabling business environment. Furthermore, the environmental and social consequences of extraction can create local damages that are difficult to mitigate and redress, giving rise to negative economic consequences such as falling agricultural productivity. In contrast, other studies record strong evidence for increased economic activity and welfare measures at both the local and regional levels. These support the view that local resource blessings are present, even when the overall picture is mixed.

Existing studies suggest that resource revenue transfers to subnational governments have, in most cases, negligible or even negative effects on local socioeconomic outcomes. More research is needed on the factors that can enhance positive effects and prevent or mitigate negative ones. A key research gap relates to the source of impact, the conditions that determine effective spending of these revenues by subnational governments, and better or worse revenue sharing arrangements for improved local welfare.

APPENDIX. META-ANALYSIS OF EVIDENCE ON THE SUBNATIONAL RESOURCE CURSE

YEAR	AUTHORS	COUNTRY	UNIT	EVIDENCE OF SUBNATIONAL CURSE	TRANSMISSION CHANNEL	OUTCOMES OF INTEREST	DIRECTION OF CHANGE IN OUTCOME VARIABLE
DIRECT IMPACTS							
2013	Allcott and Keniston	USA	Counties	No	Growth of local manufacturing sector positively associated with natural resource booms	Employment and wages in the manufacturing sector	Positive
2009	Corey	USA	States	Yes	Poor institutions	Growth of gross state product	Negative if institutions are weak, positive with strong institutions
2015	Cust	Indonesia	Communities	No	Labor market	Sector of employment	Shift to non-traded and resource sector, from traded and agriculture sectors
2006	Papyrakis and Gerlagh	USA	States	Yes	Multiple channels: increased corruption, decreased investment, schooling and spending on research and development	Growth of gross state product	Negative
2010	James and Aadland	USA	Counties	Yes	-	Personal income	Negative
2010	Libman	Russia	Regions	Yes	Institutional environment	Growth of gross regional product	Negative (if quality of institutions is low)
2011	Hajkowicz, Heyenga and Moffat	Australia	Regions	No	Spending effects	Quality of life indicators (household income, housing affordability, access to communication services, educational attainment, life expectancy, and unemployment)	Positive
2010	Rolfe, Lawrence, Morrish and Ivanova	Australia	Region (Queensland)	No	Spending effects	Employment	Positive (direct and indirect employment)
2012	Reeson, Measham, Hosking	Australia	States and local government areas	Conditional	Inequality (initially increased, but then decreased as the level of mining activity was higher)	Inequality (Gini coefficient) and gross individual income by gender	Non-linear (inequality increases with mining activity, but then decreases). Negative effect in the case of female income.
2012	Raveh	Canada	Regions	Conditional	Subnational Dutch disease	Growth of federal GDP	Negative
2012	Papyrakis and Raveh	Canada	Provinces	Conditional	Local inflation and a labor (capital) shift from (to) non-primary tradable sectors.	Inflation rates and sectoral capital and labor shifts (factor movements)	Positive (higher inflation and shift of factors away from non-primary tradable sector)
2007	Zhang, et.al	China	Provinces	Conditional	Property rights (benefits captured by government and state-owned enterprises), decreased competitiveness of non-tradeable sector	Per capita consumption growth	Negative
2010	Aragon and Rud	Peru	Region (Cajamarca)	No	Spending effects	Household income	Positive (sensitive to distance)

2014	Ticci and Escobal	Peru	Districts	Both positive and negative effects	Spending effects and CSR / Inflow of migrants, no improvement in access to social services	Employment, composition of employment, inflow of migrants, local social indicators (school attendance in rural areas)	Both positive and negative
2011	Arellano	Peru	Districts	Mixed	Spending effects, no reduction of poverty	Regional GDP growth and welfare indicators (poverty rates, drinking water coverage, sanitation facilities at home, school attendance)	Both positive and negative
2007	Zegarra, Orihuela and Paredes	Peru	Districts	Conditional	Only in rural districts	Household income (rural and urban)	Positive in rural districts
2013	Loayza, Mier y Teran and Rigolini	Peru	Districts	Yes	Increased inequality across and within districts	Socioeconomic outcomes (household consumption, poverty rate, literacy)	Positive incomes on socioeconomic outcomes, but uneven distribution (inequality)
2014	Orihuela, Huaroto and Paredes	Peru	District	Yes	Impacts on water and land from mining activities (old and new mining)	Conflict and impacts on agriculture	Positive relationship between mining activities on conflict and negative impact on agriculture sector
2014	Asher and Novosad	India	District	No	Price booms, crowding out of workers from other sectors	Economic structure of districts (growth of economic sectors – agricultural, services, etc.)	Positive, in towns up to 50km from mining site
2014	Zuo and Schieffer	China	Province	Yes	Crowding out of R&D and education expenditures	Economic growth at province level	Negative
INDIRECT IMPACTS							
2006	Dube and Vargas	Colombia	Municipalities	Yes	Rapacity over resources	Conflict	Negative (increase in conflict with increase in oil prices and windfalls)
2009	Caselli and Michaels	Brazil	Municipalities	Yes	Municipalities with oil windfalls have worse performance in welfare indicators and service provision	Welfare relevant outcomes (housing quality and quantity, supply of educational and health inputs, road infrastructure, and welfare receipts).	Negative
2009	Monteiro and Ferraz	Brazil	Municipalities	Yes	Spending of oil royalties had no significant impacts on education or in health supply in resource rich municipalities	Local democracy measures (electoral outcomes, behavior of politicians in power, electoral competition and political selection)	No effect
2009	Perry and Olivera	Colombia	Municipalities, regions	Conditional	Oil windfalls had negative effect on growth at regional level, weak positive at local level	Regional GDP growth and provision of public services (education, health, investment), institutional quality	Negative at the regional level, positive at the local level
2014	Cust and Rusli	Indonesia	Districts, municipalities	No	Positive impact of local government spending of resource revenues	Local GDP	Positive

2010	Aragon and Rud	Peru	Region (Cajamarca)	No	No effect from local spending of resource revenues	Household income	No effect
2011	Michaels	USA	Counties	No	Sectoral specialization, public spending, spillover effects	Per capita incomes	Positive
2010	Arellano	Peru	Districts	Yes	Conflicts and poor spending of resource revenues	Conflict	Negative (increase in conflict with higher resource revenue transfers)
2011	Monge and Viale	Peru	Districts	Yes	Spending of resource revenues by local governments	Inflation rates and sectoral labor shifts	Negative (higher inflation and shift of labor to municipal work, away from agriculture)
2014	Zambran, Robles and Laos	Peru	Districts	No	Mining revenue transfers to districts	Headcount poverty ratio and GINI index	Positive (higher in districts mining districts with lower poverty rates and higher inequality).
2014	Ardanaz and Maldonad	Peru	Municipalities	No	Increase in political competition	Efficiency in use of resource revenue windfalls by municipalities	Positive when resource revenue transfers were large.

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