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VARIEGATED DEPENDENCE: THE GEOGRAPHICALLY DIFFERENTIATED ECONOMIC OUTCOMES OF RESOURCE-BASED DEVELOPMENT IN PERU, 2001-2015

José Carlos Orihuela y
Victor Gamarra Echenique

DEPARTAMENTO DE
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Abstract

The economic impacts of resource-based development are distributed unevenly across national space, and not even mining regions experience economic development in the same way. We build on the methodology of Rehner et. al. (2014) to typify resource-based economic development in Peru in the period 2001- 2015 and compare it with the case of mineral-abundant Chile. What we find is a nuanced version of the same dependency-related resource curse phenomenon. With the commodity cycle: (i) export specialization is not the same in all places; (ii) regional growth volatility is much higher in Peru than in Chile; (iii) the Dutch disease does not clearly manifest itself; and therefore (iv) economic dependence within Peru is variegated. At the national level, gold-and-copper-dependent Peru is not as vulnerable as copper-dependent Chile to external shocks. At the subnational level, outside Lima in particular, dependence-related volatility can be very high for clusters of regions. The results of the quantitative analysis are attuned to a theoretical framework of variegated dependence, which, while acknowledging the centrality of the center-and-periphery supranational structure for economic development, attributes variation in resource curse phenomena to subnational differences across space and over time in economic-geography configurations and institutional regimes.

Keywords: Dependence; resource curse; Dutch disease; export specialization; regional development; institutions

JEL Classification: O11, O18, F43, R58, Q33, Q34, Q37

Resumen

Los impactos económicos del desarrollo basado en los recursos se distribuyen de manera desigual a través del espacio nacional, y ni siquiera las regiones mineras experimentan el desarrollo económico de la misma manera. Trabajamos sobre la metodología de Rehner et. al. (2014) para tipificar el desarrollo económico basado en los recursos en el Perú en el período 2001-2015 y compararlo con el caso del Chile abundante en minerales. Lo que encontramos es una versión matizada del mismo fenómeno de maldición de recursos relacionados con la dependencia. Con el ciclo de commodities: (i) la especialización de exportaciones no es la misma en todos los lugares; (ii) la volatilidad del crecimiento regional es mucho más alta en Perú que en Chile; (iii) la enfermedad holandesa no se manifiesta claramente; y por lo tanto (iv) la dependencia económica dentro de Perú es matizada. A nivel nacional, el Perú dependiente del oro y el cobre no es tan vulnerable como Chile dependiente del cobre a los shocks externos. A nivel subnacional, fuera de Lima en particular, la volatilidad relacionada con la dependencia puede ser muy alta para los conglomerados de regiones. Los resultados del análisis cuantitativo están en sintonía con un marco teórico de dependencia diversa que, aunque reconoce la centralidad de la estructura supranacional centro-periferia para el desarrollo económico, atribuye la variación en los fenómenos de maldición de recursos a las diferencias subnacionales a través del espacio y en el tiempo en configuraciones económico-geográficas y regímenes institucionales.

Palabras clave: Dependencia; maldición de los recursos; enfermedad Holandesa; especialización de exportaciones; desarrollo regional; instituciones

Código JEL: O11, O18, F43, R58, Q33, Q34, Q37

Variegated dependence: The geographically differentiated economic outcomes of resource-based development in Peru, 2001-2015

José Carlos Orihuela[1]
Victor Gamarra Echenique[2]

Introduction

Do natural resources curse the economic development prospects of nations? Perhaps not the prospects of nations, but those of their resource peripheries? And are resource peripheries in the periphery all equally "cursed"? Contributing to new economic geography on resource-based development (Arias et. al. 2014, Rehner et. al. 2014, Phelps et. al. 2015), we produce evidence that supports the view that economic development is geographically uneven and that embedding institutional conditions is likely to have something to do with it. Similar claims have been made by economic geographers in relation to advanced, non-resource-dependent economies (Martin 2000, Hayter 2004, Boschma and Frenken 2009, MacKinnon et. al. 2009), but we find them applicable to developing, resource-dependent ones as well. Peru, the mineral economy with the best macroeconomic indicators during the last Latin American commodity supercycle, makes an appealing case to inform these debates.

The resource-curse literature largely ignores the significance of place. Even though the work of geographer Richard Auty (1994, 2001) was quite influential in the inception of what has now become a rich mineral deposit of scholarly outputs, and despite the penchant of old economic-development perspectives for space-based analytical concepts (Prebisch 1950, Hirschman 1958, Cardoso and Falleto 1967), seminal resource-curse literature seems to assume the world to be flat: place is not a prominent dimension in resource-curse economic studies (van der Ploeg 2011). Rather, the resource-based development debate has been framed as a "curse or blessing" dichotomy, dismissing sub-national variation. Such a flaw can certainly be attributed to disciplinary paradigms and methods, as economists shaping the debate have been searching largely for some general rule applicable to the development of national economies (Sachs and Warner 1997, Lederman and Mahoney 2007, van der Ploeg 2011, Orihuela 2017).

Recent economic literature has opted for a "local resource curse" line of inquiry. This quantitative methods-based literature exploits national household survey data to find out whether mining regions—instead of mining countries—are cursed or blessed (Caselli and Michaels 2013, Allcott and Keninston 2014). But thus far, local resource-curse evidence on Peru appears inconclusive: some studies find mixed outcomes or scattered and disappointingly modest benefits given the significance of the macroeconomic boom (Zegarra et. al. 2007, Ticci and Escobal 2015); others find a rosier picture, but point out that positive outcomes seem to disappear the further that producing regions are from the capital city (Aragón and Rudd 2013, Loayza and Rigolini 2015). This is a stimulating

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line of research which we believe—as with the "national resource curse" one—needs to be complemented and included in a dialogue with perspectives that give more conceptual consideration to time (immediate outcomes vis-à-vis long term ones) and space.

To contribute a more time-and-space sensitive analysis, we replicate the study by Rehner et. al. (2014) on Chile. We found such an approach suitable for putting the hypothesis of geographically uneven development at the center of the discussion, expecting dependence to rule but to vary. Having gathered and analyzed the data, what we found is a picture of diverse regional dependence. To begin with, unlike Chile, Peru is not a mono-export economy. Moreover, as commodity prices do not always covariate and resources are not distributed uniformly throughout an intricate national territory made up of arid coastline, the Andes and Amazonia, it is problematic to expect sub-national economic convergence in this case. We found five clusters (two more than Chile in the aforementioned study) of regions when looking into the relationship between export dependence and variance in regional economic growth (with some high levels of regional growth volatility not seen in Chile). And to add nuances to an already complex portrait, export specialization intensified with price surges in one group of regions, but not in another. Finally, we find that in most—but not all—cases, and considering that the less dependent and wealthier regions are all coastal (in Chile, all regions are coastal), the more export dependent and geographically peripheral the region, the more susceptible it is to boom-and-bust cycles.

Drawing on Peck and Theodore (2007), we read our findings as an illustration of what we call variegated dependency. The case of Peru shows us that resource-based development in the periphery is not uniform. In turn, that development outcomes are complex and can be markedly different, even for apparently similar mineral regions, points to the significance of regional and sub-regional economic geographies and institutional settings: as well as resource endowments and other geographically shaped conditions, institutional structures can also vary greatly across space and over time.

This study is organized as follows. First, we present what we call variegated dependency and how it relates to the resource curse and to institutional economic-geography literatures. Then, we define the main features of resource-based development in Peru. Next, we set out our methods and data, followed by the results and a discussion based on the quantitative analysis. Finally, we conclude by highlighting lessons from the study and their implications for advancing an institutional economic-geography perspective of the resource curse.

Variegated dependency: economic development in resource-based Latin America

The term "resource curse" is commonly attributed to geographer Richard Auty (1994), who argued that the underperformance of resource-rich countries is due to weak domestic linkages of mining. Prior to this, Gelb (1988) inquired into whether oil windfalls were a blessing or a curse. In fact, resource-curse theories can be traced back to the foundational book of modern economics: Adam Smith singled out extraction as an economic activity that reduced the wealth of nations (The Wealth of Nations, Book IV). The resource curse thesis per se gained popularity following Sachs and Warner's (1997)

cross-country econometric analysis, which linked dependency on resource exports to poor economic growth rates. The association of these two variables became highly contested, as conclusions differed subject to sampled data, variable definitions, and model specification (Lederman and Maloney 2007; Wick and Bulte 2009; van der Ploeg 2011; Venables 2016).

The resource-curse debate has become somewhat deadlocked. Above all, "resource curse" does not mean the same to everyone. Reviewing resource-curse literature across the social sciences, one can identify six governance challenges and 13 development diseases/traps. Governance challenges relate to (i) the macroeconomy; (ii) the local and sectoral economy or the microeconomy; (iii) the sustainability of economic growth; (iv) democracy; (v) environmental justice and community inclusion; and (vi) peace. Economic development diseases include balance of payment and public finance crises, the Dutch disease, and the enclave form of microeconomic development. There is more than one kind of "resource curse" (Orihuela 2013 and 2017).

The challenges of resource-based economic development have long received the attention of academics and policy elites in Latin America. Half a century before the term "resource curse" was coined, Latin American structuralism expounded the case of dependent development. Raúl Prebisch (1948) attributed Latin American underdevelopment to its peripheral position in the international economy, exchanging raw materials for manufactures from the world economy's center. Chilean structuralist economists argued that dependency on minerals was a structural reason behind the frustrated development of early-industrialized Chile (Pinto 1958, Ahumada 1970). The United Nations Economic Commission for Latin America (ECLA, later ECLAC) was established in Chile's capital city, Santiago. In turn, in a masterpiece of political economy as "comprehensive social science" that stressed "the socio-political nature of economic relations of production", Cardoso and Faletto (1967) explained post-colonial Latin American dependency and development, typifying Latin America as a "periphery" with few industrial centers and plenty of "enclaves" meeting with a new international economy. Finally, Celso Furtado called for an end to "internal colonialism" in Brazil, with the restructuring of the agricultural economy of the northeast as a preliminary requirement for industrialization (Furtado 1961, Love 1996).

Dependency theory is a name for various forms of structuralist perspectives of economic development (Love 1996 and forthcoming), just some of which are loosely sketched above. As far as it relates to this paper, the point to make is that: (i) resource dependence has for long been a structural feature shaping the political economy of Latin American development, in particular that of mineral-rich Chile and Peru (Thorp and Bertram 1978, Thorp 1998, Thorp et. al. 2012); and that (ii) one can distill down the old dependency theory postulates that are central to the contemporary resource curse debate. Dependency-related resource curse phenomena are, on the one hand, those forms of macroeconomic dependence shaping public finance and balance of payments crises and, on the other, those forms of microeconomic dependence shaping the development of resource peripheries that all too commonly turn into rich enclaves, hosted in poor regions and subject to strong economic volatility. That resource-based development leads to various forms of highly volatile and sectorially and spatially uneven regional economic development is not exactly news for Latin American structuralism.

The effects of Dutch disease, when booming exports and associated exchange-rate appreciation result in the crowding out of non-booming export sectors (Corden 1984), are not exactly part of stylized dependency-related resource-curse phenomena. In other words, the Dutch disease occurred in the world's center, not in the periphery. Thus, resource curses can be classified as Dutch disease in some cases, and not in others (see Schuldt, 1994). The same applies to dependency: both dependency and non-dependency forms of resource curse exist. In a nutshell, there are many types of resource curses (Orihuela 2017).

Although quite explicit is some dependency perspectives, such as that of Celso Furtado and, to some extent, in the widely held postulate of dual economies within the national space, dependency theory could be read as stressing the peripheral character of Latin American capitalist development while downplaying the various forms such peripheral dependency can take. It is here that the variegated capitalism perspective of contemporary economic geography helps to highlight within-country variation at the global periphery (Hayter 2004, Peck and Theodore 2007). Peck and Theodore (2007) are critical of the "varieties of capitalism" political economy perspective of Hall and Soskice (2001). Indeed, as any evidence-based scholar will argue, capitalism in the USA is not like that of Germany, neither in the 19th century nor today; while there are commonalities resulting from exchanges and integration of economic ideas and interests, there are also big differences resulting from national structural features and historical trajectories.

Despite sympathizing with its general claim, Peck and Theodore (2007) rightly criticize the varieties-of-capitalism framework for discussing capitalism as national phenomena, without considering sub-national—spatial—variation. Scholars should think of capitalism as "variegated", spatially differentiated within national borders. In other words, institutions matter, yes, but they are neither static nor uniform within national space.

Drawing on the dependency and variegated capitalism perspectives, we find "variegated dependency" an appropriate term for what we think of as a general hypothesis on resource-based economic development in the periphery: dependency-related resource-curse phenomena is common but is not the same everywhere, within a given resource-rich country located in the periphery. We should expect spatially differentiated economic development at the sub-national level because: (i) economic-geography structures are not uniform and: (ii) institutional structures are also spatially differentiated. By "institutions" here we do not mean the influential but narrow view of new institutional economics, institutions as "the rules of the game" (North 1990); instead, we think of institutions as institutional regimes composed of formal and informal rules, habits, belief systems, and organizations embodying rooted ideas on what entails good government/governance (Polanyi 1944, Greif 2006, Hodgson 2014). Thus, the claim is that institutional regimes should not be expected to be the same within national borders. Moreover, not only are geographic and institutional structures unlikely to be uniform across subnational space, but they can also be subject to different contingencies over time. Because conditions in the periphery are not the same across space and over time, dependency in the periphery is variegated.

Under this assembled framework, national economic development outcomes in peripheral, mineral-dependent Chile and Peru are expected to be different because of their associated but different national economic geographies and institutions. On top of that and for the same reasons, economic dependency within Peru should also vary across space and over time, as subnational geographies and institutions are not uniform. Before turning to our quantitative exploration of the variegated dependence hypothesis, in the next section we define key features that qualify Peru as resource-dependent.

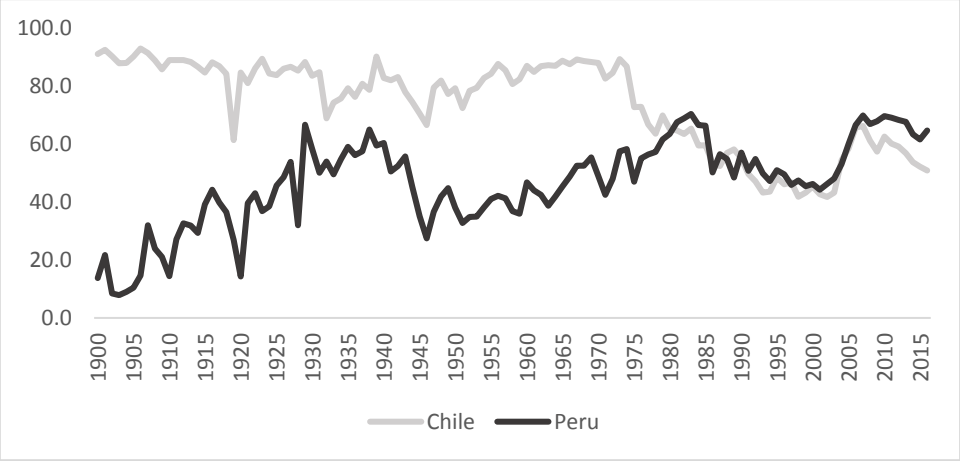
Resource-dependent Peru: Structural factors and their key features

We have made the claim that variegated dependency is the result of uneven economic geographies and institutions. Key features to understand the particularities of the Peruvian case are that (i) in terms of economic geography and its evolution, Peru stands as a diversified resource-based economy within an ecologically diverse country, with resources unevenly distributed across ecological (Pacific Ocean, arid coast, Andes, and Amazonia)[3] and political (twenty five) regions, numerous boom-and-bust cycles, significant contemporary illegal economies of coca in the Andes and gold and timber in the Andean Amazon, and a national political-economic system centralized in the nowadays megacity of Lima (Thorp and Bertram 1978, Thorp et. al. 2012); (ii) in terms of institutions and their evolution, the Peruvian state is typified as "weak" given its poorly developed and geographically uneven "infrastructural power" (Centeno and Ferraro 2013, Soifer 2015), and has recently undergone a process of political decentralization that included the creation of regional governments and the establishment of an architecture of mining-rent transfers to subnational governments (Gruber 2017).

Following our theoretical framework, the first structural factor qualifying resource curse phenomena is the economic geography. In the case of Peru, by diversified resource-based economy we mean, first, that mining exports are important, but their collective historical significance varies, having fluctuated between 10% and 70% over the last 125 years (see Figure 1). Second, mining exports mean different things at different points in history, from silver and nitrates in the 19th century to copper, gold, lead, oil and natural gas, silver and zinc in the 20th and 21st centuries. Third, these resource economies take place across the national territory, in spatially differentiated ways: while some early mining regions continue being so, others die and new ones arise; gold cycles, in particular, have both killed off and restored life to a subset of mineral regions (Thorp and Bertram 1978). While most mining takes place in the Andes, most oil activity is located in Amazonia. Amazonia is also the site of (legal and illegal) gold mining, logging and, more recently, oil palm plantations. Finally, the Pacific Ocean yielded guano exports in the 19th century and fishmeal exports since the mid-20th century.

[3] Some other studies classify or typify the regions of Peru in 8 or 11 (see Pulgar Vidal, 1981)

Figure 1. Mining and Oil Exports in Chile and Peru (Percentages). 1900-2015.



Source: Orihuela (2014) based on Thorp and Bertram (1978) and Central Bank of Peru and Chile.

Such historical and spatial complexities qualify "dependence", to the extent that one could label mineral-rich Peru a historical case of diversified dependence and mineral-rich Chile a case closer to mono-commodity dependence[4]. In Chile, mining meant copper in the mid-nineteenth century, nitrates in the 1870s to the 1920s, and since then copper again, most of which is located in the northern regions. In that country, mining exports have never accounted for less than 50% of all exports over the last 125 years (see Figure 1).

Table 1 shows the main commodities in the export basket and macroeconomic indicators. Between World War II and the Debt Crisis, Peru's resource dependence moved from fisheries in the Pacific Ocean to oil in Amazonia and the northern continental shelf and copper in the southern regions of Moquegua and Tacna (the Peruvian side of the Atacama Desert, which also hosts copper in Chile). The structural reforms of 1992, which liberalized the mining and oil sectors resulted in a new, positive international-economic outlook. Put together, reforms and foreign capital led to a new export cycle between 1993-2015 dominated by copper and gold, amounting to 24% and 19% of exports over the last five-year period, respectively.

[4] See De la Cuba & Ormeño (2003) for more information about historical Perú's primary exports high volatility.

Table 1. Growth, Exports Growth and Leading Exports. Peru 1945-2015

	1945-72	1972-81	1981-93	1993-2015
Principal Exports (Main Location)	Sugar (northern Coast); fish flour (Pacific Ocean-Ancash); copper (Moquegua and Tacna)	Fish flour (Pacific Ocean-Ancash); copper (Moquegua and Tacna); petroleum (Amazon)	Copper (Moquegua and Tacna); petroleum (Amazon); lead and zinc (central Andes)	Copper, gold (all over the Andes); agricultural products (Coast)
Exports Rate Growth (annual average)	8.4	3.7	1.6	12.9
PIB Rate Growth (annual average)	5.3	4.0	0.1	4.27

Source: Authors' own calculation, based on BCRP, OXLAD y WDI.
Note: (a) 1961-72

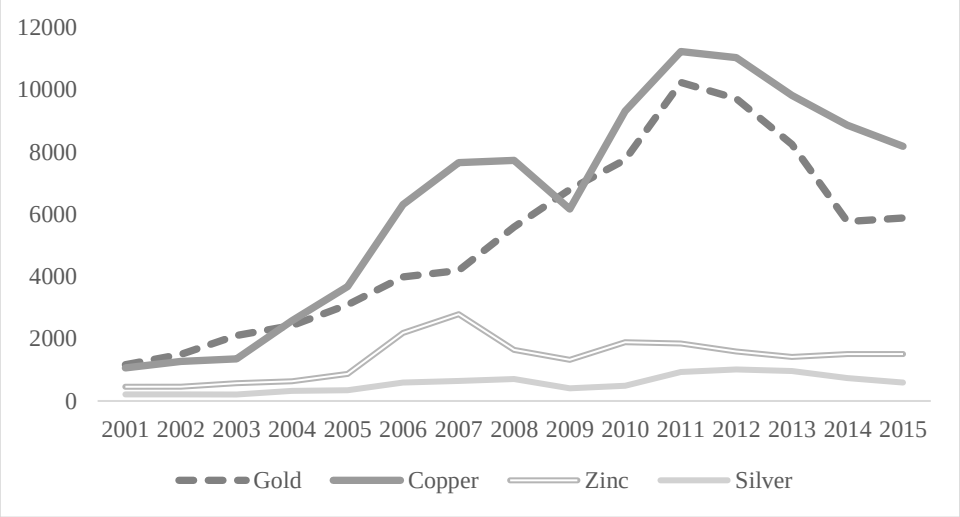
In turn, the second structural factor qualifying resource-based economic development is the quality of institutions, state institutions in particular - the claim being that institutions vary across and within nations. While the Peruvian state is commonly described as weak by historical-sociology and comparative-politics literatures, the Chilean state is the paradigm of state strength within Latin America. Arguably, relatively stronger political stability has enabled much more sophisticated state institutional development in Chile than in Peru. The general diagnosis is that there is more "infrastructural power" in Chile than in Peru, meaning that state reach is greater and more homogenous throughout national territory in the former case (Centeno and Ferraro 2013, Soifer 2015).

How do state institutions matter for regional economic development, beyond securing property rights? In Chile, the state-owned national development corporation CORFO, established in 1939, is historically associated with "new exports" including salmon, timber, and wine; small-scale mining, in turn, has long been subsidized through credits, state-owned refineries and marketing schemes; finally, large-scale mining includes state-owned copper corporation CODELCO, which owns the three big old mines that were nationalized in the 1960s-70s (Orihuela 2014 and forthcoming). Thus, the export basket is not the straightforward result of "resource endowments", but a historical construction resulting from the interplay between economic geography and institutions.

Conversely, Peru has neither an equivalent to CORFO promoting industrial policy nor a state presence in the mining industry. Regional development corporations were closed before becoming significant, in the 1970s. Where the Peruvian state has been

historically successful, however, is in the development of irrigation projects for the arid coast, which now hosts export agriculture. Thus, state reach has privileged the relatively wealthier coast over the Andes and Amazonia, as can be also observed in the history of transportation infrastructure or literacy (Thorp and Paredes 2010, Thorp et. al. 2012). Interplaying with geographic conditions over time, stronger state-building in Lima and the coast is a central feature of institutional story of Peru.

Figure 2. Recent Evolution of Principal Mining Products of Peru (2005-2015).



Source: Authors' own calculation, based on MINAM data.

We now turn to key contemporary features of economic geography, focusing on how export diversity benefits Peru and the spatial form that such diversity takes. As can be seen in Figure 2, Peru exports a number of minerals, but gold and copper are by far the most important ones. The "commodity lottery", the term used by Díaz Alejandro (1984) when discussing the impact of 1929 on Latin America, matters. Thus, during the 2008-2009 crisis, copper and zinc exports went down while gold exports continued growing. External shocks were different: while gold prices kept escalating, copper and zinc prices fell drastically (see Figure 8 below). The gold price trend changed after 2012, this time moving along with copper and greatly impacting on Peru's exports (see Figure 8 below).

Peru is ranked among the biggest mineral producers in the world: it is the third-largest producer of copper, the sixth of gold, and the second of silver. In recent years, Peru and Latin America as a whole have experienced a boom in economic growth and exports. China's growth, in particular, has offered exceptional opportunities for attracting investment and expanding export markets. According to Sanborn and Yong (2013), trade between Latin America and Asia grew at a rate of 26% in 2004-2008, prior to the global economic crisis. The main destinations for Latin American exports were China (48%), Japan (14%) and South Korea (8%). In the case of Peru, exports to China account for 92% of trade with Asia or 17% of the country's total exports. China imports more than 50% of Peru's copper, around 40% of its zinc and lead, and close to 95% of its iron. Thus, China drives copper exports, but not gold (see Table 2). Again, Peru's dependency is not like that of Chile.

Table 2. Principal Peruvian Mineral Export Destinations - 2015

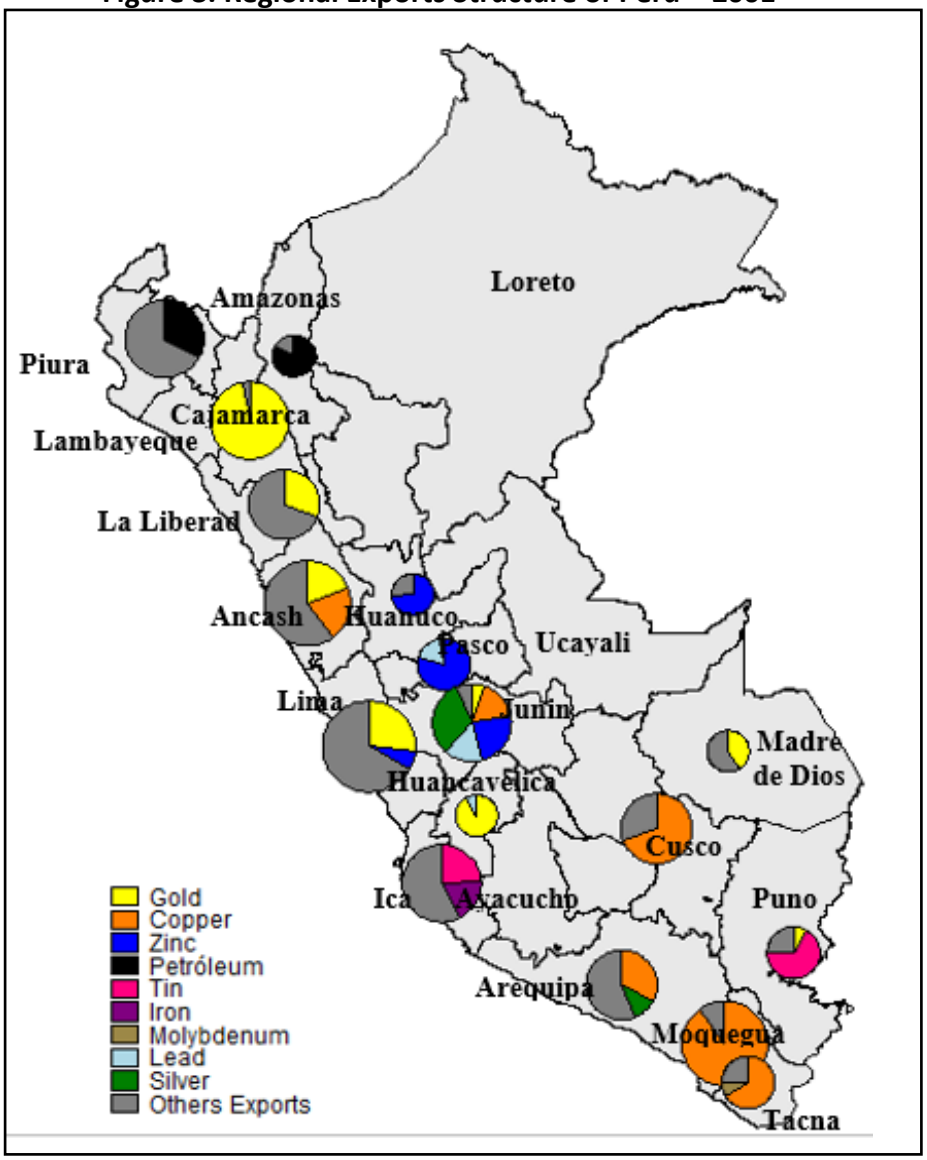
Copper			Gold			Silver			Zinc		
Country	**US$**	**%**	**Country**	**US$**	**%**	**Country**	**US$**	**%**	**Country**	**US$**	**%**
China	4,459	54.9	Switzerland	2,680	40.7	United States	63.14	45.8	China	535	35.5
Japan	676	8.3	Canadá	1,579	24.0	Canadá	41.60	30.2	South Corea	197	13.1
Germany	432	5.3	United States	840	12.7	Brasil	23.29	16.9	Spain	161	10.7
Brasil	423	5.2	India	354	5.4	Switzerland	4.05	2.9	Brasil	134	8.9
South Corea	316	3.9	Reino Unido	141	2.1	Chile	3.18	2.3	Japan	115	7.6
Italy	289	3.6	Sudáfrica	45	0.7	Argentina	1.31	1.0	Bélgica	73	4.8
Spain	258	3.2	Italy	12	0.2	Colombia	1.15	0.8	Canadá	51	3.4
India	214	2.6	China	12	0.2	Bolivia	0.04	0.0	United States	35	2.3
Taiwán	151	1.9	Bulgaria	9	0.1	Arab Emirates Unidos	0.02	0.0	Taiwán	23	1.5
Bulgaria	139	1.7	Arab Emirates Unidos	4	0.1	Italy	0.01	0.0	Colombia	20	1.3
Others	769	9.5	Others	913	13.9	Others	0.01	0.0	Others	162	10.8
Total	8,125	100.0	Total	6,590	100.0	Total	138	100.0	Total	1,507	100.0
Lead			**Tin**			**Iron**			**Molybdennum**		
Country	**US$**	**%**	**Country**	**US$**	**%**	**Country**	**US$**	**%**	**Country**	**US$**	**%**
China	662	43.2	United States	121	35.4	China	329.38	94.1	Chile	103	47.1
South Corea	291	19.0	Netherlands	81	23.7	Japan	19.20	5.5	United States	52	23.9
Canadá	275	17.9	Spain	33	9.8	United States	1.37	0.4	Netherlands	41	18.6
Bélgica	106	6.9	Canadá	31	9.1	South Corea	0.05	0.0	South Corea	13	5.7
Italy	62	4.0	United Kingdom	25	7.4	Others	0.002	0.0	China	9	3.9
Japan	49	3.2	Japan	18	5.2				Tailand	1	0.5
Rusia	34	2.2	Germany	11	3.1				Others	1	0.3
Chile	21	1.3	Eslovaquia	8	2.5						
Germany	16	1.1	France	6	1.9						
Australia	10	0.7	Chile	2	0.5						
Others	9	0.6	Others	5	1.5						
Total	1,535	100.0	Total	342	100.0	Total	350	100.0	Total	219	100.0

Source: Authors' own calculation, based on MINAM data. US$ column shows export values in millions.

The following two maps show how geographically diverse export specialization, and therefore mineral dependence, is at the subnational level in Peru. Regional mineral exports vary in size and composition. From south to north, copper is prevalent in the southern regions, neighboring Chile: Moquegua and Tacna. Mineral deposits in Arequipa and Cusco are copper- and gold-rich. Next, to the east, the peripheral Andean Amazonian regions of Puno and Madre de Dios are gold-rich and constitute extreme cases of export dependency.

As these two frontier regions constitute the epicenter of illegal gold mining, figures are not credible (illegal logging and coca are the other noticeable resource export-linked activities over there and elsewhere in the Eastern Andes or Andean Amazon). West of Cusco, small and poor Apurímac is silver dependent, an exceptional case.

Figure 3. Regional Exports Structure of Peru – 2001

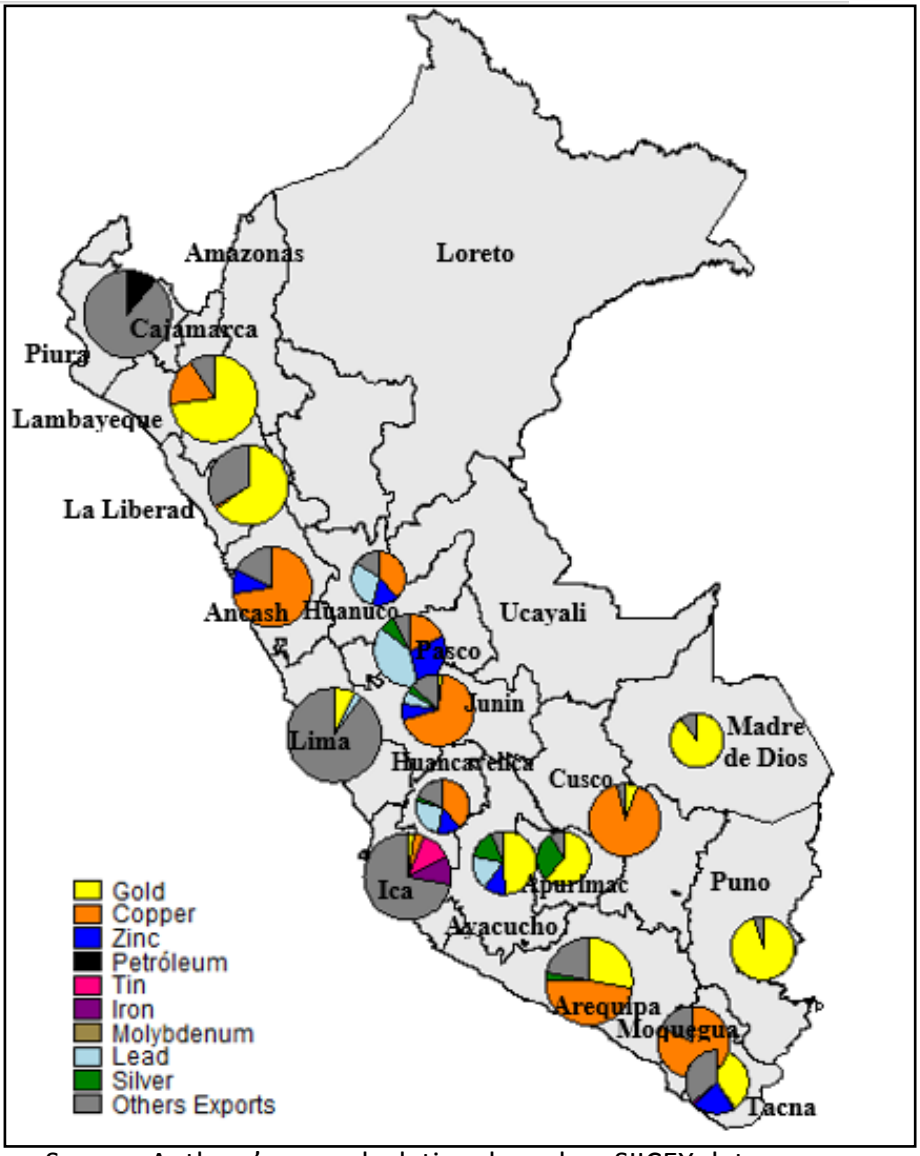


Source: Authors' own calculation, based on SIICEX data.

Seated on a slightly different geology, the central Andes are lead rich, but copper and zinc are also significant. Coastal regions holding coast south and north of Lima are mineral rich but diversified. Ica has large-scale iron mining and export agriculture. Copper-rich Ancash, in turn, is more diversified because of its fishmeal industry and the port development in Chimbote. In the north, gold-rich Cajamarca and La Libertad constitute another geological cluster, the latter region being more diversified because of its coastal access and agricultural sector. Unlike small-scale gold mining in the south of the country, both legal and illegal, these are massive open-pit developments in the

Andes. Piura has not welcomed new mining (in its large-scale form, but illegal activity takes place regardless), but benefits from oil. In turn, some northern regions have neither mineral nor oil endowments, but are subject nonetheless to other kinds of resource-curse phenomena—notably San Martin with coca, although government has recently succeeded in introducing alternative crops. Of the remaining regions, Loreto and Ucayali are wood and fish exporters, and the coastal Tumbes exports fish and shellfish. Thus, it can be seen that there are very few regions that are not mineral dependent.

Figure 4. Regional Exports Structure of Peru - 2015



Source: Authors' own calculation, based on SIICEX data.

From 2001 to 2015, the pies showing export structures changed in size and composition. The most significant increases took place in Arequipa, Puno, La Libertad and Madre de Dios which became important gold exporters; and the central regions of Huánuco, Pasco and Junín, as well as Ancash, which became more copper-dependent. In turn, more drastic changes in composition took place in Ayacucho and Apurimac, which went from not exporting any metals at all in 2001 to exporting gold and silver by 2015.

In a nutshell, Peru's economic geography is even more complex than that of long and slim Chile. With a larger territory (1,275 million km^2 compared to Chile's 0.756 million km^2), 60% of which belongs to the Amazon basin, and a larger number of political regions (25 compared to 15 in Chile), Peru has greater diversity in terms of ecological and political regions and a more varied pool of natural resources, minerals in particular.

In principle, highly specialized mineral regions are more dependent on international conditions, as mineral prices tend to fluctuate more than other commodity prices. Taking the lead from Rehner et. al. (2014: 37), one would expect the following of recent economic development in Peru: first, growing export specialization, especially in the mining regions; second, that highly specialized regions are more susceptible to external shocks; and third, an adverse effect on other export activities due to Dutch-disease mechanisms. However, we find the reality to be more nuanced. Because export specialization and mineral dependence are subject to distinct regional patterns in resource-rich-and-diverse Peru, resource-curse phenomena vary. Next, we carry out a quantitative approximation of the stated contention of variegated dependence.

Methods and data

To assess the hypothesis of spatially differentiated resource-based development in Peru, we follow the methodology of Rehner et. al. (2014). Throughout the discussion, by "the case of Chile" we refer to that paper. We explore three resource-curse phenomena using a set of quantitative approximations: (a) the specialization hypothesis, through an analysis of regional export specialization of mineral-rich regions and their recent evolution; (b) the macroeconomic volatility hypothesis, through an analysis of the relationship between export specialization and GDP growth on a regional basis; and (c) the Dutch disease hypothesis, through an analysis of different export sectors by region in terms of their growth and their growth variability. As such, we will proceed as follows:

(a) Regional export specialization and its recent evolution: using the methodology of Rehner et. al. (2014), we use the Herfindahl-Hirschmann Index (HHI), which is an index that is within the range of 1/n and 1.0, where 'n' is the number of products in the Peruvian export basket. Because of the high export specialization of some of the regions, some in this HHI are close to 1 (Rhoades, 1993; Calkins, 1983), while other regions are close to 0 (such as the region of Lima, which is the most diversified of all).

(b) Export specialization and regional economic growth: in this case, we relate the export specialization of Peru's regions (using the HHI) and the regional GDP growth rate, taking averages from both indicators for the period 2001-2015. We classify the regions in clusters, using the non-hierarchical cluster technique, the 'k-means' methodology, classifying the variables mentioned above using their own value and their standardized value (z-score[5] standardization).

(c) Dutch disease analysis: for this purpose, we look at the export growth rates of the main resource products, the volatility of the international prices of those

[5] This value is obtained by subtracting the mean of the observations and dividing by the standard deviation, so the mean and the standard deviation of the resulting variables are 0 and 1, respectively.

products, and the relationship between these variables at different time periods for 2001-2015. We focus on gold and copper exports due to their greater significance for the national economy. This is done by comparing growth rates among sectors and years using T-tests.

We obtained our database from the Ministry of Trade and Tourism's Foreign Trade Integrated Information System (*Sistema Integrado de Información de Comercio Exterior*, SIICEX), which puts together data on regional exports in FOB prices for the period of 2001-2015. Although the database was at a very small level of disaggregation, the removal of 'extreme values' did not affect the indices. We eliminated all items that had an export value of less than USD 1,000. The information about the international prices of the resources was obtained from Bloomberg. In turn, the information on regional GDP and the US dollar-Peruvian sol conversion was obtained from the National Institute of Statistics (INEI) and the Central Bank of Peru (BCRP), respectively. The series on regional GDP is in real terms, with 2007 as the base year. All such series were calculated using the same methodology (INEI, 2015).

Results and discussion: mining dependence is spatially uneven

(a) Growing export specialization in some cases, diminishing in others

At first sight, we can see that coastal regions have the lowest HHI (see Table 3). Lima (which has some mining) and the port city of Callao (which today, alongside Lima, constitutes one big megacity of ten million people) have the lowest export-specialization indicators, followed by other coastal and non-mining regions. Taking the group of mining regions alone, the average HHI value for non-landlocked mining regions excluding Lima (Ancash, Arequipa, Ica, La Libertad, Lambayeque, Moquegua, Piura, Tacna y Tumbes) was 0.298 in 2001 and 0.290 in 2015; while the average HHI value for landlocked mining regions (Amazonas, Apurímac, Ayacucho, Cajamarca, Cusco, Huancavelica, Huánuco, Junín, Loreto, Madre de Dios, Pasco, Puno, San Martín y Ucayali) was 0.573 in 2001 and 0.485 in 2015.

Some of the coastal regions, however, have a relatively high HHI value, as they are highly dependent on resource exports. Ancash exports fishmeal and copper; while Arequipa, Moquegua, and Tacna export copper, gold, silver, iron, molybdenum and cement.

As to the evolution of the HHI and the mining product price, the results are very diverse. On the one hand, the copper-dependent region of Ancash shows an increase in specialization, which decreased in 2008-2009 when the price of copper fell. In the cases of Cusco, Junin, Puno and Ayacucho, dependent on several minerals, there is no clear trend.

Export specialization does not always increase along with mineral prices. In particular, Tacna and Moquegua defy the export-specialization hypothesis. The mining boom cycle brought about a decrease in HHI values, much more substantial for the less dependent Tacna. Their proximity to both Chile and to Bolivia—via Puno— are features that characterize the regional development of these two regions. Another interesting feature is that the regional governments of Tacna and Moquegua—so far—have not been

caught up in the notable corruption controversies plaguing most subnational governments of mining regions, which points to the hypothesis of better-spent fiscal windfalls. In fact, these two regions are the success stories of human-capital formation within mining regions (Agüero et. al. 2016, Calle et. al. 2017).

Table 3. Export Specialization – HHI differentiated by Region

Region	Average HHI	Estándar Dev.	HHI 2001	HHI 2015	Landlocked
Amazonas	0.665	0.185	0.716	0.856	Yes
Ancash	0.357	0.101	0.252	0.539	No
Apurímac	0.820	0.216	1.000	0.470	Yes
Arequipa	0.275	0.075	0.142	0.269	No
Ayacucho	0.356	0.147	0.653	0.304	Yes
Cajamarca	0.787	0.175	0.951	0.569	Yes
Callao	0.071	0.013	0.053	0.086	No
Cusco	0.523	0.183	0.557	0.824	Yes
Huancavelica	0.477	0.140	0.856	0.245	Yes
Huánuco	0.332	0.126	0.616	0.277	Yes
Ica	0.153	0.034	0.145	0.099	No
Junín	0.219	0.080	0.178	0.493	Yes
La Libertad	0.393	0.124	0.220	0.434	No
Lambayeque	0.306	0.102	0.406	0.134	No
Lima	0.063	0.026	0.084	0.018	No
Loreto	0.187	0.079	0.207	0.169	Yes
Madre De Dios	0.481	0.169	0.310	0.822	Yes
Moquegua	0.552	0.079	0.677	0.596	No
Pasco	0.431	0.111	0.667	0.274	Yes
Piura	0.134	0.047	0.201	0.068	No
Puno	0.663	0.197	0.484	0.878	Yes
San Martin	0.590	0.148	0.608	0.358	Yes
Tacna	0.318	0.109	0.445	0.212	No
Tumbes	0.232	0.046	0.206	0.270	No
Ucayali	0.240	0.085	0.207	0.257	Yes

Source: Authors' own calculation, based on SIICEX data.

It has also to be considered that large-scale mining started in Moquegua and Tacna decades before the post-1980s mining cycle (see Table 1 above), which points to a different subnational path of institutional development. The cases of Moquegua and Tacna reveal that a complex relationship between resources, institutions and regional development may develop over time, rather than a clear-cut dichotomous "resource curse" or "resource blessing" typology. Further case-study research on these two regions would help to better understand which "institutions" matter and how they evolve, as in Orihuela (2017).

There are always other economic geographical features and institutional structures that condition the development of a "mining region". The dry coastal region of Ica is another case of high complexity. Compared to Moquegua and Tacna, mining is of less

importance. Instead of copper, Ica has one large iron mine in the hands of a single Chinese enterprise, which of course takes the iron to China, in addition to small-scale informal gold mining. Thus, Ica is highly dependent on China. However, there are more resource endowments than just iron ore. Agriculture is booming in arid Ica through the use of underground water enabled by water rights, fiscal incentives, a lax and ad hoc labor regime for promoting exports, and state-provided infrastructure (Muñoz, 2011, 2015; Urteaga et. al. 2014). Moreover, Ica is close to Lima, so the export-agricultural sector finds it relatively easier to gain the ear of national state actors. These contextual economic-geography and institutional conditions are different to those of the frontier regions of Moquegua and Tacna—whose old economic elites may all by now have migrated to Lima. Again, historically oriented research on institutional change in Ica would help us cognize the geographic and institutional nuances of resource curses and blessings. Like non-mining, coastal Piura in the north, Ica has one of the lowest HHI scores, after Lima and Callao. Meanwhile, in contrast with the likes of Ica and Piura (or Moquegua and Tacna), landlocked mining regions such as Cusco, Puno, and Madre de Dios have become more export specialized.

(b) More region types and much higher growth volatility than in Chile

The relationship between export specialization and economic growth volatility is addressed through cluster analysis. We document two important differences compared with regional economic growth in Chile: (i) a more complex typology is needed to depict the relationship between export specialization and variance of regional economic growth; and (ii) regions in Peru have undergone much higher economic growth volatility, three times more on average, with a sub-set of cases of extreme dependence/volatility. While the basic economic geography of Chile is that of the mineral-rich northern regions, the agricultural- and manufacturing-based Central Valley, and the water- and forest-rich southern regions, Peru has mining all over the Andes, some on the coast and some in the Amazon, while export agriculture takes place fundamentally along the dry, irrigated coast.

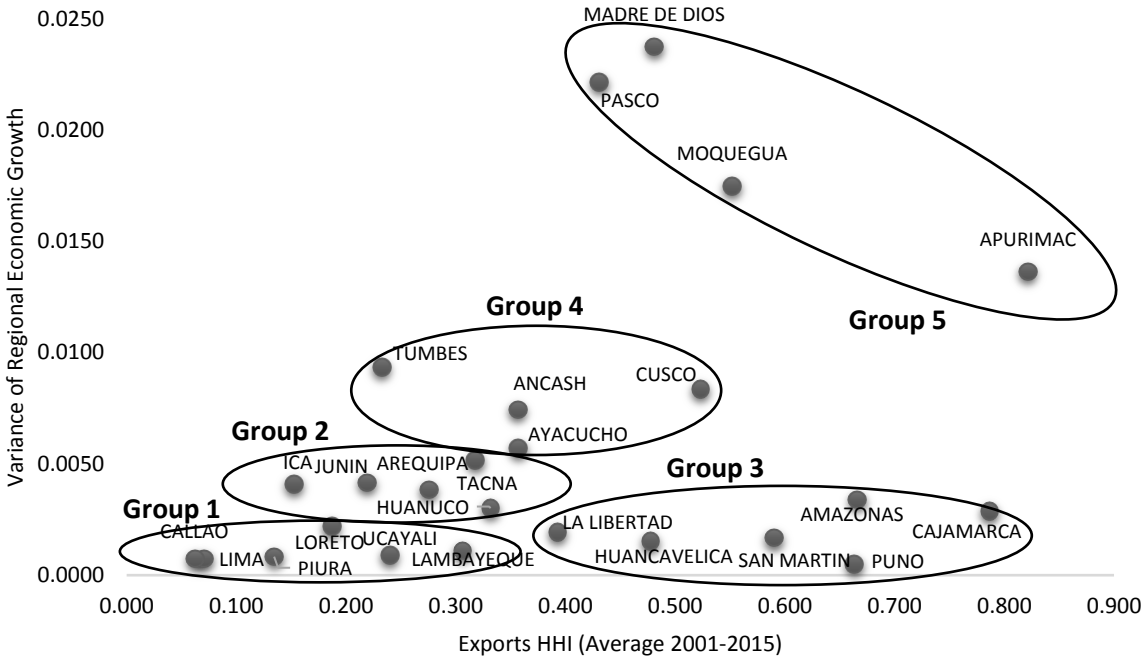
International trade dependence has both pros and cons. Under a good international context, exports and therefore aggregate income increase. However, those regions that are highly specialized in the export of raw materials are more susceptible to external shocks, which makes economic growth for such regions highly volatile and ultimately unsustainable. There have been no institutional efforts to cope with this developmental challenge. At the macroeconomic level, countercyclical policies have been the recipe of choice against external shocks since Keynes. Regional governments administer larger budgets than ever. In the last two decades, fiscal decentralization and the implementation of a scheme for fiscal mining-rent transfers to regional governments and municipalities, the so-called "*canon minero*" (Gruber 2017), have increased the input of subnational politics in regional development. A medicine for ameliorating high regional growth volatility would then be countercyclical fiscal policy carried out by regional governments. There have been no such institutional developments, however; quite the contrary, regional government expenditure is pro-cyclical.

The analysis of export specialization (average HHI) and the variation of regional GDP growth rates are presented on the basis of the standard deviation of the regional GDP. Compared to the Chilean case, Peruvian regions look hyper volatile. Unlike the Chilean

case (which only made 3 clusters), k = 5 clusters had the best performance[6]. See Figure 5.

Cluster 1 groups regions that have low HHI and relatively lower variation of economic growth (as mentioned, the economies of Peruvian regions are on average three times more volatile than Chilean ones). In this cluster are the coastal regions of Lima and Callao, Piura, and Lambayeque, as well as Amazonian Loreto and Ucayali, see Figure 6. No Andes-centered regions are located in this cluster. The average HHI ranges from values close to 0.050 to mean values of 0.350, being the mean 0.167. What these political regions have in common is that they are not eminently mining regions. This is evidence that regions of low export specialization and without much presence of mining exports tend to have a more stable and not so volatile economic growth.

Figure 5. Exports Specialization and GDP Growth Stability (2001-2015)



Source: Authors' own calculation, based on SIICEX and INEI data.

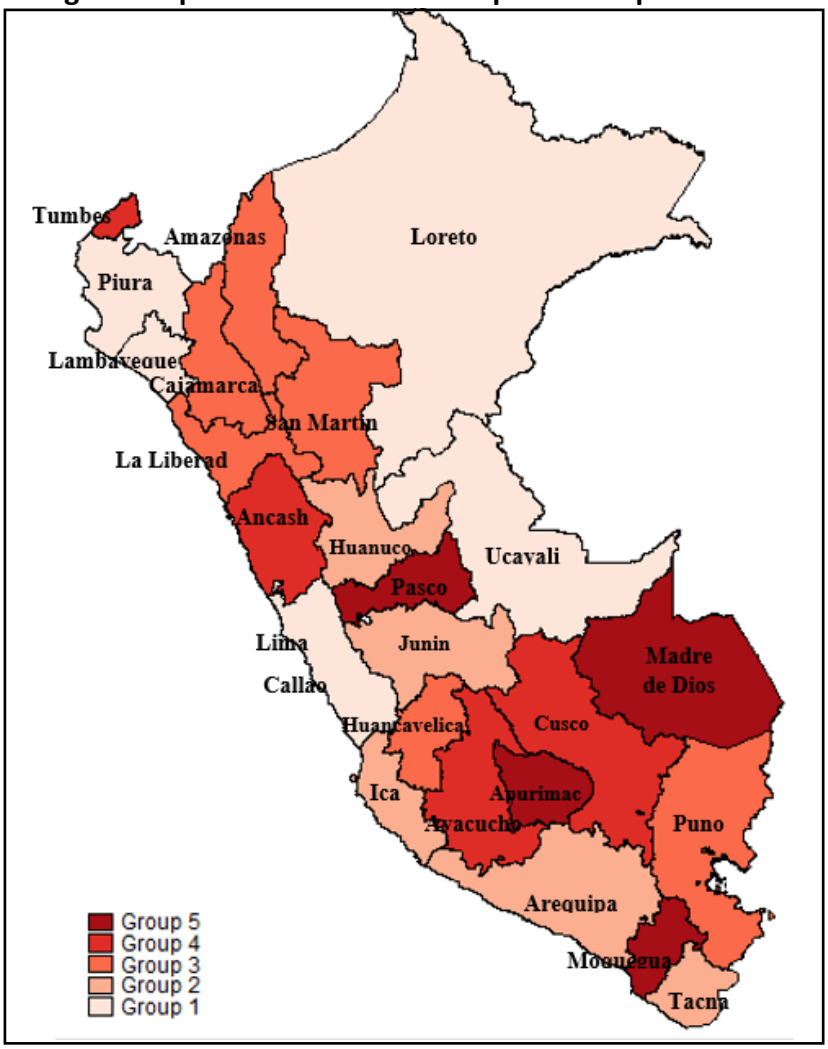
Cluster 2 presents low HHI but higher volatility of GDP than Cluster 1. Here we have the mining regions of Junín, Huánuco, Ica, Arequipa and Tacna. Junín, Arequipa and Huánuco have a diversified export basket, yet dependent on mining resources: gold, silver, copper, lead and zinc. In the case of Tacna and Ica, mining has a relatively lower significance among regional exports.

Cluster 3 is a subset with slightly more volatility of GDP than Cluster 1 (but not as much as Cluster 2) and much higher export specialization. Within this cluster are the gold export regions Cajamarca, La Libertad and Puno, in addition to Huancavelica, Amazonas

[6] Cluster-analysis stopping rules are used to determine the number of clusters. A stopping-rule value (also called an index) is computed for each cluster solution. Larger values (or smaller, depending on the particular stopping rule) indicate more distinct clustering. We use Calinski and Harabasz (1974) stopping rule, which consists in a pseudo-F index, where larger values indicate more distinct clustering.

and San Martin. While deprived Huancavelica is a region that exports several metals, Amazonas and San Martin have no mining. Thus, in the period of analysis, there was relative stability of economic growth when the region's main export product was gold, as well as non-mining products. In other words, gold looks less likely to become a curse for short-term regional economic growth (for long term growth, curse/blessing will depend on where are gold rents being invested).

Figure 6. Spatial Distribution of Exports Groups – Peru.



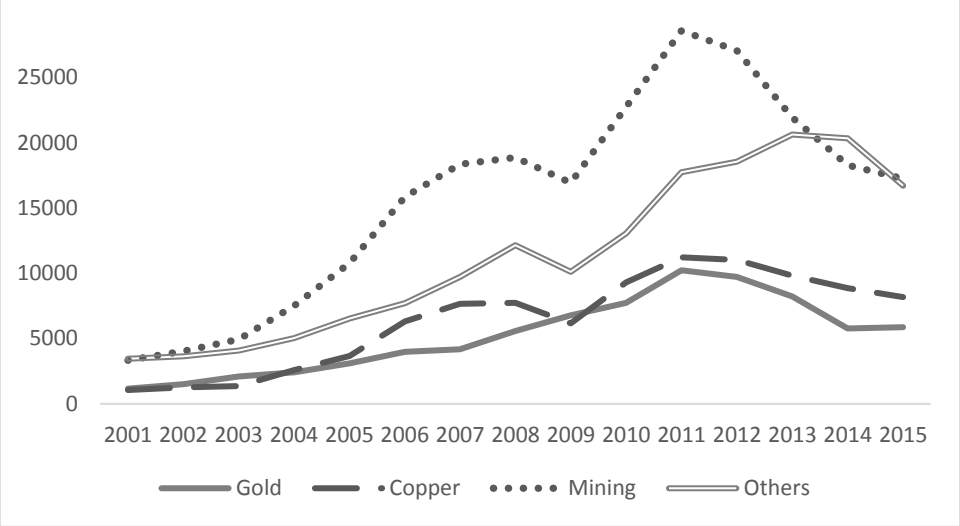
Source: Authors' own calculation based on data from SIICEX (2016).

The next two clusters are those with high GDP volatility. Cluster 4 collects HHI values of between 0.200 and 0.600, medium-level export specialization, along with high regional economic growth variance. The regions in this cluster are Ancash, Cusco and Ayacucho in the Andes, and coastal Tumbes, on the border with Ecuador. It is noteworthy that Ancash and Cusco are both highly dependent on copper (75 and 85 percent respectively). In turn, Ayacucho constitutes an exceptional case. At the beginning of the period, the region was not dependent on any mineral resource; its basket of metals was subject to variation over the years. Finally, Tumbes'story is completely different because its exports come from fisheries.

Finally, Cluster 5 is made of cases with extremely high growth volatility along with high export specialization: Apurímac, Madre de Dios, Pasco, and Moquegua. Although their

exports are concentrated on mining products, there is no evident pattern among the four. They are not neighbors, to begin with (see Figure 6), and each of them brings with it a different story. Madre de Dios is in Amazonia, but the other two fully Amazonian regions of Loreto and Ucayali are in the opposite cluster, the least volatile and most diversified Cluster 1. The big difference is gold mining, booming in Madre de Dios, non-existent in the other two; although we have already noted that gold is not as volatile, Madre de Dios happens to be a very poor region with a wealthy gold economy, a singular case. Moquegua is dependent not on gold but on copper, and so is not poor. In turn, deprived Apurímac has the highest export concentration: Gold and silver explain the 90% of its exports. Finally, the old mining region of Pasco, in the central Andes, is dependent on an open pit which gobbles up the centuries-old city of Cerro de Pasco, located more than 4,000 meters above sea level.[7]

Figure 7. Peru's Export Performance. 2001-2015



Source: Authors' own calculation based on data from SIICEX (2016). Millions of Dollars.

(c) Some evidence of Dutch disease, but only partial

The volatility of international commodities markets (see Figure 8) should affect export-oriented natural resource sectors and regions specializing in mineral exports more strongly than other sectors and regions, respectively. In Table 4, we compare exports growth rate of Gold, Copper and Total Mining versus the average of Other Sectors (non-mining sectors). As Rehner et. al. (2014) found for copper in the Chilean case, we find that gold, copper and the entire mining sector are subject to a higher export growth rate than other sectors in Peru, which is, in principle, conducive to the effects of Dutch disease. However, and besides the fact that changes in international markets have not impacted Peruvian mineral regions in the same way, Dutch disease did not manifest itself at the subnational level during the period of analysis. Thus, we have a diagnosis of high sub-national volatility - so high that it renders all tests of means in Table 5 statistically insignificant - but not of Dutch disease, meaning that non-mining exports

[7] For a complete review of regional exports, HHI and GDP growth, see annexes.

kept growing. The evidence supports a high-volatility type of resource curse, but not Dutch disease per se.

Table 4. Export Growth Rate - Differentiated by Period and Sector

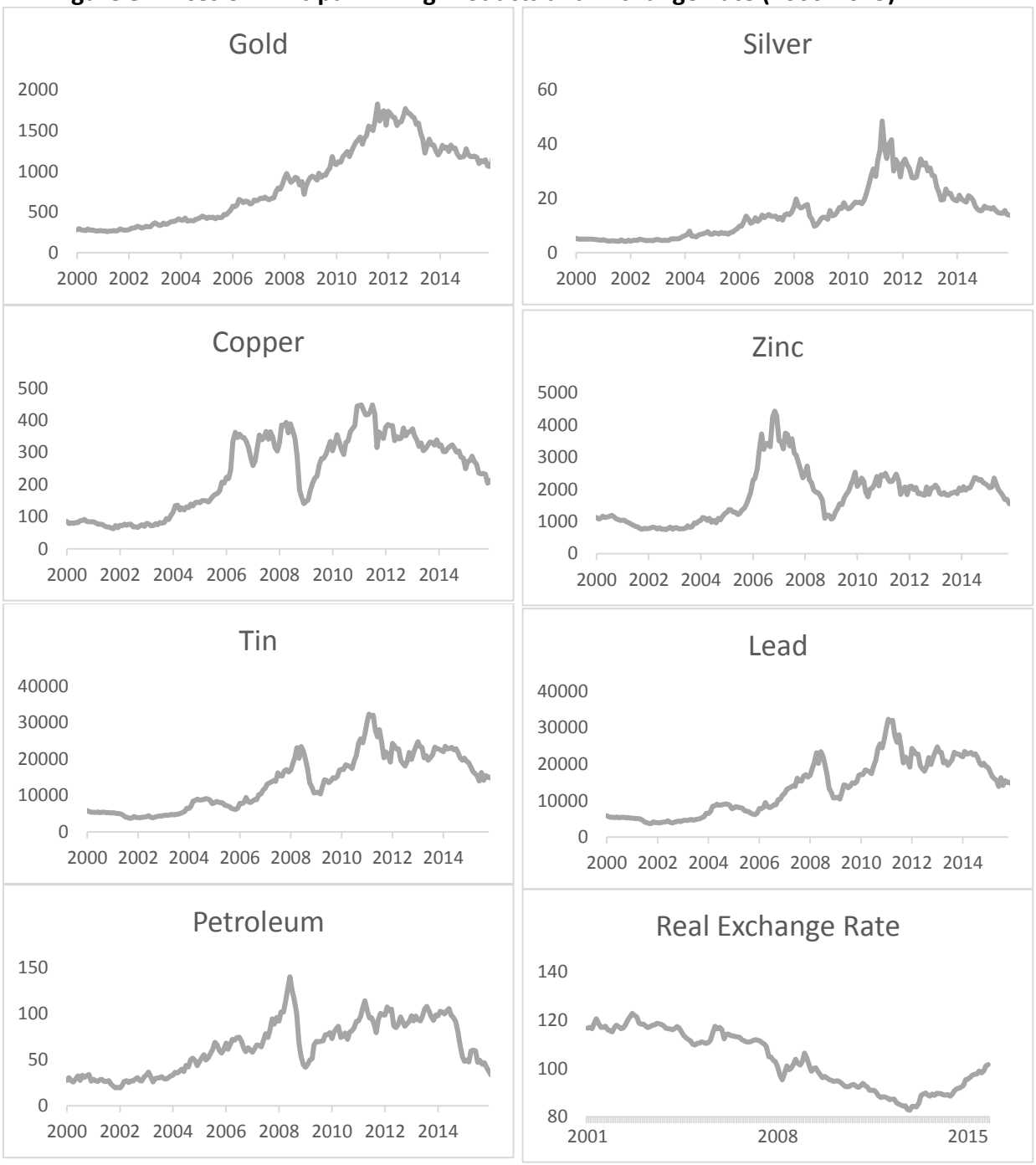
Variable	Sectors	N	Standard dev.	Average	Significance
Export growth rate 2001-2015 (%)	Gold	166	0.64	17.43	0.0775*
	Copper	170	0.70	14.55	ns
	Total Mining	253	0.48	18.49	0.0301*
	Other Sectors	315	0.32	11.20	-
Export growth rate 2001-2011(%)	Gold	73	0.60	30.07	0.0015***
	Copper	70	0.58	34.44	0.0802*
	Total Mining	121	0.48	27.00	0.0724*
	Other Sectors	154	0.28	17.00	-
Export growth rate 2001-2008 (%)	Gold	112	0.56	32.79	0.0264**
	Copper	110	0.71	27.41	0.0029***
	Total Mining	176	0.47	24.68	0.0322**
	Other Sectors	221	0.30	17.67	-
Export growth rate 2008-2009 (%)	Gold	11	0.73	21.57	0.0161**
	Copper	13	0.98	-17.26	ns
	Total Mining	18	0.56	-10.18	ns
	Other Sectors	21	0.35	-16.59	-
Export growth rate 2009-2012 (%)	Gold	28	0.39	35.49	ns
	Copper	27	0.82	30.72	ns
	Total Mining	37	0.38	28.88	ns
	Other Sectors	46	0.25	29.91	-
Export growth rate 2012-2015 (%)	Gold	41	0.63	-24.22	0.0208**
	Copper	46	0.66	-11.32	ns
	Total Mining	57	0.46	-11.63	ns
	Other Sectors	71	0.34	-0.86	-

Source: Authors' own calculation based on data from SIICEX (2016). Column Significance show T-test of exports growth rates of Gold, Copper and Total Mining versus exports growth rates of Other Sectors. Other Sectors refers to non-mining exports. Ns. means no significant. *** means significant at 1%. ** means significant at 5%. * means significant at 10%

Figure 7 basically shows that other exports kept growing along with copper and gold exports in 2001-2015. Table 4 breaks the information down by relevant time periods: 2001-2008 (expansion), 2008-9 (crisis), 2009-2012 (recovery) and 2012-2015 (end of cycle). The 2008-9 crisis, in particular, had different outcomes for different export sectors. This is fundamentally because while the prices of copper, zinc and petroleum fell sharply as global demand shrunk, gold prices continued increasing (see Figure 8 below). Copper (like oil) is much more volatile than gold, as the latter works as an asset of last resort. It could be said that the resource curse depends on "the commodities lottery". Thus, the 2008-9 change in international conditions had a different impact on mono-dependent Chile than it did on diverse-dependent Peru. However, deterioration of international conditions does not always take the same form. While during the crisis

of 2008-2009 the gold price kept climbing, the 2012-2015 downturn meant the same for copper and gold prices, and gold exports fell more sharply (see Table 4).

Figure 8. Prices of Principal Mining Products and Exchange Rate (2000-2015).



Source: Authors' own calculation based on data from Bloomberg. BCRP (2016)

With the purpose of performing a subnational analysis of export growth rates, Table 5 uses the five groups identified in the cluster analysis. As already mentioned, subnational volatility of GDP growth rates is so high (again, higher than in Chile) that differences of averages compared with the mining sector are non-statistically significant. Despite this, it is important to note that, on average, the most volatile group (Group 5) also has a higher export growth rate, which is positive even in times of crisis or falls of all other groups.

Table 5. Export Growth Rates in All Sectors and in Non-Mining Sectors - Differentiated by Period and Group of Region

Variable	Groups of Regions	N	Std. dev.	Average	Significance
All Sectors					
Export growth rate 2001-2015 (%)	Group 1	75	0.19	9.22	ns
	Group 2	63	0.29	12.53	ns
	Group 3	75	0.34	13.63	ns
	Group 4	51	0.27	16.56	ns
	Group 5	51	0.49	21.09	ns
Export growth rate 2001-2011(%)	Group 1	52	0.17	14.39	ns
	Group 2	43	0.28	18.03	ns
	Group 3	52	0.28	23.26	ns
	Group 4	35	0.26	23.49	ns
	Group 5	35	0.48	25.88	ns
Export growth rate 2012-2015 (%)	Group 1	17	0.20	-5.23	ns
	Group 2	15	0.30	5.29	ns
	Group 3	17	0.41	-6.57	ns
	Group 4	12	0.26	-0.34	ns
	Group 5	12	0.45	2.41	ns
Non-Mining Sectors					
Export growth rate 2001-2015 (%)	Group 1	75	0.19	8.81	ns
	Group 2	63	0.27	10.55	ns
	Group 3	75	0.39	16.35	ns
	Group 4	51	0.31	6.90	ns
	Group 5	51	0.64	12.24	ns
Export growth rate 2001-2011(%)	Group 1	52	0.17	13.53	ns
	Group 2	44	0.22	16.79	ns
	Group 3	53	0.36	23.63	ns
	Group 4	35	0.24	14.75	ns
	Group 5	36	0.63	14.82	ns
Export growth rate 2012-2015 (%)	Group 1	17	0.19	-4.00	ns
	Group 2	14	0.35	-0.36	ns
	Group 3	16	0.43	2.52	ns
	Group 4	12	0.39	-13.15	ns
	Group 5	11	0.33	2.08	ns

Source: Authors' own calculation based on data from SIICEX (2016). Other Sectors reffers to non-mining exports. N.S. means no significant. *** means significant at 1%. ** means significant at 5%. * means significant at 10%

Conclusions

The statistical analysis backs a general "variegated dependency" hypothesis of resource-based economic development: dependency-related resource curse phenomena is common but is not the same everywhere. We should expect spatially differentiated economic development at the sub-national level because being a "resource abundant" country in the periphery is not the only structural feature that matters. Our theoretical framework points to the significance of other economic geographic and institutional structures: (i) economic-geography structures such as other resource endowments, peripheral location (in relation to national and international markets) of regions, and transportation costs; and (ii) institutional structures such as the quality of national and subnational state reach. In fact, geographic and institutional structures interplay and evolve over time. Peru is subject to wider resource heterogeneity and institutional complexity than Chile. The most important factors behind that are the wider diversity of ecological regions, the larger number of political regions, and the limited and more uneven infrastructural power of the state outside the capital city of Lima, first, and along the coast, second. The cluster analysis did not show a spatial pattern, as mining takes place all over the Peruvian Andes. Political regions, moreover, have varied baskets of resources, resulting from the diversity of ecosystems contained within subnational political borders, and over time have built diverse institutional conditions—which cannot be explored quantitatively.

In theory, a greater degree of export specialization in minerals leads to higher vulnerability to external shocks, which is conducive to Dutch disease/resource curse phenomena. Yet in practice our analysis tells a nuanced tale. Yes, there is very high sub-national volatility of export income; however, not all mineral-rich regions experienced higher export specialization during the recent commodity cycle and, moreover, there is no real pattern of Dutch disease. The results are quite mixed. Some mining regions have further specialized in the export of mining resources, but not others. Certain regions, mainly located in the Central Andes, have remained dependent on mining during the whole period, but have changed their main mineral export. In turn, volatility is not the same everywhere within resource-rich Peru: we identified clusters with extreme, high, moderate, and low growth volatility. As dependency-related resource curse phenomena do not clearly emerge in all political regions of Peru during the period of analysis, we conclude that the resource curse in the periphery should not be conceptualized as either homogenous or universal. Rather, dependency is variegated.

Peru has the curse of diversified dependency: resource-based development is a "blessing" for voters and authorities located in the coastal megacity of Lima, who experience not-so-volatile growth and have an eye to national macroeconomic figures; while such development would likely be or become a "curse" for regions highly specialized in mining but lacking other historically shaped factor endowments, geographic conditions, and institutional resources to tackle the developmental challenges of mineral dependence.

Thus, diversity is not always a blessing, or not a blessing everywhere, as the focus on GDP and exports may lead us to believe. Moreover, diversified exports also mean other

resource curses that are not fully discussed in this paper; Peru is highly dependent on the resource-based *illegal* economies of gold, coca and timber. Illegal economies bring pecuniary benefits to a wide network of entrepreneurs and workers and therefore generate wider local consumption, leading to productive linkages and diversification. However, illegal economies also construct institutional regimes conducive to corruption, violence and environmental degradation, which might crowd out non-corrupt, non-violent and environmentally friendly economies. This might be termed the "Andean disease" type of resource curse.

Summing up, while in principle a curse may become a blessing over time—and vice-versa— this study demonstrates that the economic impacts of resource development are unevenly distributed across space. In other words, mineral regions could become less/more vulnerable to external shocks over time, on the one hand, and not all mineral regions would perform in the same way within the same time period, on the other. Having depicted quantitatively a general picture of variegated dependence for regional development in Peru, an institutional economic-geography perspective calls for complimentary qualitative research to look into how structural geographic and institutional conditions matter in specific mineral-abundant regions (say Ancash, Ica, Madre de Dios, Moquegua or Tacna), and at well-defined time periods, for the curbing or aggravation of given resource-curse phenomena.

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