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THE BOLIVIAN LITHIUM PUZZLE: PUTTING TOGETHER MARKET UNCERTAINTY, POLITICAL DIVIDENDS, AND THE PERILS OF NATURAL RESOURCE-LED DEVELOPMENT

by

COREY L. BENSON

Prof. James Mahon, Advisor

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Chapter 1: Introduction

"Brothers and sisters, with the lithium, with the reserves, of the Salar de Uyuni, of the Salar de Coipasa, and other small salars existing in the department of Potosí, I think that Potosí, that Bolivia, is the hope, not only for the people of Potosí, not only for Bolivia, but for the whole of humanity."[1]

- Bolivian President Evo Morales

"It's you who controls the raw materials for the 21st and 22nd centuries. You are like Saudi Arabia."[2]

- French business magnate Vincent Bolloré, speaking to Bolivian President Evo Morales

The Lithium Puzzle

Bolivia's massive lithium deposits have motivated Bolivian President Evo Morales and members of the international business community to characterize Bolivia as being on the precipice of global importance in the energy industry. Rigorous analysis of Bolivia's lithium reserves in the context of global lithium demand has revealed this characterization to be wildly inaccurate. It is the purpose of this thesis to understand the plausible political dividends and risks that animate President Morales' unrealistically optimistic lithium rhetoric.

The global fascination with Bolivia's natural resources is not a new phenomenon. Bolivia's historical experience has been one of an exploited, natural resource producer. Beginning in 1545, when the world's most valuable silver deposit was discovered, Bolivia's natural resources (nitrates, tin, natural gas, zinc, silver, and lead) have played a central role in determining Bolivia's intractable political instability and economic underdevelopment. Despite its substantial natural resource wealth, Bolivia remains the

[1] Evo Morales, "Industrializacion Del Litio - Uyuni Potosi - Bolivia 2/2," ComunicaBolivia, http://www.youtube.com/watch?v=mTMAZmJxbCQ&NR=1.
[2] Michael Smith and Matthew Craze, "Lithium for 4.8 Billion Electric Cars Lets Bolivia Upset Market," Bloomberg, http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aVqbD6T3XJeM.

poorest country in South America.[3] However, exploiting natural resource wealth for economic development remains a focus of the Bolivian government and a concern of the Bolivian people.

As the world confronts the dual crises of climate change and Peak Oil, Bolivia's lithium is being heralded as a natural resource with the power to promote environmental sustainability. Geological exploration of the Salar de Uyuni (the world's highest salt flats) has revealed 8.9 million metric tons of lithium (approximately 30% of the global total and the largest lithium deposit in a single country).[4] With the growing global prioritization of carbon dioxide emissions reduction and projected increases in gasoline prices, the demand for lithium is expected to rise dramatically throughout the 21st century.

In December 2005, former coca-grower union leader Evo Morales was elected to Bolivia's highest public office, becoming its first indigenous president.[5] The election came on the heels of popular mobilizations to reassert public control over Bolivia's water and natural gas; President Morales was elected with a strong mandate to remove the neoliberal reforms of the recent past. Owing to this mandate, President Morales nationalized Bolivia's massive hydrocarbon industry in 2006 (Bolivia has the second largest natural gas reserves in South America).[6] Along with nationalizing the industry, President Morales advocated a hydrocarbon revenue distribution policy that heavily favors sub national levels of government at the expense of the national government.

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[3] The World Bank, "Data: Bolivia," (2009).
[4] Simon Moores, "Behind Bolivia's Lithium," *Industrial Minerals* (2009): 1.
[5] Juan Forero, "Coca Advocate Wins Election for President in Bolivia," *New York Times* 2005.
[6] Christian Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," (Institute for Advanced Development Studies, 2007), 2.

Despite this, Bolivia's mineral industry remains under private ownership and mining royalties are distributed primarily to the national government.

The transition towards more government control over the economy and its natural resources has magnified existing political antipathy between the hydrocarbon rich and conservative eastern lowlands (Media Luna) and the mineral rich and statist west (Western Highlands). These tensions came to a head in the summer of 2008 when the Media Luna threatened to secede, in an effort to maintain complete control over its hydrocarbon resources. Additionally, the Western Highlands have become increasingly aggravated by the continuation of neoliberal mining taxation policy and a mineral revenue distribution policy that favors the national government at the expense of sub national governments. It is within this context of political disunity and natural resource prioritization that President Morales has asserted the vital importance of Bolivia's lithium reserves.

Growth and Natural Resources

Evaluating the prospects for Bolivia's lithium and the political motivations for President Morales' lithium rhetoric begins with a rigorous examination of the advantages and common pitfalls of natural resource-led development. By advocating a development path predicated on natural resource wealth, President Morales is taking substantial political risks. While many resource-rich states have enthusiastically committed substantial financial resources and attracted foreign investment in the service of developing extractive capacity, strong natural resource endowments are capable of

producing perverse economic and political outcomes.[7] The observed correlation between resource-rich countries, stunted economic growth, and political authoritarianism (the so-called "resource curse")[8] has led many within the political science community to question the validity of natural resource-led development. In light of Bolivia's stated commitment to exploit its lithium reserves, I focus my analysis on the strategies that allow states to escape the resource curse in their macroeconomic policy and contractual relations with transnational extractive companies.

While ideal macroeconomic resource development policy and contractual best practices must be employed in maximizing Bolivia's resource wealth, the volume of this wealth and its attractiveness on the global lithium market are subject to rigorous debate. Geological estimates of the lithium contained in the Salar de Uyuni, potential operation and capital costs for the proposed lithium plant (extraction, refinement, and transportation) and market projections of future lithium supply and demand vary considerably between sources. Forecasting Bolivia's lithium potential requires an analysis of the relationship between these three factors. While the Salar de Uyuni's lithium deposits are massive, the already productive lithium reserves in Chile's Salar de Atacama and Argentina's Salar de Hombre Muerto are likely to undermine the Salar de Uyuni's commercial viability. This controversy depends on disagreement between market analysts as to: (1) future lithium demand growth, (2) potential supply growth at existing lithium mining ventures, and (3) electric and hybrid vehicle demand growth.

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[7] Thad Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes* (Cambridge ; New York: Cambridge University Press, 2008), xvi.
[8] Macartan Humphreys, Jeffrey Sachs, and Joseph E. Stiglitz, *Escaping the Resource Curse* (New York: Columbia University Press, 2007).

The final and perhaps most important issue in determining the political motivations that animate the "lithium puzzle" concerns the impact of Bolivia's natural resource history and contemporary political friction surrounding natural resource development policy and revenue distribution on lithium policy. Analyzing this puzzle requires an examination of how the Bolivian government will manage domestic expectations for lithium wealth and regional claims to natural resource revenues throughout Bolivia. This analysis will focus on the political ramifications of President Morales' inconsistent natural resource management strategy in the context of a prospective lithium bonanza.

Thesis

The disconnect between President Morales' hyperbolic lithium rhetoric and the unfavorable economic outlook for Bolivia's lithium reserves, i.e. the "lithium puzzle," demands a political explanation. President Morales is overemphasizing the viability of Bolivian lithium to placate the secessionist aspirations of his economically powerful political opposition and the growing disillusionment within his political base. There is reason to believe that the Bolivian population respects the validity of Morales' rhetoric because of the international media attention that Bolivia's lithium has received and an ingrained belief in the "magical" developmental power of natural resources. However, by elevating the importance of natural resources as the key to Bolivia's economic development, President Morales runs the risk of stimulating further political fragmentation within Bolivia and a corresponding reduction in his own political capital.

Methodology

I utilize the wealth of social science literature regarding the aforementioned resource curse and natural resource management strategies to develop a lens through which to view contemporary Bolivia. In so doing, I focus on strategies for macroeconomic management and contractual negotiations between resource rich countries and foreign extractive companies. Assessing Bolivia's lithium potential requires consultation of geological sampling information from the United States Geological Service and lithium industry leaders. There is significant disagreement between sources as to the geological composition in the world's largest lithium deposits, the Salar de Uyuni, Bolivia, the Salar de Atacama, Chile, and the Salar de Hombre Muerto, Argentina. These discrepancies are due both to sampling differences and the vested interests of lithium companies in promoting their mining claims; I present the available geological data with these unavoidable biases in mind. I gather information on lithium demand from both energy consultancies and lithium companies' financial statements. I assess the growth of the electric and hybrid vehicle market by consulting clean technology consultancy and financial institution projections.

Synopsis of Paper

In order to contextualize Bolivia's contemporary lithium discourse, I enlist the existing literature regarding the resource-curse theory. In this first substantive chapter, I establish the institutional, macroeconomic, and physical conditions that can lead natural resource abundant states to foster political authoritarianism and economic underdevelopment. Within this definitional section (Section I), I also indentify the role

that transnational extractive companies play in perpetuating the resource curse. Section II responds to the common pitfalls of natural resource abundance enumerated in Section I by providing macroeconomic management and contractual negotiation strategies; that can help states transform their natural resource wealth into sustained economic growth. While Section II focuses on natural resource management strategies within the context of foreign participation (technical, financial) in the extractive sector(s), Section III presents the advantages and disadvantages of domestic natural resource management strategies (natural resource nationalization, state ownership). In so doing, Chapter 2 establishes a theoretical framework by which to judge the Morales administration's natural resource management strategy for Bolivia's lithium and other valuable natural resources (hydrocarbons, lead, zinc, silver).

Chapter 3 explores Bolivia's checkered natural resource history, beginning with Imperial Spain's silver mining at Cerro Rico through to the popular insurrection and ouster of Presidents Gonzalo Sanchéz de Losada and Carlos Mesa in reaction to the Bolivian government's contemporary efforts to increase natural gas exports to Chile and the citizenry's desires to nationalize the hydrocarbon industry.[9] Section I chronicles the historical episodes that have created Bolivia's fierce resource nationalism/regionalism and the political power gained through natural resource ownership. Throughout this section, I focus on both foreign actors that seized Bolivian natural resources and domestic elites that established policies that promoted stunted economic development. Bolivia's post-independence history was marred with two costly wars – the War of the Pacific (1879-1884), which was fought over guano and saltpeter deposits and the Chaco War

[9] Kent Eaton, "Backlash in Bolivia: Regional Autonomy as a Reaction against Indigenous Mobilization," *Politics & Society* 35, no. 71 (2007): 73.

(1932-1935), which was fought over hydrocarbon deposits – that ultimately led to popular political insurrection.[10] Section II describes the emergence of popular mobilization as a means of reasserting popular control over natural resources. In this section, I chronicle the importance of natural resource ownership in precipitating the Revolution of 1952 and the role that natural resource management played in shaping the politics of the post-Revolution era. Section III recounts the effectiveness of popular mobilization in defending Bolivia's natural resources since the 1990's. Section IV comments on the contribution of natural resource wealth to Bolivia's intractable political instability and stunted economic development. As a whole, Chapter 3 establishes the historical lens through which the Bolivian public views the contemporary natural resource management policy debate.

Chapter 4 examines the economic significance of Bolivia's massive lithium reserves in the context of the global lithium and hybrid-electric (HEV) and pure-electric vehicle (EV) markets. I conclude that the unfavorable geological composition of Bolivia's Salar de Uyuni – coupled with the production expansion potential of existing, low-cost lithium producers – precludes Bolivian lithium's commercial viability in the short term. Next, I look towards the long-term EV market by examining the limitations of currently used battery technologies and the promises and technological challenges of experimental battery technologies. In so doing, I reassert the relevance of Bolivia's lithium reserves, so long as lithium-air technology (a potentially disruptive technology that could rival gasoline-powered transportation) can reach commercial viability. Through this process, I identify the most likely outcome (baseline scenario) for the future

[10] Herbert S. Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 2nd ed. (New York: Oxford University Press, 1992), 194.

of Bolivia's lithium capability as being an important, but not definitive factor in Bolivia's long-term economic development. However, the developmental potential of Bolivia's lithium will not come to fruition under the guidance of President Morales. I also establish alternative scenarios ranging from a "worst-case" scenario (in which lithium's importance collapses due to technological advances by competitor battery technologies) to a "best-case" scenario (in which Bolivia realizes its aspirations as the "Saudi Arabia of lithium"). Finally, I draw attention to President Morales' unrealistically optimistic rhetoric regarding lithium development, in the belief that the study of this attitude may reveal the political and economic motivations underlying Bolivia's broader natural resource development strategy.

While Bolivia's lithium reserves are unlikely to be commercially viable in the near-term, the Morales administration, along with the state-owned mining company COMIBOL has proposed a bold plan to industrialize the Salar de Uyuni. Following an explanation of Bolivia's plans for lithium industrialization, I turn my focus towards the political motivations for President Morales' lithium rhetoric. In order to achieve this goal, I describe the Morales administration's inconsistent natural resource development strategy and the contentious political conflict between different levels of government within Bolivia over the control of natural resource revenues. In so doing, I comment on the economic explanations for the Morales administration's inconsistent natural resource strategy and articulate how this effort provides context for understanding the political components of the lithium puzzle. My conclusions cast President Morales' political philosophy as part rational and part irrational. President Morales is using lithium rhetoric to stimulate foreign interest in developing Bolivia's lithium resources and as a means of

placating political tension in both regions of his political opposition and base. Undergirding these rational explanations is President Morales' irrational fetishization of lithium and the Bolivian populace's complicity in this fetishization.

Chapter 6 comments on the political risks President Morales is making in asserting the importance of Bolivia's lithium reserves. In so doing, I seek to draw attention to the conflict between President Morales' fetishization of lithium, the decentralized hydrocarbon revenue distribution policy, the proposed centralized lithium revenue distribution policy and the political backlash this proposal has caused. Having offered both the political motivations for the lithium puzzle and the political implications therein, I conclude the thesis by commenting on the effectiveness of the Morales administration's broader natural resource management strategy in combating the resource curse. I conclude that despite the Morales administration's best efforts to create a natural resource development strategy that escapes the common pitfalls of the resource curse theory, constraints within the Bolivian sociopolitical milieu have thus far dictated a natural resource development strategy that perpetuates unsustainable macroeconomic practices and exacerbates income inequality and economic development. Enumerating the linkages between political pressures for decentralizing resource revenue distribution, historically conditioned cultural attitudes towards natural resources, President Morales' political philosophy, and economic expediency provides nuance to the simplified theoretical framework of the resource curse theory.

Chapter 2: The Perils Of Natural Resource-led Development

"Projects of mining, instead of replacing the capital employed in them, together with the ordinary profits of stock, commonly absorb both capital and stock. These are the projects, therefore, to which of all others a prudent law-giver, who desired to increase the capital of his nation, would least chuse [sic] to give any extraordinary encouragement…(1776,562)"[11]

- Adam Smith, *Wealth of Nations*, 1776

"If mineral wealth is not 'transformed' through investment and does not lead to productive capital formation in other areas – if the 'oil' is not 'sown' – the country will be poorer after the foreign operations are finished than it was before."[12]

- Edith Penrose, *Risk and the Political Economy of Resource Development*, 1984

Introduction

This chapter begins by identifying the causal relationship between natural resource endowments, political authoritarianism, and economic underdevelopment (the resource curse theory). Next, I offer the most prudent macroeconomic policy tools for managing natural resource wealth. Economic underdevelopment and authoritarian rule are not necessarily the destiny of states with abundant natural resource wealth. I then examine the negotiation techniques used by host governments and transnational extractive companies, with an emphasis on the most effective strategies a host government can employ to maximize the revenues it receives from its resource endowments. Finally, I describe the advantages and disadvantages of domestic natural resource development strategies (resource nationalization and state-ownership).

Before examining the political economy of natural resource-led development, it is worth considering whether states with natural resource wealth are best served in pursuing

[11] Daniel Lederman and William F. Maloney, *Natural Resources, Neither Curse nor Destiny* (Palo Alto, CA Washington, DC: Stanford Economics and Finance an imprint of Stanford University Press ; World Bank, 2007), 183.
[12] David W. Pearce et al., *Risk and the Political Economy of Resource Development* (New York: St. Martin's Press, 1984), 42.

a development model prefaced on finite, natural resource wealth. Leaving sub-soil resources in the ground is a legitimate strategy because these resources are "non-wasting assets."[13] A host nation will be best served to wait until it has articulated a long-term natural resource management strategy before exploiting its sub-soil wealth. For the purposes of this thesis, I will couch the possibility of Bolivia forgoing its lithium reserves for the sake of alternative development strategies such as manufacturing-led economic development, focusing instead on the promises and pitfalls of resource-led economic development.

Section I. Resource Curse Theory

What is the Resource Curse?

The resource curse is a phenomenon whereby "a massive flow of natural resource revenues into the fiscal coffers of the state" engenders "perverse political as well as economic effects."[14] Natural resources that are subject to the resource curse are those that produce rents, i.e. "… profits, or the excess over the return to capital, land, and labor when these factors of production are put to their next-best use."[15] Rent-producing natural resources, such as hydrocarbon or mineral deposits, tend to be "geographically concentrated industries without widespread linkages to other productive processes."[16] This geographic concentration, coupled with the fact that extractive industries are usually capital-intensive rather than labor-intensive, creates the ideal conditions whereby powerful elites can exert unquestionable authority over the resource industry. It is important to note that there is a lack of consensus within the political economy

[13] Humphreys, Sachs, and Stiglitz, *Escaping the Resource Curse*, 15.
[14] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, xv.
[15] Ibid., 6.
[16] Ibid.

community as to whether the resource curse exists, and if it exists, there is disagreement as to the specific mechanisms that cause it.[17] The following section enumerates some of the most-widely accepted mechanisms by which the resource curse is believed to exist.

Resource Curse – Perverse Political Effects

In its simplest formulation, the resource curse asserts a causal relationship between resource wealth and authoritarian governments.[18] Well-financed elites can control a nation's natural resource rents through violent suppression of the public, but in many cases overt suppression is unnecessary. Resource abundance bestows an external source of revenue that precludes the need for domestic taxation. In the absence of taxation, political elites are less accountable to their citizens and citizen acceptance of elite rule can be justified through "sustaining patronage networks and/or providing huge subsidies to the population to garner social and political support, rather than on developing institutionalized mechanisms of responsiveness."[19] Without the need to develop 'institutionalized mechanisms of responsiveness,' i.e. a free-and-fair electoral process that allows public participation, authoritarianism can easily flourish.

The correlation between natural resource wealth and authoritarianism is not a sacrosanct rule of social science. If resource wealth alone stimulated authoritarianism, resource-rich states like the United States and Australia would be expected to support strong authoritarian traditions. Historically, these resource rich states have fostered strong democratic political traditions; in fact, resource wealth can serve as a democratizing force

[17] For additional information see Jeffrey Frankel's "The Natural Resource Curse: A Survey" – NBER Working Paper No. 15836
[18] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 1.
[19] Erika Weinthal and Pauline Jones Luong, "Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth," *Perspectives on Politics* 4, no. 1 (2006): 38.

under the proper conditions. According to political scientist Thad Dunning, whether or not resource wealth has a democratizing or authoritarian effect is based on the level of income inequality in the non-resource economy, and the extent of resource dependence (calculated as the fractional size of the resource economy compared to the total economy).[20] Higher levels of non-resource income inequality and low levels of resource dependence create the conditions for democracy while low levels of non-resource income inequality and high levels of resource dependence create the conditions for autocracy.[21] By this argument, in contemporary Bolivia, resource rents are democratizing because of Bolivia's comparatively high non-resource income inequality and comparatively low level of resource dependence.

Resource Curse – Perverse Economic Effects

The preponderance of states whose economies have underperformed despite rich endowments of natural resource wealth informs the belief that natural resources are in same way "cursed." The following section describes the adverse economic effects that can arise from extracting resource wealth. These effects can be organized into three categories: (1) the "Dutch Disease"; (2) investment precluded by consumption; and (3) exploitive concessionary contracts.

[20] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 62.
[21] Ibid., 22.

1. The "Dutch Disease"

The "Dutch Disease" describes the economic disruption caused by the 1960's discovery of rich natural gas deposits in the North Sea on the Dutch economy.[22] In this case, the resource boom triggered an increase in the real exchange rate which can inhibit or even retard growth in other tradable export sectors.[23] By making non-resource export industries less internationally competitive, the "Dutch Disease" may also shift investment away form non-resource export industries, creating a self-perpetuating cycle that detracts from a national economy's diversity and growth.

2. Investment Precluded by Consumption

Natural resource booms create resource rents, which can be easily mismanaged if a state lacks strong institutions. I categorize strong institutions as government structures (legislative stability, checks on power) that limit short-term political gain at the expense of long-term economic stability and growth. Mismanagement of resource wealth is due in large part to a divergence in short-term political incentives that favor consumption (direct distribution of rents and subsidy systems) and long-term macroeconomic development incentives that favor investment (in productive capacity and savings). Maintaining discipline in macroeconomic policy is especially difficult in states with glaring developmental deficiencies and strong populist cultures. The state's populace may criticize and ultimately depose its leaders if it believes that the resource wealth is being embezzled by elites; elites that do not invest in public projects or distribute rents directly to the population are vulnerable to popular mobilization. Populist pressure to share

[22] Weinthal and Luong, "Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth," 37.
[23] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 23.

resource rents with the public often leads to "investment in unproductive public work projects that are motivated by politics rather than profit (that is, "white elephants") or subsidizing food, fuel, failing industries and even government jobs."[24]

For the poor individual who has problems that could be solved by short-term consumption (i.e. malnutrition), the presence of resource wealth may create the belief that resource rents would be best spent on consumption; investing resource rents in productive capacity or interest-bearing funds may not be popular policies. In cases of malnutrition, an increase in consumption may represent a vital step in allowing individuals to participate and contribute to economic activity. However, above a certain threshold, the prioritization of consumption, while politically attractive, is a main contributor to the resource curse.[25]

3. Exploitive Concessionary Contracts

Extracting and processing natural resources on an industrial scale requires substantial capital and technical expertise. Economically developing states often lack the requisite financial and technical resources to develop their natural resource extraction and processing potential. In the absence of this domestic capability, developing states often enlist transnational extractive companies (heretofore referred to as TECs) to aid in natural resource development. TECs offer a "combination of capital, technology, and experience that are necessary to find [natural resources], bring them on-line, and process and market

[24] Weinthal and Luong, "Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth," 37.
[25] Humphreys, Sachs, and Stiglitz, *Escaping the Resource Curse*, 157.

the output."[26] Owing to their superior resources and the economically risky nature of natural resource exploration, i.e. the "risk premium,"[27] TECs can demand very attractive contract terms.[28] If a host nation does not have an accurate understanding of the extent of its sub-soil wealth, TECs have the incentive to under-represent the host nation's resource wealth when bidding for natural resource concession rights. In so doing, TECs can potentially accrue a larger percentage of resource revenues than they would under conditions of equal information. Bidding competition between multiple TECs should limit the exploitation stemming from informational asymmetries so long as there is no collusion. However, given that economically underdeveloped nations usually lack mining expertise and/or a clear understanding of their own resources, the host nation is in a weak bargaining position. Exploitive concessionary contracts, whether the product of informational asymmetries or the TEC's risk premium, contribute to the economic deprivation of the resource curse by minimizing the amount of revenue a host nation receives for its natural resources.

Exploitive concessionary contracts can also diminish a host nation's potential resource revenues by not including provisions to add value-added industries within the host nation. The market value of a primary product (mineral, hydrocarbons, etc.) mined in a developing host nation is a small fraction of the market value of that commodity's final use. For example, the value of the lithium used in the lithium-ion battery that powers the Tesla Roadster electric vehicle accounts for only 6.7% of the lithium-ion

[26] Theodore H. Moran, *Multinational Corporations and the Politics of Dependence : Copper in Chile* (Princeton, N.J.: Princeton University Press, 1974), 5.
[27] Tom Tietenberg and Lynne Lewis, *Environmental & Natural Resoruce Economics (8th Ed.)* (Boston: Pearson Education, Inc., 2009), 55.
[28] Moran, *Multinational Corporations and the Politics of Dependence : Copper in Chile*, 8.

battery's market value.[29] TECs usually do not have the incentive to create value-added industries within a host nation because it requires additional investment. Refining and other value-added processes normally exist outside of the host nation, so it is more economically feasible to use these existing resources.

Section II. Strategies for Natural Resource-Led Development

Macroeconomic Policy

Any state that is serious about avoiding the pitfalls of the resource curse must take deliberate actions to remedy the perverse impacts of resource rents on the national economy. As Adam Smith noted in 1776, exploiting natural resource wealth may actually decrease a state's total capital stock. This alarming phenomenon is not inevitable, but rather a consequence of poor macroeconomic management. A state seeking long-term resource-led macroeconomic development must restrain short-term political interests and promote long-term, and sometimes unpopular, macroeconomic prudence. The following sections highlight policy mechanisms that states can employ in their efforts to transform natural resource wealth into sustainable economic development. Without strong institutions, none of these policy recommendations can be successfully implemented.

1. Promoting Productive Investment

Macroeconomic management is essential to ensure that mineral wealth (natural capital) is transformed into productive capacity and infrastructure (physical capital). Theoretically, a state is best suited for natural resource-led development if its follows the

[29] Jefferson Strait, *Energy Science and Technology (Class #15)* (2010).

Hartwick Rule: all revenues from resource production net of production costs should be invested.[30] The Hartwick Rule is based on the premise of maintaining "weak sustainability,"[31] i.e. ensuring that a state's total capital stock does not decrease, by investing the proceeds of natural capital (minerals, hydrocarbons, etc.) in wealth-creating physical capital (factories, infrastructure, etc.). Part of this physical capital investment must be directed at the extractive operation itself, but maintaining extractive capabilities normally requires only a small percentage of total resource revenues.

Forward thinking resource rich states (e.g. Botswana) recognize that resource revenues are most valuable in that they can be used to diversify the state's productive capacity. The inevitability of resource depletion necessitates economic diversification; the state must have alternative wealth-creating industries to replace the extractive industry when no more wealth can be extracted from the earth. Investing in education is imperative towards realizing economic diversification and economic growth. In addition to promoting overall economic growth, economic diversification can shield economies from the inevitable shocks caused by resource market volatility.[32]

2. Strategies for Minimizing the Impact of the "Dutch Disease"

In theory, avoiding the real exchange rate appreciation that causes the "Dutch Disease" requires a state to build up financial assets in foreign money markets, instead of financing domestic consumption.[33] In practice, all resource revenues cannot be sequestered in financial assets, especially in developing countries with immediate

[30] Humphreys, Sachs, and Stiglitz, *Escaping the Resource Curse*, 170.
[31] Lewis, *Environmental & Natural Resoruce Economics (8th Ed.)*, 100.
[32] Weinthal and Luong, "Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth," 39.
[33] Humphreys, Sachs, and Stiglitz, *Escaping the Resource Curse*, 181.

infrastructural and educational needs. What money is invested directly in the economy is best used to improve deficient infrastructure and promote human capital growth. In developing countries, the productivity gains made by these investments "are likely to outweigh any negative effects on production caused by exchange rate appreciation due to the public investment spending."[34] Additionally, if investment is used to generate growth in non-tradable sectors of the economy (e.g. food production), the negative impact of the "Dutch Disease" on the overall economy can be minimized. [35]

3. Natural Resource Funds

In terms of long-term planning, many states have benefited from natural resource funds. Natural resource funds are used to reduce the "impact of commodity price volatility on the economy and, in turn, improve budget predictability by stabilizing spending patterns."[36] They achieve this important goal by accumulating rents when commodity prices are high; when commodity prices are low, revenue is transferred out of the natural resource fund to make up for budgetary shortfalls.

4. Direct Distribution of Rents

Some political economists have suggested that the best method for resource rent mismanagement is to distribute resource rents directly to citizens. This theory is based on the belief that individual citizens have a greater incentive to save the windfall rents then do government officials who are most concerned with maintaining power through

[34] Ibid., 187.
[35] Ibid., 173.
[36] Weinthal and Luong, "Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth," 40.

granting state subsidies and/or investing in "white elephants."[37] Commenting on the efficacy of this approach requires a clear distinction between developed and developing economies. While the short-term political incentives to please the voting public may be similar in developed and developing economies, the importance of government investment is not equal. In developing nations, individual citizens cannot pool their rents to build a much-needed national infrastructure network; the central government can accomplish this goal. In a developed state without glaring infrastructural deficiencies, distributing rents to individual citizens allow individual citizens to focus their investment on smaller-scale productive capacity. Infrastructural investment is considered a public good. Private actors have the incentive to undersupply public goods;[38] because of this, national governments usually fill the role of public goods provider. In developing countries that require infrastructural installation, there is a strong argument for government provision of public goods. In developed countries that require infrastructural maintenance, the benefit of public spending is comparatively less than in developing nations.

Contractual Negotiations

The financial and technical that characterize the TEC-host nation relationship create the conditions for concessionary contracts that overwhelmingly favor TECs' interests. Before resource extraction begins, a host nation can attempt to minimize contractual exploitation by demanding that the TEC include a provision for local employment in the concessionary contract. Ensuring local employment is most

[37] Ibid., 41.
[38] Lewis, *Environmental & Natural Resoruce Economics (8th Ed.)*, 79.

productive in that it may involve a diffusion of technical knowledge from the TEC to the host nation.[39] Cooperation between the technical experts of a TEC and those of a host nation may involve a loss of proprietary information regarding the extent of the resource base and the best extraction practices. This dissemination of information may undercut the long-term importance of the TEC in efficiently exploiting the resource base; this is the goal of ensuring local employment.

Once resource extraction begins and the extent of the resource base is known, a host nation can demand a renegotiation of the concessionary contract. "Empirically, few natural resource concessions in underdeveloped countries remain long unchanged."[40] The fluid nature of natural resource concessionary contracts in developing countries has motivated the "obsolescing bargain" theory. The "obsolescing bargain" theory asserts that the political economy of natural resource development favors a shift in negotiating power from the TEC to the host nation once resource extraction begins. Once a TEC agrees to undertake the project, it will invest the vast majority of its capital in the first years of the project; these start-up exploratory and physical capital costs become sunk costs. After this initial investment period, it is in a TEC's economic interest to continue its extractive operations even if less attractive contract terms are forced upon it, so long as the tax burden is not greater than variable costs.[41] A host nation that follows this strategy ensures that it will extract the maximum amount of revenue from its resource base, but runs the risk of discouraging future foreign investment. The decision to force a concessionary renegotiation must consider these competing interests.

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[39] This relationship presupposes some degree of technical competency on the part of the host nation.
[40] Moran, *Multinational Corporations and the Politics of Dependence : Copper in Chile*, 9.
[41] Robin Boadway and Michael Keen, "Theoretical Perspectives on Resource Tax Design," (Queen's University Department of Economics
, 2009), 4.

1. Royalty Bidding Versus Bonus Bidding

Once a host nation and a TEC begin negotiations, the host nation should be motivated by a single consideration, maximizing the government's percentage of resource revenues. Most natural resource contracts can be divided into two categories: royalty bidding and bonus bidding. In royalty bidding, governments auction mining rights in return for a percentage of the value of production from the extractive operations.[42] Royalty bidding is attractive for TECs that are attempting to exploit unproven resources because they are granted rights to explore without having to pay upfront costs to the host nation. Royalty bidding is also attractive to the host nation because it collects royalties on all of the real production assets, instead of auctioning concessionary rights based on guessing the quantity of its reserves. This strategy is useful in that it minimizes the importance of informational asymmetries between the TEC and host nation. However, high royalty rates reduce the incentive for extractive companies to invest in clean-up operations, and "may result in premature shutdown of wells as extraction costs rise…"[43] Royalty bidding is significant in that it forces the TEC to bear the risk of uncertain profits.

Bonus bidding is an inadvisable, but politically attractive option for auctioning natural resource concessionary rights. In bonus bidding, a TEC pays an upfront bonus to the host nation in return for full extraction and exportation rights. In this, bonus bidding exposes host nations to informational asymmetries with TECs: TECs have the incentive to under-represent the size of the mineral deposit. This strategy is tempting for governments that are in need of a quick infusion of money or desire immediate

[42] Humphreys, Sachs, and Stiglitz, *Escaping the Resource Curse*, 31.
[43] Ibid., 32.

gratification for political gain. However, bonus bidding ultimately leads to suboptimal outcomes in terms of maximizing government take of resource revenues.[44] Bonus bidding is significant in that it forces the host nation to bear the risk of uncertain profits.

Section III. Alternative Strategies for Natural Resource-Led Development

Resource Nationalization

The most aggressive contract-related strategy a host nation can adopt in an attempt to assert influence over its relationship with a TEC is to nationalize privately owned natural resources. Resource nationalization can take two basic forms: (1) the national army/police seizes a TEC's assets and ownership and operating responsibilities are ceded to the host nation and (2) a forced contract renegotiation whereby a host nation claims a substantially higher percentage of a TEC's revenues, but allows the TEC to continue operation. While both strategies are likely to infuriate the TEC, provoke international diplomatic backlash, and dissuade future foreign investment, the second option is the most pragmatic approach to dramatically increase government revenue associated with natural resource extraction. The second option's efficacy lies in its ability to generate greater revenues for the host nation while ensuring the continued presence of the TEC in the resource venture. The continued presence of the TEC can normally be ensured so long as the new tax burden is not so onerous as to exceed operating costs.

Host nations that choose to reclaim sovereignty of natural resources and expel the TECs may be choosing a symbolically superior strategy (with obvious political benefits to the ruling administration), but they are also inheriting difficult managerial

[44] Ibid.

responsibilities. Successful traditional resource nationalization implicitly asserts a host nation's confidence in managing the financial and technical affairs of its resource venture. Beyond the technical difficulties inherent in natural resource exploitation, a host nation assuming full ownership of its natural resources must establish new relationships with nongovernmental actors down the resource supply chain.

State Ownership

For those states with the requisite capital and technical expertise, creating nationally owned extractive companies can be an attractive alternative to the TEC development model because it allows a state to extract the full monetary value from its resources. However, the record of state-owned extractive companies is decidedly mixed. In evaluating the managerial efficiency of nationally owned extractive companies, it is most useful to consider nationally owned oil companies (NOCs) because they provide the richest dataset for analysis. Stacey L. Eller et al. (2007) analyzed 80 NOCs over a period of three years (2002-2004) and concluded that the typical NOC "is likely to under-invest in reserves and shift extraction of resources away from the future toward the present,"[45] and that NOCs score lower than privately owned oil companies in terms of revenue per employee and revenue per unit reserves. [46] NOCs' suboptimal performance on these two metrics is caused by over-employment and inefficient capital investment. In addition, NOC revenue generation often suffers from domestic subsidization of fuel.[47]

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[45] Peter Hartley Stacy L. Eller, Kenneth B. Medlock III, "Empirical Evidence on the Operational Efficiency of National Oil Companies," (Rice University: James A. Baker III Institute For Public Policy , 2007), 1.

[46] For detailed statistical analysis, please consult eter Hartley Stacy L. Eller, Kenneth B. Medlock III, "Empirical Evidence on the Operational Efficiency of National Oil Companies," (Rice University: James A. Baker III Institute For Public Policy, 2007), 21.

[47] Stacy L. Eller, "Empirical Evidence on the Operational Efficiency of National Oil Companies," 1.

Conclusion

The preceding literature review serves two main functions. First, it provides a basic theoretical framework (the resource curse theory) with which to contextualize contemporary Bolivia's political tension. The resource curse theory also provides a lens through which to view the political instability and economic underdevelopment that have plagued Bolivia since 1825. Second, the literature review introduces the obsolescing bargain theory: an invaluable theoretical tool that I use to interpret the Morales administration's seemingly inconsistent natural resource development strategy in chapter 5. All told, the foregoing chapter serves to contextualize the resource revenue distribution conflicts between different levels of Bolivian government and between the Bolivian national government and TECs. Shedding light on the lithium puzzle requires an analysis of these two levels of conflict.

Chapter 3: Bolivia's Natural Resource History

"…we cannot repeat another Cerro Rico de Potosí. For many years they have robbed us…Those who took our natural resources now are very rich, the looted are left very poor. And this has to change. Because of this, friends, not with lithium, nor with iron, nor with petroleum, can we repeat another Cerro Rico de Potosí. We have the obligation to understand, learn, and organize ourselves and begin to utilize the resource."[48]

- President Evo Morales

Introduction

The current rhetorical fervor regarding Bolivia's lithium reserves and the Morales administration's commitment to maintain sovereignty over this resource are the product of Bolivia's trouble natural resource history. The following historical narrative clarifies the central role of Bolivia's natural resource history in shaping its economic trajectory, social structure, and the popular understanding of Bolivia's historic underdevelopment. In serving this purpose, I aim to (1) chronicle the historical causes of Bolivia's fierce resource nationalism and resource regionalism; (2) establish the importance of natural resource ownership in determining political power in Bolivia; (3) demonstrate the power of popular mobilizations in shaping natural resource policy and national politics; (4) describe the vulnerability of resource dependency on national development; and (5) establish Bolivia's chronic political instability. All told, these themes provide context for President Morales' lithium rhetoric and Bolivia's contemporary political disunity related to natural resource ownership.

[48] Morales, "Industrializacion Del Litio - Uyuni Potosi - Bolivia 2/2."

Section I. The Rise of Resource Nationalism and the Power of Natural Resource Ownership in National Politics

Potosí's Silver

No resource has been more historically significant than the silver deposits at Cerro Rico de Potosí. After nearly pure silver deposits were discovered in 1545, the once strategically unimportant highland outpost of Potosí became Imperial Spain's most prized New World possession: "…the rich Potosi mines alone offered up to $1 billion in silver to the European colonizers."[49]

In order to create a profitable business enterprise, the Spanish instituted a system of forced servitude (known as the *mita* system). The slave-laborers (known as *mitayos*) were drawn from throughout Charcas (modern-day Bolivia) and forced to work the silver mines for little or no pay. The terrible working conditions, coupled with systemic malnutrition, produced between 2,500 and 12,000 miner deaths in a given year.[50] While the *mitayos*' exploitation cannot be overstated, Imperial Spain's exploitation of Bolivia was equally insidious in terms of the market forces it unleashed. Prior to the Spanish's "discovery" of silver at Potosí, surface silver deposits were mined by the native peoples and refined in small open-hearth smelters (known as guayra).[51] After the Spanish began mining operations, the nearly pure surface deposits were quickly exhausted. This development not only made silver mining a much more dangerous activity, but also necessitated new refining processes. In 1572, the Spanish used their financial and technological capital to displace the 15,000 native guayra smelters with several hundred

[49] Waltraud Q. Morales, "A Brief History of Bolivia ". (Infobase Publishing, 2010).
[50] Ibid., 28.
[51] Ibid., 25.

Spanish refineries that utilized an advanced "mercury amalgam process."[52] In order to increase its control on all steps of the silver industry, Viceroy Toledo of Imperial Spain created a Spanish mercury monopoly with its Huancavelica mine in Peru. Now Imperial Spain could control all steps in the silver mining/refining process.[53]

So rich were the silver veins at Cerro Rico that the former outpost swelled to 150,000 inhabitants by the early 17th century, equal in size to London.[54] By the beginning of the 18th century, the Bolivian silver industry began a long secular decline.[55] By the time Bolivia declared independence in 1825, the once robust silver industry had collapsed. Without access to Spanish capital and expertise, and with surface mines exhausted, the population of Potosí collapsed to 9,000 inhabitants.[56] The abandoned city stood as a physical manifestation of Bolivia's plundered natural resource wealth.

The Rise of the Silver Oligarchy

On December 28th 1864, General Mariano Melgarejo seized control of the Bolivian government.[57] In an effort to escape Bolivia's chronic economic underdevelopment, the Melgarejo regime pursued a highly liberal economic policy, especially as it pertained to Bolivia's natural resources. Facing persistent budget shortfalls and lacking a robust domestic industrial sector to tax, Bolivian leaders in the post-independence era attempted to resurrect the silver mining export industry. In the 1860s, the largest silver-mining companies, such as the Huanchaca enterprise of Aniceto Arce, received exemptions from the national government that allowed them to export

[52] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 41.
[53] Morales, "A Brief History of Bolivia ".
[54] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 55.
[55] Ibid., 70.
[56] Ibid., 104.
[57] Ibid., 135.

their silver to the international market without first being purchased by the *Banco de Rescate* (Minerals Purchasing Bank). As a result, the national government lost control in setting prices for Bolivian silver and faced diminishing silver revenues.[58] Melgarejo's business-friendly tax policy ushered in the rise of the silver oligarchy. By the end of the 1870s, Aniceto Arce's Huanchaca silver enterprise "was generating more income than the central government itself."[59]

The War of the Pacific (1879-1884)

In the 1840's, vast nitrate (guano and saltpeter) deposits were discovered in the Atacama Desert on Bolivia's Pacific seacoast.[60] Internationally, guano was used as a fertilizer and saltpeter was used in gunpowder.[61] Once again, a seemingly worthless and inhospitable tract of Bolivian land was instantly transformed into a natural resource deposit with international importance. While both Bolivia and Chile had territorial claims to the Atacama Litoral region, only after 1840 did Chile seriously challenge Bolivian sovereignty there.[62]

The nitrates discovery attracted a rush of foreign settlers to the region: "this population increase only compounded Bolivia's problems since Bolivian citizens were now outnumbered 10 to one by Chileans and other immigrants."[63] The dramatic overrepresentation of foreign entrepreneurs and prospectors was the result of the Bolivian government's aggressive policy to resurrect its silver industry in the mining centers of

[58] Ibid., 141.
[59] Ibid., 143.
[60] Morales, "A Brief History of Bolivia ".
[61] John Bellamy Foster and Brett Clark, "Ecological Imperialism: The Curse of Capitalism," *Socialist Register* (2004): 190.
[62] Morales, "A Brief History of Bolivia ".
[63] Ibid., 70.

Potosí and Oruro;[64] the limited amount of Bolivian capital was committed to these ventures. Recognizing the comparative commercial might of Chilean mining interests and hoping to secure loans from Chile,[65] Bolivian President Mariano Melgarejo adopted a policy of appeasement towards the commercially aggressive Chileans. Under the Mejillones Treaty of 1866, President Melgarejo ceded Bolivia's Atacama region below the 24th parallel and exempted Chile from paying taxes at Bolivia's Pacific ports.

The Mejillones Treaty severely diminished Bolivia's nitrate claims at the expense of Chilean interests: "as a result of his secret machinations with the Chilean nitrate interests, Melgarejo filled his personal coffers at the expense of the nation."[66] Bolivia's inability to profit from its first post-independence resource bonanza took on a new significance for Bolivia's frustrated populace. Instead of being exploited by the Spanish, the Mejillones Treaty typified exploitation by foreigners through the corruption and liberal economic policies of domestic political leadership. That the motivations leading to the Mejillones Treaty were more complicated than simple corruption and rent seeking was lost on the Bolivian populace – they felt betrayed by their own.

Twelve years later, President General Hilarion Daza's government and the Bolivian Congress of 1878 enacted a 10-cent tax for every 100 pounds of nitrates exported from Bolivian territory by the British-Chilean Nitrates and Railroad Company of Antofagasta. The 10-cent tax "provided Chile with the perfect pretext"[67] to occupy what remained of Bolivia's seacoast and provoke a full-scale war. When the British-Chilean Nitrates and Railroad Company of Antofagasta refused to pay the new tax,

[64] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 136.
[65] Melgarejo hoped to secure the loans, in part, to counteract falling government revenues.
[66] Morales, "A Brief History of Bolivia ".
[67] Ibid., 81.

President Daza unilaterally terminated its mining contract.[68] In response, Chilean troops occupied Antofagasta in February 1879 and within two months occupied all of Bolivia's Antofagasta province and the entire Pacific coast south of the 23rd parallel.[69] The Chileans faced minimal resistance from an unprepared Bolivian army, led by the ineffectual General Daza; Bolivia lost its entire seacoast and its valuable nitrate deposits.

The War of the Pacific had a substantial and lasting economic impact: "the gross value of the nitrate exports from the conquered regions reached nearly 3 billion pesos."[70] Additionally, Bolivia's landlocked status has detracted from its international competiveness.

Interwar Period – Metal Politics

The business-friendly policies of the Melgarejo regime benefitted silver mining interests, at the expense of the Bolivian state. Whereas in the past, the leaders of Bolivia's most powerful industries had remained outside of politics, the 1880s marked a shift towards the consolidation of the political and business elite. Recognizing that their long-term interests required the "establishment of a stable and financially sound government" that could avoid massive business disruptions like the one experienced during the War of the Pacific, Bolivia's business elite entered the political forum.[71] In the aftermath of the Melgarejo regime's liberal shift, silver oligarchs Gregorio Pacheco and Aniceto Arce successfully ran for Congress in 1880.[72] Four years later, Pacheco was elected president,

[68] Peter J. McFarren, "Bolivian History," Encyclopedia Britannica, http://www.britannica.com/EBchecked/topic/72106/Bolivia/218812/History.
[69] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 146.
[70] Morales, "A Brief History of Bolivia ".
[71] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 148.
[72] Ibid.

followed by Arce in 1888. Together, these two silver oligarchs consolidated the business reforms of the 1860s and maintained 15 years of Conservative Party rule.[73]

While the silver oligarchy controlled political power, the liberal economic policies that had solidified their power also held the antecedents for their political destruction. The 15 years of Conservative Party rule were not upended by popular revolt, but by dramatic changes in global commodity markets. In the 1880s and 1890s, the price of silver declined sharply, which led to a collapse in the silver oligarchy's economic and corresponding political power.[74] At the same time, rising tin prices shifted power to the tin merchants of the northern altiplano.[75] The shift in economic power from the silver producers to the tin producers caused a literal and figurative political realignment. The national capital was moved from Sucre to La Paz, i.e. from the silver-producing regions to the tin-producing regions.[76]

The Rise of the Tin Barons

As tin prices increased dramatically in the early 1900s, three "tin barons" emerged; collectively they controlled 80% of national production.[77] Chief among these barons was Simon Patiño, whose mines produced one-half of all Bolivian tin. During the high point of the tin boom in the 1920's, Bolivian mines accounted for 30 percent of the annual world production;[78] meaning Simon Patiño's operations represented 15% of the global tin market. In this climate of high tin prices, the Bolivian government stimulated tin production by building needed infrastructure, subsidizing transportation costs, and

[73] Morales, "A Brief History of Bolivia ".
[74] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 161.
[75] Morales, "A Brief History of Bolivia ".
[76] James A. Robinson, "The Political Economy of Decentralization in Bolivia," (Harvard University, 2008), 12.
[77] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 233.
[78] Morales, "A Brief History of Bolivia ".

reducing taxes to 3 percent of annual mineral exports.[79] Despite this preferential treatment, Patiño did not reciprocate by reinvesting his profits in developing Bolivia's economy. Instead, Patiño reorganized as much of his business outside of Bolivia as possible, including all refining.[80] This management strategy helped to enrich Patiño, but vilified him among the Bolivian populace.

The tin oligarchy's management strategy revealed the extent to which his mining interests dictated the actions of the Bolivian state. Specifically, in protecting their mines from labor organizations and periodic protests, the members of the tin oligarchy paid a part of the wages and benefits of soldiers stationed at their mines, underscoring the degree of official connection between the tin oligarchy and the state's repressive apparatus."[81] Additionally, the three tin barons each owned one of Bolivia's three largest newspapers in an effort to minimize organized popular opposition.[82] Whereas the Bolivian people had suffered from the expropriation of their silver by the Spanish and their nitrates by the Chileans, they had to stand by and watch a fellow countryman (Patiño) expropriate Bolivia's tin wealth, albeit with the Bolivian government's complicity.

The Chaco War (1932-1935)

The outcome of the War of the Pacific created fierce territorialism among the Bolivian populace – Bolivia entered the Chaco War to defend its territory and its natural resources. The Chaco War was waged by Paraguay and Bolivia over a section of inhospitable land, known as the Gran Chaco. In July 1932, Standard Oil of New Jersey

[79] Ibid., 95.
[80] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 165.
[81] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 233.
[82] Ibid., 234.

purchased petroleum concessions in southeastern Bolivian (Gran Chaco), which produced a significant quantity of oil.[83] Bolivia mobilized its entire army to defend to maintain territorial sovereignty and defend the Gran Chaco's rich oil deposits.

The Bolivian military campaign in the Chaco War was characterized by a severe disunity between the light-skinned military officers and the dark-skinned indigenous soldiers; soldiers were sent on suicide missions with no discernable strategic purpose.[84] Additionally, the Gran Chaco's arid climate, combined with ineffectual military planning, caused thousands of soldiers to die of thirst. In this, Bolivian soldiers "considered the brutal Chaco itself as their greatest enemy, followed by their own officers and the Paraguayan soldiers, respectively."[85] The Chaco War was a military failure and a national embarrassment.

In addition to the carnage, the Chaco War was defined by Standard Oil of Bolivia's admission that it had secretly exported oil to its Argentine subsidiary, through a "clandestine pipe they built from Bolivia to Argentina."[86] Standard Oil refused to give any aid to Bolivia during the conflict, even refusing to supply gasoline for the air force.

The senseless destruction of 65,000 Bolivian soldiers (proportionally "losses equal to what European nations suffered in World War I"),[87] coupled with the military leadership's loss of legitimacy, radically disrupted the political status quo. Disillusioned veterans of the Chaco War seized upon popular discontent and instituted a "military socialism."[88] Acting on this new ideology, Bolivia became the first Latin American

[83] Morales, "A Brief History of Bolivia ".
[84] Ibid., 108.
[85] Ibid., 110.
[86] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 9.
[87] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 194.
[88] Morales, "A Brief History of Bolivia ".

nation to seize control of a major transnational oil company when President David Toro nationalized the New Jersey-based Standard Oil Company on March 13, 1937.[89] This event was particularly significant in that it received approval throughout Bolivian society, including elite landowners. In the post Chaco War sociopolitical milieu, Standard Oil of New Jersey stood as a "popular symbol of foreign exploitation and economic imperialism."[90]

Section II. The Emergence of Popular Mobilization and The Political Left

The post-Chaco War environment led to three major changes in national politics which helped precipitate the Revolution of 1952: (1) increased government control of natural resource revenues (2) increased unionization and (3) the reorganization of the Bolivian electorate.

Increased Government Control of Natural Resource Revenues

In the immediate aftermath of Standard Oil's nationalization, President German Busch announced a Mining Decree on June 7, 1939,[91] requiring mining companies "to remit foreign exchange currency from mineral exports to the Central Bank at a substantially lower, government-controlled rate."[92] This new policy quadrupled the Bolivian government's tax revenues and "increased its share of profits from mining by 25

[89] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 203.
[90] Morales, "A Brief History of Bolivia ".
[91] Herbert Klein, "German Busch and the Era of "Military Socialism" in Bolivia," *The Hispanic American Historical Review* 47, no. 2 (1967): 179.
[92] Morales, "A Brief History of Bolivia ".

percent."[93] The Mining Decree was historically significant in that it remained unchanged under conservative and radical regimes alike.[94] After centuries of natural resource exploitation, the sovereignty of natural resources had become a non-partisan issue.

Increased Unionization

The post Chaco War political environment gave renewed strength to Bolivia's labor movement. In the war's immediate aftermath, various labor groups consolidated into the Confederation of Bolivian Workers (Confederación Sindical de Trabajadores de Bolivia). The CSTB lobbied the Busch administration for improved working conditions and were rewarded with the passage of the Busch Labor Code of May 24, 1939.[95] Increasing union rights did not deter conservative forces within Bolivia from fighting back. In 1942, hundreds of miners at the Catavi tin mine staged a strike over wages and working/living conditions. "Patiño prevailed upon the regime of General Peñaranda to send in troops, and thirty-five unarmed miners were killed."[96] Using this horrific incident constructively, Bolivian mine workers organized themselves into the Bolivian Mine Workers' Federation (Federación Sindicial de Trabajadores Mineros de Bolivia) in June 1944.[97] Led by the Trotskyist, Juan Lechín Oquendo, the FSTMB would play an important role in the Revolution of 1952, and typified the arrival of labor unions as a considerable force within Bolivian politics.

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[93] Ibid.
[94] Ibid.
[95] Ibid.
[96] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 234.
[97] Morales, "A Brief History of Bolivia ".

The Reorganization of the Bolivian Electorate

The reorganization of the Bolivian electorate solidified the secular shift towards left-leaning politics. After the Chaco War, both middle-class and upper-class intelligentsia support for the traditional parties disintegrated. Amidst this political vacuum, the Revolutionary Nationalist Movement (MNR) emerged as a multiclass party, consolidating the interests of the indigenous peasants and the miners; the MNR's political identity was typified in the slogan "Land to the Indian, mines to the State."[98] In the 1940s, the MNR substantially increased its presence in Congress. By 1951, the MNR had won a national election by electing Victor Paz Estenssoro as president. However, the national army nullified the election results.[99] The army's actions provided the final motivation for the Revolution of 1952 to emerge.

The Revolution of 1952

MNR loyalists launched the National Revolution on April 9, 1952.[100] Enlisting the combined power of workers, miners, middle-class students and intellectuals, and the national police, the MNR fought the army and government supporters for two bloody days. In total, 552 were killed and 787 wounded.[101] On April 11, 1952, General Torres Ortiz's government signed a truce with the revolutionaries;[102] exiled MNR-leader Victor Paz Estenssoro assumed the presidency.

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[98] Ibid., 136.
[99] Ibid., 137.
[100] Fernando Garcia Arganaras, "Bolivia's Transformist Revolution," *Latin American Perspectives* 19, no. 2 (1992): 50.
[101] Morales, "A Brief History of Bolivia ".
[102] Ibid.

The MNR's ascendance to national prominence allowed it to act on its three major policy goals: universal suffrage, nationalization of the tin mines, and land reform.[103] A new electoral law guaranteed the right to vote for all Bolivians over 21, or 18 if married, and most importantly, abolished literacy tests and property requirements.[104] This reform increased the electorate five-fold; illiterate miners and indigenous peoples joined the political process for the first time.[105] On October 31, 1952, the MNR government nationalized the assets of the tin mining barons. The state mining company COMIBOL was then created to manage the seized mines.[106] Finally, the Agrarian Reform Decree of 1953 ushered in an era of land redistribution; by June 1970, more than 5 million acres of agricultural land had been distributed to Bolivia's landless or land poor.[107]

Conservative Pushback: The Rise of Neo-liberalism (1982-2005)

Twenty-two years of military governments, which began in 1962, led to continued violence and political discord. The situation came to a head on September 17, 1982, when thousands of Bolivians staged a general strike, causing the military to vacate the government. In its place, the Bolivian Congress of 1980 appointed Hernán Siles Zuazo to be president on October 10, 1982.[108] The return to civilian rule did not immediately solve Bolivia's intractable economic issues. Economic stagnation and hyperinflation in the 1980s caused the Bolivian government to appeal to the International Monetary Fund and

[103] Ibid., 144.
[104] McFarren, "Bolivian History."
[105] Morales, "A Brief History of Bolivia ".
[106] Ibid., 147.
[107] Ibid., 152.
[108] Klein, *Bolivia : The Evolution of a Multi-Ethnic Society*, 269.

World Bank for assistance.[109] In attempting to escape its economic deprivation, Bolivian leadership implemented structural changes to the economy, including a privatization of major national enterprises, which it hoped would stimulate capital accumulation. In 1994, Capitalization Law 1544 "authorized the Executive Branch to sell 50 percent of the state company's shares."[110] Two years later, Law 1689, a new hydrocarbon law, was created to attract foreign investment in the hydrocarbon industry and facilitate the breakup of Bolivia's state-owned hydrocarbon company, YPFB.[111] The breakup of YPFB dramatically decreased government revenues from the hydrocarbon industry. Whereas taxes and royalties on oil and gas "had constituted between 38 and 60 percent of state revenues from 1985 to 1995", they constituted just 7 percent of total government revenues in 2002.[112]

Section III. Popular Mobilization in Defense of Natural Resources in the Contemporary Era

Lithium Company of America – Salar de Uyuni (1990-1991)

In 1990, the Lithium Company of America (Lithco) won a public tender to exploit the lithium reserves at the Salar de Uyuni in the department of Potosí. Local civic and political leaders organized the largely indigenous population to protest the contract. In addition to fears of environmental degradation, the protestors opposed the Lithco contract because:

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[109] Ibid., 272.
[110] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 11.
[111] Ibid.
[112] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 247.

> Lithco wanted to take out the highest concentration brines (Rio Grande Delta) without considering a comprehensive utilization of brines and their various minerals. With this contract, Bolivia would have continued exporting primary material, without value added, because the lithium carbonate factory of the corporation was in the United States.[113]

This criticism, articulated by the state-owned mining company COMIBOL, was significant in that it addressed the historical lesson that the value of Bolivia's natural resources resided in value added industries. The protestors feared that Bolivia would remain in its traditional position as a primary product producer, while allowing Lithco to accrue the vast majority of the lithium profits; the proposed deal would have taxed Lithco's revenues at a 16.4% tax rate.[114] Ultimately, 30 civic and political leaders in Potosí conducted a hunger strike, causing President Jaime Paz Zamora to annul the contract on May 4, 1990.[115] The Lithco incident highlighted the power of regional activism in the post-1952 Revolution atmosphere, especially as it pertained to neo-liberal policies.

A new Lithco contract was presented in 1991, but faced with an uncertain business climate, Lithco redirected its attention to the lithium brines contained in the bordering Salar de Hombre Muerto, Argentina.[116]

Bechtel Water War (2000-2001)

The start of a new century did not disrupt the proliferation of Bolivia's natural resource management conflicts. In 1999, President Hugo Banzer's administration passed

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[113] Comibol, "La Industrializacion Del Litio," (2010), 8.
[114] "U.S. Company Wins Contract for Lithium Exploitation," (Foreign Broadcast Information Service, 1991).
[115] Shirley Christian, "U.S. Company Loses Bolivian Mining Deal," *New York Times* 1990.
[116] Tyler Bridges, "Lithium Could Be Bolivia's Future, If Politics Don't Get in Way," McClatchy Newspapers, http://www.mcclatchydc.com/2009/01/30/61110/lithium-could-be-bolivias-future.html#ixzz1AwqvyhLr.

legislation to privatize water in major cities,[117] in an attempt to attract transnational corporations to improve Bolivia's notoriously inefficient municipal water systems. The legislation provoked violent popular backlash in large part because the privatization would entail a 200-400% increase in water prices for those customers using these systems.[118] On April 4, 2001, more than 30,000 protestors filled the streets of Cochabamba, demanding the dismissal of Aguas del Tunari, the Bechtel subsidiary that had won contracts to operate Bolivia's municipal water systems. Later that week, protests spread to El Alto and La Paz, leaving Bolivia in a state of emergency. President Banzer responded by imposing martial law, but continuing demonstrations gave him no choice but to cancel the water contracts on April 10th.[119]

The Gas War (2003-2005)

The conflict between neoliberal economic policies and popular mobilization expanded to Bolivia's massive hydrocarbon industry. The breakup of YPFB in 1996 ushered in an era of increased foreign direct investment, expanding production, and contracting government revenue from the hydrocarbon industry. The dramatic decrease in government hydrocarbon revenues, in addition to a heightened sense of resource nationalism on the part of the Bolivian populace helped spur the Gas War of 2003-2005. In October 2003, indigenous groups launched massive protests against President Gonzalo Sánchez de Losada in reaction to his attempts to increase natural gas exports, forcing him

[117] Benjamin Dangl, *The Price of Fire: Resource Wars and Social Movements in Bolivia* (Edinburgh: AK Press, 2007), 57.
[118] Morales, "A Brief History of Bolivia ".
[119] Ibid.

to resign.[120] The gas was to be exported through Chile, Bolivia's adversary since the War of the Pacific. Sánchez de Losada's successor, Carlos Mesa, was similarly compelled to vacate the presidency in June 2005 when he refused to support the indigenous community's demands hydrocarbon nationalization.[121]

The Election of Evo Morales

Former cocalero (coca-growers) union leader Evo Morales rose to national prominence by taking second place in the 2002 presidential election, garnering 21% of the popular vote.[122] Three years later, Morales became the first indigenous person to win a presidential office in Latin America,[123] wining 54% of the popular vote (the first time a Bolivian president was elected by absolute majority since the return to democracy in 1982).[124] The election's impressive 85 percent voter turnout – the highest in 25 years – gave Morales a strong mandate for change.

In 2008, President Evo Morales stated: "This process of change cannot be turned back…neoliberalism will never return to Bolivia."[125] In these words we hear more than just anger with the IMF-backed austerity measures of the 1980s and President Banzer's attempts to privatize water; Morales is speaking of reestablishing sovereignty over Bolivia's economic destiny and natural resources and redressing economic inequalities that have stunted Bolivia's economic growth since the arrival of the Spanish in the 16th century.

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[120] Kent H. Eaton, "Bolivia at the Crossroads: Interpreting the December 2005 Election," *Strategic Insights* 5, no. 2 (2006): 4.
[121] Eaton, "Backlash in Bolivia: Regional Autonomy as a Reaction against Indigenous Mobilization," 73.
[122] Morales, "A Brief History of Bolivia ".
[123] Forero, "Coca Advocate Wins Election for President in Bolivia."
[124] Morales, "A Brief History of Bolivia ".
[125] Ibid., 275.

Section IV. General Trends in Bolivian History

Chronic Bolivian Political Instability

Bolivia's political history, whether led by civilian or military governments, has been defined by violence and popular mobilization. Bolivia's natural resource history has created a hypersensitive populace that is willing to stage debilitating strikes and protests to express its political desires. Despite the reemergence of legitimate democratic elections, and the relatively peaceful political protests of the Morales years, the current political stability is the exception rather than the rule in Bolivian history. Bolivia has experienced 193 coups between 1825 and 1982, the most coups of a single nation in history.[126]

The Vulnerability of Resource Dependency on National Development

First and foremost, resource dependency subjects national development to the instability of global commodity prices. This instability was typified by the dramatic decline in tin prices in the aftermath of the Stock Market crash of 1929. Bolivia's liberal trade policy and its reliance on internationally traded commodities for economic growth (particularly tin exports), ensured that Bolivia was among the first nations to feel the brunt of the Great Depression. By 1932, tin export earnings dropped to 17 percent of their 1929 value.[127]

Bolivian governments have struggled throughout the 19th and 20th centuries to create an ideal tax policy that was conducive to natural resource business development while ensuring adequate government revenues for national development goals. Even in

[126] "Bolivia," Travel Earth, http://www.travel-earth.com/bolivia/.
[127] Morales, "A Brief History of Bolivia ".

situations in which the power of natural resource producers was limited, and rising natural resource prices permitted large government tax revenues, natural resource dependency created a highly uncertain national development trajectory:

> First there would be the discovery of an unexpected resource bonanza, followed by excessive spending and reckless foreign loans. Eventually when the resources and/or prices declined, an overextended treasury would be unable to make good on the debts, and the country would descend into extreme political and economic instability.[128]

This pattern manifested itself in the mid-1970s when an oil boom in the eastern department of Santa Cruz prompted direct foreign investment in and loans to regional and national development projects.[129] When oil prices dropped during the late 1970s, the debt became unsustainable, triggering painful IMF economic restructuring and austerity measures.

Conclusion

Bolivia is a country in which the control of natural resources has caused international wars (the War of the Pacific, the Chaco War), and provoked popular mobilizations that have forced political change (the Revolution of 1952 and the Gas War). I conclude this historical narrative by offering several plausible impacts of these persistent historical trends on contemporary natural resource management policy:

1. The Morales administration's plans to exploit lithium reserves will require the explicit approval of the Bolivian people, especially by those directly impact by the mining operation. Any unilateral decision-making regarding lithium policy will trigger debilitating protests and road blockades.

[128] Ibid., 203.
[129] Ibid.

2. Fear of foreign expropriation of natural resources will place onerous restrictions on foreign participation in lithium mining operations.
3. After having been told of the soon-to-be-realized lithium riches, the Bolivian public expects results. There is real potential for social unrest and violent political transition if these promised results are not realized.

Chapter 4: The Economics of Bolivia's Lithium in the Context of the Global Lithium Market

Introduction

Lithium mining in the Salar de Uyuni faces considerable challenges on both a micro (high extraction, infrastructural, and transportation costs) and a macro level (lower-cost competitors who can expand production in order to meet projected demand growth over the next decade). This chapter will describe the existing global lithium market and the economic forces with which lithium mining in the Salar de Uyuni must contend. I conclude that market forces will undermine Bolivia's efforts to create a viable lithium industry over the next decade.

I continue by focusing on the long-term electric vehicle battery market by highlighting the most promising battery technologies; I conclude that for Bolivia's lithium to become internationally relevant, lithium-air technology must become commercially viable. Next, I propose three possible scenarios for the future of Bolivia's lithium industry: a baseline scenario (the most likely); a pessimistic scenario in which the importance of Bolivia's lithium is nullified by market forces; and an optimistic scenario, in which Bolivia becomes the "Saudi Arabia of Lithium." In recognition of the fact that Bolivia's lithium will not important in the short term, I return to the Morales administration's unrealistic lithium rhetoric, and propose a study of the political motivations for this unrealistic rhetoric.

Section I. Lithium Basics

Lithium, an alkali metal, is the lightest of all solid elements. It is highly reactive as a pure element and has never been found in its pure form in nature; instead it is always combined with stable compounds. Lithium was first discovered in the 19th century and was used initially in ceramic additives.[130] In the interim, lithium's uses have grown to include pharmaceuticals, lubricating grease, glass, and batteries, among others.

Table 1. Principal Uses of Lithium - 2009[131]

Application	Market Share
Batteries	26%
Other Uses	23%
Lubricating Grease	13%
Glazes	8%
Glass	7%
Air Conditioning	6%
Polymers	5%
Aluminum	4%
Continuous Casting	3%
Pharmaceuticals	3%
Chemical Processes	2%

[130] D.I. Bleiwas and J.S. Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) " (Denver, CO: United States Dept. of the Interior, Bureau of Mines, 1986), 3.
[131] SQM, "Annual Report," (2009), 35.

Lithium Use in Batteries

While the use of lithium derivatives (principally lithium carbonate) in battery technologies already commands a large market share (26%), the projected increase in hybrid-electric (HEV) and pure-electric (EV) vehicle demand – as well as increased demand for consumer electronics (cell phones, laptop computers, etc.) – is likely to increase the share of batteries in the overall lithium market. For the purposes of this thesis, I will concentrate exclusively on the growth of the EV-HEV market. Lithium-ion battery technology is appealing because of its high energy density (defined as energy stored per unit weight) among batteries; it has an energy density of 160 Watt-hour per kilogram.[132]

While lithium-ion battery technology currently outdistances all other battery technologies in terms of energy density, (its closest competitor, nickel metal hydride (NiMH) has a energy density of 0.05kWh/kg),[133] it cannot rival gasoline's energy storage capacity (gasoline has an energy density of 13.2kWh/kg).[134] Because of its comparatively low energy density, storing sufficient electrical energy to ensure a reasonable driving range for battery-powered vehicles requires heavy batteries. In its current applications in hybrid and electric vehicles, lithium-ion batteries make up a large percentage of the total weight of the car. As an example, the Tesla Roadster, which is unique in the EV industry for having a 245-mile driving range, houses a 992 lb lithium-ion battery; the battery accounts for 36.7% of the total vehicle weight.[135] In order for the niche HEV-EV market

[132] B. McCloskey G. Girishkumar, A.C. Luntz, S. Swanson, and W. Wilcke, "Lithium-Air Battery: Promise and Challenges," *The Journal of Physical Chemistry Letters* 1, no. 14 (2010): 2194.
[133] Ibid., 2195.
[134] American Physical Society, "How America Can Look within to Acheive Energy Security and Reduce Global Warming," (2008), 43.
[135] "Tesla Roadster: Features and Specs," http://www.teslamotors.com/roadster/specs.

to move into the mainstream, substantial improvements must be made in energy density so as to reduce battery weight while simultaneously increasing driving range.

Lithium Extraction

The most concentrated forms of lithium are found in hard-rock pegmatites and salt brines.[136] Extracting lithium from salt brines ($1,500-$2,300/ton) is significantly less expensive than extracting lithium from hard-rock pegmatites ($4,200-$4,500/ton).[137] Extracting lithium from salt brines (salars) requires a lengthy evaporation process. The salt brine (which contains lithium, potassium, sodium, boron and magnesium) is pumped from beneath the salar surface into a network of holding ponds where it evaporates until it reaches 6% lithium concentration.[138] At this point, the solution is shipped to a processing plant to be purified, dried and crystallized into lithium carbonate.[139] The purification process involves separating lithium from the associated brine minerals (potassium, sodium, boron and magnesium). Separating lithium from magnesium is especially difficult; the magnesium-to-lithium ratio must be below 9:1 or 10:1 for a project to be economically viable given current lithium prices.[140] Lithium carbonate (19% lithium by weight) must be refined to 99.5% purity before it can be used in lithium-ion batteries.[141] The evaporative lithium extraction process requires substantial water

[136] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 3.
[137] Ivan Lerner, "Bolivia's Lithium Is Not as Important as the Country Wants You to Think," Chemical Industry News & Intelligence
, http://www.icis.com/Articles/2009/11/02/9258538/bolivias-lithium-is-not-as-important-as-the-country-wants-you-to-think.html.
[138] Ibid.
[139] Ibid.
[140] Simon Walker, "Lithium: Good Potential, or Needing a Jump Start?," *Engineering & Mining Journal* 202, no. 2 (2011): 107.
[141] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 15.

resources; at the world's largest producing lithium mine at the Salar de Atacama in Chile, lithium extraction uses 65% of the area's water.[142]

Section II. South American Lithium

The Geology of the Salar de Uyuni

Bolivia's lithium reserves, located principally at the Salar de Uyuni, are estimated between 5.4 million metric tons (MT)[143] and 8.9MT,[144] making them the first or second largest national reserve in the world. The Salar de Uyuni is situated at 3,656 meters (11,995 feet) above sea level and comprises an area of 10,582 square kilometers (4,086 square miles).[145] The lithium concentration varies widely, but the overall average is 250mg Li/L.[146] Most important, the Salar de Uyuni has an average magnesium-to-lithium ratio of 21.6:1.[147]

[142] Moores, "Behind Bolivia's Lithium," 3.
[143] Chemetall, "Chemtall Statement: Lithium Applications and Availability," (2009), 14.
[144] Simon Moores, "Bolivian Lithium Reserves Increase?," *Industrial Minerals* (2009): 16.
[145] "Uyuni Salt Flat," Encyclopedia Britannica Online, http://www.britannica.com/EBchecked/topic/621014/Uyuni-Salt-Flat.
[146] SQM, "Annual Report," 34.
[147] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 5.

The Value of Bolivia's Lithium vs. The Value of Lithium-ion Batteries

Assuming an average price of $5,000/ton for lithium carbonate (the average global price over the past 5 years),[148] Bolivia's lithium has a market value between $142 billion (5.4 MT estimate) and $234 billion (8.9 MT estimate). The lithium carbonate used in the lithium-ion battery accounts for a fraction of the total battery cost. The lithium carbonate used in the Tesla Roadster lithium-ion battery accounts for 6.7% of its total cost.[149] Using the Tesla Roadster lithium-ion battery as an estimation parameter, Bolivia's $142-$234 billion USD worth of lithium could be transformed into lithium-ion batteries worth $2.12-$3.49 trillion USD.

The "Lithium Triangle"

The world's largest single concentration of lithium-containing brines occurs in a highland region of South America known as the "Lithium Triangle." Comprising the Salar de Uyuni (Bolivia), the Salar de Atacama (Chile), and the Salar de Hombre Muerto (Argentina), the "Lithium Triangle" holds approximately 15.0 MT of lithium,[150] approximately 50% of global lithium reserves, and more importantly (because current market conditions for lithium precludes carbonate production from hard-rock pegmatites), 85% of global brine lithium reserves (the remaining lithium brine reserves are in China, USA (Nevada), and Mexico).[151] In 2010, lithium producers in the Lithium

[148] Roskill Consulting Group, "The Economics of Lithium," (2009).
[149] Strait, *Energy Science and Technology (Class #15)*.
[150] Chemetall, "Chemtall Statement: Lithium Applications and Availability," 14.
[151] Ibid.

Triangle accounted for approximately 72% of total global lithium carbonate production.[152]

While the lower extraction and refining costs associated with lithium brines ensure the importance of the "Lithium Triangle" in the global lithium market, there are significant differences between the chemical compositions of the three major South American salars. The Salar de Atacama is currently the most developed and productive lithium mining operation in South America, currently producing approximately 46,300 metric tons of lithium carbonate production/year.[153] Its commercial preeminence is due in large part to its comparatively high lithium concentration and comparatively low magnesium-to-lithium ratio. While the Salar de Atacama contains a similar amount of lithium reserves (6.9MT) as the Salar de Uyuni (5.4MT-8.9MT), the Salar de Atacama's average lithium concentration is .125% while the Salar de Uyuni's average lithium concentration is approximately .025%.[154] The Salar de Hombre Muerto has an average lithium concentration of .0744%,[155] and a total reserve base of 2.6MT.[156]

The Salar de Atacama and Salar de Hombre Muerto are geologically superior not only in terms of lithium concentration, but also in terms of chemical purity and climatic conditions (higher evaporation rate, lower precipitation rate). The Salar de Uyuni has a currently uneconomical magnesium-to-lithium ratio of 21.6:1[157] while both the Salar de

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[152] Brian W. Jaskula, "Mineral Commodity Summaries - Lithium," (U.S. Geological Survey, 2011), 95.
[153] Ibid.
[154] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 5.
[155] Orocobre Limited, "Orocobre - the Next Low Cost Lithium Producer," (2010), 12.
[156] Chemetall, "Chemtall Statement: Lithium Applications and Availability," 14.
[157] It is important that we contextualize the importance of the magnesium-to-lithium ratio in terms of its effects on commercial viability. The current lithium price (approximately $5,000/metric ton) and current extraction and refinement techniques make it uneconomical to mine lithium with a magnesium-to-lithium ratio above 10:1. However, future increases in lithium demand could raise lithium prices to the point at which the Salar de Uyuni's 21.6:1 lithium-to-magnesium ratio could be economically feasible for lithium mining. Additionally, improvements in refinement techniques could improve the commercial viability of

Atacama and the Salar de Hombre Muerto have economical magnesium-to-lithium ratios, 7.3:1,[158] and 1.5:1,[159] respectively. Additionally, lithium mining in the Salar de Atacama benefits from an evaporation rate (3,200 mm/y)[160] that is approximately twice that of Salar de Uyuni's (1300mm/yr-1700mm/yr),[161] and a precipitation rate (10-30 mm/yr)[162] that is approximately one-tenth of that of Salar de Uyuni's (100-200mm/yr).[163] The Salar de Uyuni's dramatically higher precipitation rate is the product of a rainy season that lasts from December-March, which floods the surface of the salar.[164] During this rainy season, lithium extraction via evaporation would be interrupted. The Salar de Atacama exists within one of the driest places on earth; there is no off-season for brine evaporation. Lithium mining at the Salar de Atacama also benefits from being close to sea, making it cheaper to ship the lithium. The Salar de Hombre Muerto is also commercially attractive because of its relatively high lithium concentration and low magnesium-to-lithium ratio.

Section III. The Global Lithium Market

Today, four major corporations dominate the global lithium market: Sociedad Química y Minera (26% market share), Chemetall (22% market share), FMC Lithium (14% market share), and Talison (23% market share); Chinese state-run lithium

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Bolivia's lithium. The market price of lithium is the main driver in determining which lithium deposits will be used.

[158] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 5.
[159] Limited, "Orocobre - the Next Low Cost Lithium Producer," 12.
[160] "Salar Brines," SQM, http://www.sqm.com/aspx/about/SalarBrines.aspx.
[161] Rodrigo Aguilar-Fernandez, "Estimating the Oppurtunity Cost of Lithium Extraction in the Salar De Uyuni, Bolivia" (Duke University, 2009), 10.
[162] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 5.
[163] Aguilar-Fernandez, "Estimating the Oppurtunity Cost of Lithium Extraction in the Salar De Uyuni, Bolivia", 10.
[164] G.E. Ericksen, "Lithium-Rich Brines at Salar De Uyuni and Nearby Salars in Southwestern Bolivia," (U.S. Geological Survey, 1977), 20.

companies account for the remaining global lithium production.[165] SQM, Chemetall, and FMC Lithium all mine lithium from South American brines.

Current Lithium Supply and Demand

Currently, lithium demand is approximately 23,000 T per annum (122,000 T lithium carbonate equivalent).[166] Current lithium production is approximately 25,300 metric tons per annum (133,000 metric tons lithium carbonate equivalent).[167] Lithium demand and supply are approximately equal.

Future Developments in the Lithium Market

Lithium demand growth will depend heavily on EV/HEV market growth and the commercial viability of substitute battery technologies. Currently, lithium-ion batteries used in HEVs and EVs are prohibitively expensive for mass adoption. For example, a 16kWh lithium-ion battery used in the new Chevrolet Volt costs approximately $15,040 (36.7% of the car's total cost).[168] Even with a $7,500 federal income tax credit,[169] the Chevrolet Volt is not affordable for the mass market. Lithium demand growth will depend in large part on reducing battery costs, especially if government subsidies are removed. Pike Research, a clean technology consultancy, projects that the current price of lithium-ion batteries ($940/kWh) will drop to $470/kWh by 2015.[170] This projected price reduction is not the product of a corresponding drop in the price of lithium, but is

[165] Limited, "Orocobre - the Next Low Cost Lithium Producer," 9.
[166] Group, "The Economics of Lithium."
[167] Jaskula, "Mineral Commodity Summaries - Lithium," 95.
[168] Jerry Hirsch, "Chevy Prices Volt at $41,000 but Will Push Leases," *Los Angeles Times* 2010.
[169] "Plug-in Electric Vehicle Credit (Irc and Irc 30d)," United States Internal Revenue Service, http://www.irs.gov/businesses/article/0,,id=214841,00.html.
[170] "Lithium Ion Batteries for Electric Vehicles to Approach $8 Billion in Sales by 2015," Pike Research, http://www.pikeresearch.com/newsroom/lithium-ion-batteries-for-electric-vehicles-to-approach-8-billion-in-sales-by-2015.

instead the product of increasing production efficiency and economies of scale. In the case of the Chevrolet Volt, this projected price decrease would yield a net savings of $7,520. With the continuation of government subsidies for HEVs and EVs uncertain, this price reduction will be key to the long-term viability of the lithium-ion battery industry.

Near Term Supply Estimates – Does the Lithium Market Need the Salar de Uyuni?

Given its chemical and climatic inferiority, Bolivia's Salar de Uyuni will only become commercially viable if (1) substantial technological breakthroughs in the magnesium purification process are made; (2) the price of lithium increases to the point where the Salar de Uyuni's magnesium-to-lithium ratio ceases to be uneconomical; or (3) current lithium producing deposits cannot expand production to meet future demand. For the purposes of this section, I will only consider this third possibility. If production cannot be sufficiently expanded at the existing locations, lithium producers will look to develop production at unused lithium deposits.

In 2010, lithium carbonate demand associated with the HEV/EV market was essentially zero.[171] With the introduction of the Chevy Volt and the Nissan Leaf (among other EV models), lithium carbonate demand associated with the EV market is projected to grow dramatically over the next decade.

Projected Demand Growth

- *Pike Research* estimates a required increase in lithium carbonate supply of 16,000 metric tons by 2015 associated with the EV market.[172]

[171] Lerner, "Bolivia's Lithium Is Not as Important as the Country Wants You to Think."
[172] "Pike Research Sizes up Lithium Battery Market," HybridCars, http://www.hybridcars.com/economics/pike-research-sizes-lithium-battery-market-26278.html.

- *Credit Suisse* estimates a required increase in lithium carbonate supply of 10,000 metric tons by 2015 and 81,000 metric tons by 2020 associated with the EV market.[173]

Prospects for Supply Growth

1. The three major lithium producers, SQM, FMC, and Chemetall, which operate in the Salar de Atacama and the Salar de Hombre Muerto, can expand production capacity by 25% with a $40-$50 million investment each.[174] A 25% increase in SQM, FMC, and Chemetall's lithium carbonate production would yield an increase of 14,570 metric tons.
2. SQM has announced its plans to invest $750 million through 2012 to increase its lithium and potassium derivatives business at the Salar de Atacama in Chile. [175]
3. Chemetall has pledged to increase its lithium carbonate production from 26,000 metric tons in 2008 to 49,000 metric tons in 2020.[176]
4. Lithium production is being developed in Tibetan salt brines that could provide an additional 10,000 metric tons of lithium carbonate by the early 2010's.[177]
5. Australian lithium company Orocobre has partnered with Toyota Tsusho to build a lithium-potash project in Salar de Olaroz, Argentina. Required investment is estimated at $80-$100 million. Orocobre intends to produce 15,000 metric tons of lithium carbonate per annum beginning in 2012.[178] The deposit has an average

[173] Lerner, "Bolivia's Lithium Is Not as Important as the Country Wants You to Think."
[174] Ibid.
[175] Dave Brown, "Top Lithium Producer Reporting Record Earnings," *International Business Times* 2011.
[176] Chemetall, "Chemtall Statement: Lithium Applications and Availability," 12.
[177] Lerner, "Bolivia's Lithium Is Not as Important as the Country Wants You to Think."
[178] Walker, "Lithium: Good Potential, or Needing a Jump Start?," 107-08.

lithium concentration of .08% and an economical magnesium-to-lithium ratio of 2.8:1.[179]

6. In 2009, the Pierro Sutti company announced an 800,000 metric tons lithium deposit discovery in Northern Mexico. The company's president, Martin Sutti, claims that the pilot plant will be capable of producing 10,000-12,000 metric tons of lithium carbonate per year.[180] The magnesium-to-lithium ratio of this deposit is unknown.
7. Sentient Group is developing the Salar de Rincon brine in Salta province, Argentina. Commercial production of battery-grade lithium carbonate is schedule to being in 2011.[181] The deposit has an average lithium concentration of 408mg/l and an economical magnesium-to-lithium ratio of 8.6:1.[182]

Conclusion: Lithium carbonate production outside of Bolivia can satisfy projected short term supply requirements.

Section V. Long Term Outlook For The Global Lithium Market

Medium to Long Term Outlook For the HEV/EV Market

The economic realities of the global lithium market diminish Bolivia's short-term importance [in the HEV/EV battery market]. However, as the 21st century unfolds, and the HEV/EV share of the total automobile market accelerates substantially, Bolivia's lithium may become relevant once again. Projecting medium to long-term market

[179] Limited, "Orocobre - the Next Low Cost Lithium Producer," 13.
[180] Megan MacAdams, "A Grey Goldmine: Lithium and Alternative Energy in Bolivia," (Council on Hemispheric Analysis, 2009).
[181] Walker, "Lithium: Good Potential, or Needing a Jump Start?," 107-08.
[182] Limited, "Orocobre - the Next Low Cost Lithium Producer," 13.

dynamics requires an analysis of the two leading battery substitute technologies (lithium-air and zinc-air) in the context of the extant commercially viable battery technologies (lithium-ion and nickel metal-hydride).

Commercially Viable Battery Technologies

Lithium-ion battery technology

The current enthusiasm over lithium-ion battery technology is due in large part to its unsurpassed energy density of 160Wh/kg.[183] Future efficiency gains are likely capped at an additional 90Wh/kg, for a total energy density of 250Wh/kg.[184] The lithium-ion battery currently enjoys the role of being the most attractive, commercially viable EV battery technology (it is used in the Nissan Leaf, GM Volt, and Tesla Roadster models). The first generation of the EV market (Nissan Leaf, GM Volt, Tesla Roadster) comprises tens of thousands of cars; there is ample lithium supply to satisfy this level of lithium production.[185]

Despite the enthusiasm surrounding lithium-ion technology, there are legitimate concerns about the viability of the technology in the mass market, given lithium's comparatively small global resource base and the energy requirements of the global transportation industry. Currently, there are approximately 900 million vehicles (cars and light trucks) on the world's roads, with approximately 60 million new vehicles being produced each year.[186] Global lithium brine supply is 92.84 MT of lithium carbonate equivalent at current prices.[187] Assuming an energy density of 160Wh/kg, 4.9 billion 16-

[183] G. Girishkumar, "Lithium-Air Battery: Promise and Challenges," 2195.
[184] "Advanced Lithium Battery Technology," Poly Plus, http://www.polyplus.com/technology.html.
[185] As demonstrated on pages 56-57.
[186] William Tahil, "The Zinc Air Battery and the Zinc Economy: A Virtuous Cycle," (Martainville, France: Meridian International Research, 2007), 5.
[187] Chemetall, "Chemtall Statement: Lithium Applications and Availability," 14.

kWh batteries (the size of the battery used in the GM Volt) could be produced if all current reserves were converted to lithium carbonate. Assuming 100% utilization of lithium reserves for lithium-ion battery production is unrealistic. Alternatively, if we assume that the market share of lithium-ion batteries increases from its present 26% to 50% over the next three decades (driven by car battery demand) and 25% of global lithium reserves can be extracted in such a short time period, then 612.5 million 16-kWh batteries can be produced (~20 million/year). Using the same market penetration assumptions, 178.2 million 55-kWh batteries (~5.9 million/year) could be produced. While the foregoing scenarios are primarily meant to serve as thought experiments, rather than predictive analysis, the underlying conclusion is clear: lithium-ion batteries cannot be used to convert the entire global fleet of vehicles to electrical power. As the global vehicle fleet rises above 1 billion in the decades to come, large-scale lithium-ion batteries (55kWh) with a reasonable range capability (200 miles) could only command approximately 15% of the global vehicle market.

Nickel metal-hydride battery technology

Due to its unparalleled reliability and safety, nickel metal-hydride (NiMH) technology has become the most widely deployed HEV battery technology today.[188] The technology's relatively low energy density (50Wh/kg)[189] has not detracted from its commercial viability because it is has been used exclusively in small battery applications (1-2kWh). These smaller battery packs are used in HEVs to provide electrical power to the car while starting up and idling (avoiding the largest inefficiencies associated with the

[188] Tahil, "The Zinc Air Battery and the Zinc Economy: A Virtuous Cycle," 2.
[189] G. Girishkumar, "Lithium-Air Battery: Promise and Challenges," 2194.

internal combustion engine), and as a means of storing recovered braking energy.[190] Given its comparatively low energy density, NiMH technology cannot be used in large battery applications. For example, a 55kWh battery capable of powering a vehicle for a 200 mile range, would weigh a staggering 1,100kg or 2,420lbs. This fundamental weight issue relegates NiMH technology to the role of small battery applications; NiMH technology is not the long-term solution for the EV market.

Experimental Battery Technologies

Lithium-air

Lithium-air battery technology is a potentially disruptive battery technology because of its unprecedented theoretical maximum energy density of 11,680Wh/kg (making it comparable to gasoline).[191] Achieving this theoretical maximum is nearly impossible; the leading IBM lithium-air researchers believe that achieving a 1,700 Wh/kg energy density is a practical goal.[192] Both IBM and GE has announced plans to invest in research and development, and one Silicon Valley start up, PolyPlus, has reportedly produced an early prototype that has achieved an energy density in excess of 700 Wh/kg.[193] This early prototype represents a greater than four-fold increase over lithium-ion battery's energy density. Lithium-air is a potentially disruptive technology in that it would make battery-powered automobiles competitive with gasoline-powered automobiles in terms of range and vehicle weight. A battery with a capacity of 125 kWh (capable of a 500 mile range) and an energy density of 1000Wh/kg weighs ~125 kg or

[190] Strait, *Energy Science and Technology (Class #15)*.
[191] G. Girishkumar, "Lithium-Air Battery: Promise and Challenges," 2194.
[192] Ibid.
[193] "Advanced Lithium Battery Technology."

275 lbs. By comparison, a 20-gallon gasoline tank with an efficiency of 25mpg would weigh roughly ~123.5 lbs.[194] The extra 150 lbs of weight of the lithium-air battery would not disqualify its use in automobiles.

Assuming an energy density of 1000Wh/kg for lithium air batteries (this is well below IBM's estimated practical energy density of 1,700Wh/kg), 1 billion 2kWh lithium-air batteries would use 0.4% of global lithium brine reserves (at current prices), 1 billion 55kWh lithium-air batteries would use 11.4% of global lithium brine reserves (at current prices), and 1 billion 125kWh lithium-air batteries would use 25.6% of global lithium brine reserves (at current prices). These supply estimates make it clear that lithium-air technology has the potential to radically alter the global vehicle fleet.

Significant technological barriers must be overcome before lithium-air battery technology can achieve commercial viability. Using oxygen as a catalyst in the lithium-air battery is problematic because [the molecules in] air can easily compromise the Li-O_2 reaction. To overcome this challenge, researchers will need to develop a membrane that permits oxygen and repels water vapor and other contaminants.[195] Creating a membrane that selectively permits O_2 while repelling H_2O will be especially difficult because "water vapor is much more permeable than O_2 through any membrane, regardless of the membrane's physical properties."[196] Achieving this breakthrough will not be easy – IBM has suggested that it might take 10 years to develop the membrane, at which point the

[194] Society, "How America Can Look within to Acheive Energy Security and Reduce Global Warming," 43.
[195] Robert Scoble, "Lithium Air: Ibm's Quest for the Super-Battery," http://www.building43.com/videos/2011/02/10/lithium-air-ibms-quest-for-the-super-battery/.
[196] G. Girishkumar, "Lithium-Air Battery: Promise and Challenges," 2201.

technology could conceivably move towards commercialization. IBM researchers suggest that it will take 35 years for lithium-air batteries to reach commercial viability.[197]

Zinc-air battery technology

Zinc air technology has a practical energy density of 350Wh/kg,[198] making it over twice as energy dense as lithium-ion technology. Zinc-air batteries have been relegated to smaller applications, with car sized battery applications not yet commercially viable. In addition to its superior energy density, zinc-air batteries are attractive because of the massive size of the existing zinc industry, and the comparatively low price of zinc-air technology. Global zinc production (zinc is the metal produced in the 4th greatest quantity globally, after iron, copper, and aluminum)[199] can support the rapid transformation of the global vehicle fleet. As an example, one year of current global zinc production would be sufficient to produce ~4.6 million 125kWh Zinc Air batteries or ~10.4 million 55kWh Zinc Air batteries.[200] Compared to the high price of lithium-ion batteries, which are forecasted to reach $470/kWh in 2015, zinc-air batteries used in transportation are predicted to cost $60/kWh once they become commercially viable.[201] Whereas the high price of lithium-ion batteries has relegated the lithium-ion technology to a niche market (even with generous government subsidies), zinc-air batteries appear to have the potential for widespread market penetration.

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[197] Ibid., 2195.
[198] Michael Graham Richard, "Very Promising! Zinc-Air Battery Could Hold 300% More Energy Than Lithium Ion," TreeHugger, http://www.treehugger.com/files/2009/10/zinc-air-battery-revolt-3-times-more-energy-lithium-ion-battery-electric-cars.php.
[199] Tahil, "The Zinc Air Battery and the Zinc Economy: A Virtuous Cycle," 6.
[200] Ibid.
[201] Ibid.

However, just as with lithium-air technology, successfully commercializing zinc-air technology will require scientists to successfully manage the membrane issues related to the impurities in air.

Long-Term Market Outlook

Zinc-air batteries and/or lithium-air batteries will likely dominate the long-term EV market. If zinc-air battery technology can achieve commercial viability before lithium-air battery technology, it will capture a large market share (despite its lower energy density), especially in the medium term.[202] However, the long-term EV market will more likely be dominated by lithium-air technology, so long as the technology can achieve commercial viability. Even with the technological issues solved, transitioning the global vehicle fleet to large-scale lithium-air batteries would require a tremendous scaling up of lithium production. Transitioning from an annual production of tens of thousands of large-scale lithium-ion batteries to tens of millions of lithium-air batteries presents a staggering technical and managerial challenge. Yet, lithium-air is the only foreseeable battery technology that can compete with gasoline-powered transportation in terms of range and weight.

Scenario 1: Baseline (Most Likely)

- Lithium-ion battery technology remains popular in the short term, but the market is small enough that the Salar de Uyuni's chemical composition precludes development of Bolivian lithium resources.

[202] This report does not examine the potential growth of biofuel-powered transportation. Nevertheless, biofuels may represent a portion of the future alternative energy transportation sector.

- Commercialization of zinc-air battery technology will diminish the global fascination with lithium-ion battery technology. Lithium-ion battery technology will slowly give way to zinc-air battery technology.
- Development of commercially viable lithium-air technology takes 35 years, by which time millions of vehicles run on low-cost zinc-air batteries. The transition from zinc-air to lithium-air technologies will be slow because of the low cost of zinc-air batteries as compared to lithium-air battery technology. Lithium-air technology's staggering energy density will support the creation of commercially viable long-range electric cars and electric trucks. Owing to this technological breakthrough, major utilization of the Salar de Uyuni will take place only in approximately 40-50 years.

Scenario 2: Pessimistic

- Commercialization of zinc-air battery technology will diminish the global fascination with lithium as a large-scale battery technology; hundreds of thousands of new vehicles will use zinc-air batteries.
- Lithium-air technology development will never become commercially viable. Bolivia's lithium resources will remain untouched as the world looks to zinc-air battery technology to power the vehicles of the future.

Scenario 3: Optimistic

- Zinc-air battery technology never achieves commercial viability; hundreds of thousands of new vehicles will use lithium-ion technology.

- Lithium-air technology development will proceed faster than anticipated, with commercialization of lithium-air batteries taking place in the next 15 years. Major utilization of the Salar de Uyuni will take place in approximately 20-30 years.

Conclusion

Over the long term, the unprecedented potential energy density of the lithium air battery could potentially make Bolivia's lithium resources relevant in the global lithium and EV markets. In the short term, the chemical impurities of Bolivia's lithium resources will diminish the Salar de Uyuni's commercial viability, unless new lithium refining methods can be developed. Even if Bolivia successfully develops a lithium mining capacity in the short term, its high-cost operations will make it unattractive on the global lithium market.

The Lithium Puzzle

Despite the substantial challenges associated with developing a large-scale lithium mining operation at the Salar de Uyuni, President Evo Morales has presented a wildly optimistic perception of Bolivia's lithium potential. Beyond his belief that the Salar de Uyuni is the "hope for all humanity,"[203] Morales has claimed that the Salar de Uyuni contains 100MT of lithium, enough to supply global lithium needs at current rates of use for the next 5,000 years.[204] With the accepted global reserve base at approximately 30MT, Morales' estimations appear to be out of touch with reality.[205] The disconnect between Morales' rhetoric and the overwhelmingly difficult task that lies ahead for

[203] Morales, "Industrializacion Del Litio - Uyuni Potosi - Bolivia 2/2."
[204] Emily Achtenberg, "Bolivia Bets on State-Run Lithium Industry," North American Congress on Latin America, https://nacla.org/node/6799.
[205] Chemetall, "Chemtall Statement: Lithium Applications and Availability," 14.

Bolivia demands a political explanation. It will be the purpose of the remainder of this thesis to understand the political motivations that motivate the lithium puzzle. Through this process, I will show how and why the development of lithium is unique among Bolivia's natural resource development projects and the political dividends President Morales seeks to gain through his lithium rhetoric.

Chapter 5: Plausible Explanations for The Lithium Puzzle

Introduction

Before offering plausible explanations for Evo Morales' lithium rhetoric, we first define "rhetoric." In the following chapters, "rhetoric" refers to both President Morales' speeches, i.e. that Bolivian lithium is "the hope…for the whole of humanity,"[206] and the specific proposed lithium development plans. Previously, I have chronicled President Morales' unrealistically optimistic characterization of Bolivia's lithium potential. To begin this chapter, I describe the Morales administration's specific plans to industrialize the Salar de Uyuni and the financial, technical, infrastructural, and political challenges therein.

Following this explanation of Bolivia's plans for lithium industrialization, I describe the Morales administration's inconsistent natural resource development policy and the contentious political conflict between different levels of government within Bolivia over the control of natural resource revenues. I provide political explanations for these policies and articulate how they provide context for understanding the lithium puzzle. My conclusions cast President Morales' political philosophy as part rational and part irrational. President Morales is using lithium rhetoric to stimulate foreign interest in developing Bolivia's lithium resources and as a means of placating political tension in both regions of his political opposition and base. Undergirding these rational explanations is President Morales' irrational fetishization of lithium and the Bolivian populace's complicity in this fetishization.

[206] Morales, "Industrializacion Del Litio - Uyuni Potosi - Bolivia 2/2."

Section I. Bolivia's Plans To Industrialize The Salar de Uyuni

Bolivia's Plans for Lithium Extraction

Despite the unfavorable short-term viability of its lithium reserves in the global lithium market, the Morales administration has set forth a bold lithium industrialization strategy that it hopes will transform the undeveloped Salar de Uyuni into the world's Mecca of electrified transportation battery materials. In 2009, the Morales administration completed work on a pilot lithium plant at Llipi, Potosí ($5.7 million) in order to conduct further testing on the composition of the Salar de Uyuni and to begin to devise production processes for lithium derivatives and other associated brine minerals. The pilot plant, which is being developed by Bolivia's state mining company COMIBOL, is designed to produce 480 metric tons of lithium carbonate per year.[207] The Bolivian national mining company COMIBOL claims that it has developed a formula for producing high-quality lithium carbonate, but no one else has confirmed that claim.[208] In addition to developing the pilot plant, the Morales administration has sought to increase its technological understanding of the Salar de Uyuni by convening the International Forum of Science and Technology for Lithium Industrialization and Other Evaporatic Resources in 2009,[209] and creating the Scientific Research Committee for the Industrialization of Evaporatic Resources of Bolivia.[210]

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[207] Rebecca Hollender and Jim Schultz, "Bolivia and Its Lithium: Can the "Gold of the 21st Century" Help Lift a Nation out of Poverty?," (Democracy Center, 2010), 26.
[208] David R. Mares, "Lithium in Bolivia: Can Resource Nationalism Deliver for Bolivians and the World?," (James A. Baker III Institute For Public Policy - Rice University, 2010), 16.
[209] Bolivia Avanza, "Primer Foro Internacional De Ciencia Y Tecnologia Para Industrializacion Del Litio Y Otros Recursos Evaporaticos," (2009).
[210] Schultz, "Bolivia and Its Lithium: Can the "Gold of the 21st Century" Help Lift a Nation out of Poverty?," 4.

Beyond this initial stage, the Morales administration intends to ramp up the production of lithium carbonate (30,000 metric tons/year), potassium chloride, potassium sulfate, and boric acid by 2013 at a cost of $485 million. Lithium-ion battery production is set to begin in 2014, with an additional government investment of $400 million required. All told, capital costs from pilot plant development to battery factory development total approximately $900 million.[211] Despite the magnitude of investment required, the Morales administration has reportedly rejected proposals from six state and private mining companies, including firms from Japan, South Korea, and France. The Morales administration has rejected these proposals because they only sought to develop lithium carbonate production capabilities, rather than providing investment for the more technically rigorous and commercially valuable battery stage.[212] In light of the uneconomical nature of the Salar de Uyuni's magnesium-to-lithium ratio it must be assumed that these foreign proposals are being made with the belief that technical progress can be made towards solving the magnesium impurity issue or that lithium demand will rise so much as to make Bolivia's lithium reserves economical to mine.

The central government is waiting to sell some $6.2 million worth of lithium carbonate and potassium chloride produced at the pilot plant at Llipi, and has proposed that the department of Potosí receive only $300,000 (5%) of the revenues.[213]

[211] Achtenberg, "Bolivia Bets on State-Run Lithium Industry."
[212] Ibid.
[213] "Potosi Pide Mayor Beneficio Sobre El Litio ", El Deber, http://www.eldeber.com.bo/2010/2010-11-03/vernotanacional.php?id=101103004810.

Lithium Development Challenges

In order to successfully capitalize on its potential lithium wealth, the Bolivian government must overcome substantial financial, technical, infrastructural and political challenges.

Financial Challenges

Bolivia is regarded as incapable of financing the entire $900 million for its proposed industrial-scale lithium operation. However, attracting willing foreign investor for all proposed stages of lithium industrialization will likely prove to be difficult.[214] At a press conference in March 2009, President Morales stated: "The state doesn't see ever losing sovereignty over the lithium. Whoever wants to invest in it should be assured that the state must have control of 60% of the earnings."[215] This ownership stipulation far outdistances the requirements of other lithium-rich South American governments. The Morales administration runs the risk of losing out on needed foreign investment like Bolivia did in its last attempt to industrialize the Salar de Uyuni in 1990-1991.

Technical Challenges

In order for the proposed lithium enterprise to become commercially viable, Bolivia will have to overcome the Salar de Uyuni's unfavorable chemical composition. Particularly, the accepted industry standard for an economical magnesium to lithium ratio stands between 9:1 and 10:1[216] (given current lithium prices of approximately

[214] As previously noted, recent lithium proposals from foreign companies have been made to develop lithium carbonate production and have excluded the much more profitable, value-adding lithium-ion battery production phase.
[215] Lerner, "Bolivia's Lithium Is Not as Important as the Country Wants You to Think."
[216] Walker, "Lithium: Good Potential, or Needing a Jump Start?," 107.

$5,000/metric ton).[217] The Salar de Uyuni's average lithium to magnesium ratio is 21.6:1.[218] Additionally, lithium technicians must overcome the Salar de Uyuni's seasonal flooding. Not only will this flooding slow the brine evaporation process; it could also potentially threaten the operations of the processing plant. In fact, in March 2011, the lithium pilot plant flooded and refining operations were stopped. Experts have called for relocating the pilot plant and starting again, potentially pushing back large-scale lithium carbonate production an additional 2 years.[219]

Infrastructural Challenges

In order to achieve its goals of a world-class lithium operation, Bolivia must radically improve the Salar de Uyuni's infrastructure. Today, the Salar de Uyuni is approached by a single-lane dirt road and is subject to annual freezing and flooding.[220] The surrounding area is subject to rolling blackouts, owing to an antiquated electricity system.[221] In short, Bolivia will have to develop world-class infrastructure in one of the world's least developed and climatically brutal regions. Achieving this goal in a nation where failing infrastructure is the norm will prove daunting. Additionally, Morales promises to begin full scale battery production in 2014, despite the fact that today, Bolivia "doesn't have a single factory that is capable of assembling from scratch, a TV,

[217] Ibid.
[218] Coffman, "Lithium Availability - Market Economy Countries (a Minerals Availability Appraisal) ", 5.
[219] "Proyecto Del Litio a Punto De Ahogarse," HidrocarburosBolivia, http://www.hidrocarburosbolivia.com/bolivia-mainmenu-117/mineria-siderurgia/41208-proyecto-del-litio-a-punto-de-ahogarse.html.
[220] Lawrence Wright, "Lithium Dreams: Can Bolivia Become the Saudi Arabia of the Electric-Car Era?," *The New Yorker* 2010.
[221] Schultz, "Bolivia and Its Lithium: Can the "Gold of the 21st Century" Help Lift a Nation out of Poverty?," 36.

telephone or radio."[222] Infrastructure requirements for a lithium battery plant would be substantial.

Political Challenges

Even if Bolivia can overcome the aforementioned financial, technical, and infrastructural challenges (which I have asserted is highly unlikely), if it does not adequately satisfy the needs and desires of the local community, lithium industrialization will be infeasible. Recent Bolivian history has showcased the power of miners and indigenous groups in staging debilitating strikes, protests and road blockages. The 1990 hunger strikes that led to the annulment of the Lithco-Salar de Uyuni concessionary deal is proof positive that local interest groups can have a dramatic impact on government policy.

A large-scale lithium operation would impose substantial economic costs on the local community. Such an operation would utilize all water resources that are currently used for quinoa production. Redirecting water away from its current uses would displace nearly two-thirds of the surrounding population, who rely on quinoa production for subsistence farming.[223] Additionally, the Salar de Uyuni is Bolivia's most popular tourist attraction, with approximately 50,000 foreign tourists visiting annually.[224] Exploiting the Salar de Uyuni's lithium would invariably lead to some form of environmental degradation, negatively impacting the area's tourist economy. Judging by currently operating lithium operations in Salar de Atacama, Chile, the toxic chemicals used in

[222] Ibid., 35.
[223] Rodrigo Aguilar-Fernandez, "Estimating the Opportunity Cost of Lithium Extraction in the Salar De Uyuni, Bolivia" (Duke, 2009), 23.
[224] Ibid., 16.

lithium processing would contaminate the air, water, and soil;[225] adversely affecting the health of the area's population and further detracting from the Salar de Uyuni's desirability as a tourist attraction. It is unlikely that these substantial costs (in the form of ecosystem services, pollution-related health and wellbeing damages, and reduced income from tourism) would be balanced by increased employment opportunities for the local community due to the capital-intensive nature of lithium mining and lithium carbonate production.

Most importantly, the national government will have to satisfy the revenue distribution demands of the local community and departmental government. The local community has already defended the Salar de Uyuni from a foreign lithium company that they perceived as receiving too attractive a concessionary contract.[226] The national government will need to satisfy local and departmental revenue distribution demands if it hopes to produce a stable climate in which an industrialized lithium operation can operate.

On March 10, 2010, the Morales administration created the Bolivian Enterprise of Evaporative Resources (Empresa Boliviana de Recursos Evaporiticos, or EBRE), a division of the national mining company COMIBOL, to oversee the lithium industrialization process. EBRE was to situated in La Paz in order "to save administrative costs, to facilitate negotiations with international investors, and because relevant technical expertise is lacking in Potosí."[227] The decision to situate EBRE in La Paz provoked backlash in Potosí, with the Potosí Civic Committee threatening to stage local strikes and set up roadblocks. Bowing to this pressure, the Morales administration

[225] Achtenberg, "Bolivia Bets on State-Run Lithium Industry."
[226] Recall the Lithco incident from Chapter 3.
[227] Mares, "Lithium in Bolivia: Can Resource Nationalism Deliver for Bolivians and the World?," 29-30.

repealed its decision 10 days later.

In addition, recent protests, road and rail blockades in the Department of Potosí, stopped production at the nearby San Cristobal silver, zinc, and lead mine for more than two weeks.[228] Despite its recent political allegiance to the Morales administration, the Department of Potosí has grown dissatisfied with what it perceives to be failed promises of economic development and an unfairly small percentage of mining revenues from the San Cristobal mine. This delicate political situation endangers lithium development.

The Lithium Puzzle

It will be the purpose of the remainder of this thesis to contextualize Morales' unrealistic lithium rhetoric within Bolivia's contentious natural resource development strategy. Through this process, I will propose political motivations for the lithium puzzle; lithium holds a special place in the Morales administration's broader natural resource management strategy.

Section II. The Obsolescing Bargain Puzzle

Proposing plausible motivations for the lithium puzzle requires an analysis of the Morales administration's broader natural resource management strategy. This section describes the evolution of Morales administration's natural resource (hydrocarbons and mining) taxation policy in the context of the obsolescing bargain theory.[229]

[228] Emily Achtenberg, "Bolivia: The Lessons of Potosi," North American Congress on Latin America, https://nacla.org/node/6731.
[229] Recall the obsolescing bargain theory from Chapter 2.

Hydrocarbon Taxation Policy

After campaigning on a socialist platform, Evo Morales took decisive action on May 1st, 2006, ordering the military to occupy Bolivia's oil and gas fields, and forcing foreign hydrocarbon companies to renegotiate the terms of their concession agreements within 180 days.[230] Natural gas companies that produced more than 100 million cubic feet per day (MMCFD) were forced to surrender 82 percent of total revenues, while natural gas companies that produced less than 100 MMCFD were forced to surrender 50 percent of total revenues.[231] Under the new framework, the national government received 18 percent of these revenues, the department in which the hydrocarbons were extracted received 32 percent, and the state hydrocarbon company YPFB received 32 percent.[232] After transfer payments are made, the national government retains ~25% of the revenues, YPFB retains ~25% of the revenues, and the individual departments retain ~50% of the revenues.[233] The 2006 hydrocarbon nationalization dramatically increased government revenues associated with the industry from approximately $300 million to more than $2 billion annually.[234] Hydrocarbon revenues now account for more than 30 percent of total government income.[235]

The nationalization was a dramatic change from the previous hydrocarbon taxation policy: under Law 1689, which was passed in 1996, private hydrocarbon companies had kept 82 percent of hydrocarbon revenues and the Bolivian government had kept 18

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[230] Paulo Prada, "Bolivian Nationalizes the Oil and Gas Sector," *New York Times* 2006.
[231] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 17.
[232] Ibid.
[233] Mark Wesibrot and Luis Sandoval, "The Distribution of Bolivia's Most Important Natural Resources and the Autonomy Conflicts," (Center for Economic and Policy Research, 2009), 2.
[234] Morales, "A Brief History of Bolivia ".
[235] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 2.

percent.[236] Of that 18 percent, 11 percent went to the department, 1 percent to the national government, and 6 percent to YPFB to cover administrative costs. Once these administrative costs were covered, the remaining funds were transferred to the national government.[237]

Hydrocarbon Law 1689, along with the Capitalization Law of 1994, "allowed the breakup and [privatization] of the state-own oil company (YPFB), which progressively abandoned its entrepreneurial role in the hydrocarbon sector and became merely the regulator of the sector."[238] Foreign investment was then incentivized through an attractive 18% gross revenue taxation policy.[239] The policy was successful: foreign investment peaked at $600 million in 1998.[240] Investment in exploration increased natural gas reserves from 14.1 trillion cubic feet (TCF) in 1999 to 26.7 TCF in 2005.[241] With the new natural gas reserves discovered, hydrocarbon production increased dramatically. Between 1999 and 2005, the hydrocarbon sector's contribution to Bolivia's GDP grew from 2.04% to 6.36%.[242] In the midst of this dramatic expansion, the Bolivian public began to protest the massive profits gained by foreign hydrocarbon companies, leading to the ouster of President Gonzalo Sánchez de Losada in October 2003 and President Carlos Mesa in June 2005.

Observed through the lens of the obsolescing bargaining theory, Bolivia's

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[236] Ibid., 12.
[237] Ibid., 14.
[238] Ibid., 11.
[239] "Hydrocarbon Law No. 1689," http://www.megalink.com/usemblapaz/english/commercial/hclaw.htm.
[240] "Bolivia Industry: Ambitious Oil and Gas Plan," Economist Intelligence Unit - The Economist, http://www.eiu.com/index.asp?layout=VWArticleVW3&article_id=1457096730&region_id=&country_id=130000013&channel_id=180004018&category_id=&refm=vwCh&page_title=Channel+Latest&rf=0.
[241] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 12.
[242] "Participacion De Las Actividades Economicas En El Producto Interno Bruto a Precios Corrienteds (En Porcentaje)," Insituto Nacional de Estadistica, http://www.ine.gob.bo/indice/visualizador.aspx?ah=PC01010304.HTM.

manipulation of hydrocarbon taxation policy in 1996 produced the desired effects of dramatically increasing Bolivia's known resources and productive capacity. In order to produce these desired effects, (the product of an infusion of superior foreign capital and technical resources), Bolivian policy-makers were compelled to provide attractive taxation terms for foreign companies. With the capital investment sunk and the intellectual property (i.e. location and extent of newly discovered reserves) revealed, Bolivia could move towards radically changing its hydrocarbon taxation policy. The hydrocarbon nationalization confirms the Morales administration's political economic rationality, insofar as they follow the obsolescing bargain.

Mining Taxation Policy

The Morales administration's nationalization of the hydrocarbon industry has not impelled it to follow a similar strategy with Bolivia's other major extractive sector, the mining industry.

Selected Mining Ventures

El Mutún

In 2007, the Bolivian government signed a $2.1 billion investment deal with India's Jindal Steel to mine half of El Mutún, the world's largest iron ore deposit (located in the department of Santa Cruz, Germán Busch municipality).[243] In addition to a $2.1 billion investment, Jindal agreed to pay $200 million annually to the Bolivian government over a 40-year mining period, for a total of $8 billion in royalty payments. Once it reaches its full capacity, Jindal expects to produce 10 million metric tons of iron

[243] Polya Lesova, "Jindal Steel to Invest $2.1 Billion in Bolivian Iron Ore Mine," Market Watch http://www.marketwatch.com/story/jindal-steel-to-invest-21-billion-in-bolivian-iron-ore-mine.

ore annually.[244] Based on recent iron ore prices (approximately $150/metric ton),[245] Jindal's iron ore production will produce approximately $1.5 billion in annual revenue. Over 40 years, the iron ore could be worth approximately $60 billion. Based on these estimates, the Jindal concessionary agreement heavily favors Jindal; its $200 million annual contribution implies a tax rate of approximately 13.3%.

The terms of the deal were negotiated towards the development of value-added industries within Bolivia; Jindal agreed to produce all Mutún-associated steel within Bolivia (1.7 million metric tons/year).[246] Of the $200 million in annual revenues, President Morales has proposed giving $18.5 (9.25%) million to the municipal government of Germán Busch.[247] There has been no announcement as to how much the department of Santa Cruz will receive. According to the Jindal agreement, 96% of workers must be Bolivian citizens.[248]

AG Glencore's Vinto Tin Smelter

On February 9, 2007, President Evo Morales ordered the military to occupy Swiss-owned AG Glencore's Vinto tin smelter in the department of Oruro. Until 1996, the Vinto tin smelter was government-owned, after which point it was sold to Comsur. Subsequently, Glencore purchased the tin smelter from Comsur in 2003 for $14 million. The Morales administration claims that the plant is worth as much as $95 million, so the

[244] Dorothy Kosich, "China May Help Bolivia Finance El Mutun," Mineweb, http://www.mineweb.com/mineweb/view/mineweb/en/page39?oid=105501&sn=Detail.
[245] "Iron Ore - Monthly Prices," Index Mundi, ttp://www.indexmundi.com/commodities/?commodity=iron-ore.
[246] "Jindal Steel Seals $2b Bolivian Deal," The Economic Times - India Times, http://articles.economictimes.indiatimes.com/2007-03-03/news/28381332_1_el-mutun-iron-ore-jspl.
[247] ComunicaBolivia, "Evo Morales Promulga Ley Para Explotar El Mutun," (Youtube, 2007).
[248] Ibid.

nationalization was aimed at recovering lost revenues.[249] Before it was nationalized, the Vinto tin smelter, the largest in Bolivia ($600 million in annual export revenues), only contributed $30 million in taxes annually (5% revenue tax rate). [250]

Sumitomo's San Cristobal Mine

In 2009, Japanese mining company Sumitomo took over 100% control of the lead, zinc, and silver San Cristobal mine from its bankrupt business partner, Apex Silver Mines Ltd.[251] The mine – located in the southwestern portion of department of Potosí – produces an estimated 1,300 metric tons of zinc-silver ore and 300 tons of lead-silver ore each day,[252] making it the world's third largest producer of silver.[253] In 2009, MSC (Minera San Cristóbal), Sumitomo's Bolivian subsidiary, generated approximately $860 million in gross export revenues.[254] Royalty and tax payments to the Bolivian state totaled $106 million, with $38 million (35.8%) of that total going to the department of Potosí.[255] Despite company fears of nationalization, President Morales has not revoked the original terms of the contract. Minera San Cristobal's tax payments indicate a basic tax rate of 12.3%.

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[249] "Bolivia Says 'No' to Glencore," ForexHelp, http://www.forexhelp.com/news-1172175247-68aa0f08-44473.
[250] Heather Walsh, "Bolivia Seeks More Revenue from Glencore after Nationalizatoin," Bloomberg, http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aafc1GJIBsD0&refer=emergingmarkets.
[251] "Bolivia's San Cristobal Concerned About Mine Taxes," Reuters, http://www.reuters.com/article/2007/07/26/bolivia-mining-sancristobal-idUSN2646965520070726.
[252] Sara Shahriari, "Bolivia Protestors Seize San Cristobal Mine Power," Bloomberg, http://www.bloomberg.com/news/2010-08-11/protesters-seize-power-supply-at-sumitomo-metal-s-zinc-mine-in-bolivia.html.
[253] Bryan Maxwell, "Third Largest Producer of Silver Says Production Is Now "Totally Paralyzed" Following Week-Long Strike," CommodityZen, http://www.commodityzen.com/2011/03/silver/third-largest-producer-of-silver-says-production-is-now-totally-paralyzed-following-week-long-strike/
[254] Federico Fuentes, "Bolivia's Mining Dilemmas," Green Left, http://www.greenleft.org.au/node/44103.
[255] S.A. Minera San Cristobal, "Press Releases - Mining Operation," http://www.minerasancristobal.com/en/?page_id=71.

Recent protests and roadblocks at the San Cristobal mine and throughout southwestern Potosí have disrupted mineral production. The protestors have voiced their disdain for what they perceive to be a weak taxation policy. Apart form financial matters, locals are frustrated that under the existing 1997 Mining Code, Sumitomo is legally entitled to extract as much water as it needs for its operations, free of charge.[256] In an area suffering from desertification, Sumitomo's reported 50,000 liters of water/day usage[257] has provoked substantial backlash.

Explanation For Inconsistent Taxation Policies

The preferential taxation policy enjoyed by both Sumitomo Corporation at its San Cristobal Mine and Jindal Steel Corporation at its El Mutún mine requires an explanation. The San Cristobal mine has been able to maintain its preferential tax treatment because the Morales administration fears that imposing a more onerous taxation policy would limit future investment in the mining sector, leading to a stagnation or decrease in mineral output. The 2006 hydrocarbon nationalization has detracted from foreign direct investment (FDI) in the hydrocarbon sector. FDI in the hydrocarbon sector peaked in 1998 at $600 million; by 2009, FDI had fallen to $325 million.[258] In the post-nationalization era, YPFB (Bolivia's state-owned oil and gas company) has had to assume a larger responsibility for investing in hydrocarbon exploration, extraction and refinement. YPFB's performance has been substandard; since 2006, hydrocarbon

[256] Achtenberg, "Bolivia: The Lessons of Potosi."
[257] Fuentes, "Bolivia's Mining Dilemmas."
[258] "Bolivia Industry: Ambitious Oil and Gas Plan."

production has plateaued,[259] while its contribution to Bolivia's GDP has fallen from 6.41% to 5.02%.[260] Maintaining the current mining taxation policy for the San Cristobal mine ensures that Sumitomo, which has invested $1.4 billion in developing the San Cristobal mine,[261] will continue to invest in developing Bolivia's various mineral resources.

Allowing the continuation of the attractive taxation policy also must be understood in the context of the development of El Mutún. By maintaining the mining taxation policy as it is, the Morales administration is hoping to redirect some of the investment fallout over hydrocarbon nationalization and the nationalization of the Vinto tin smelter towards the attractiveness of the mining sector. The Morales administration's efforts seem to have been successful in this regard, as China has pledged a $15 billion loan for the right to mine the remaining unexploited half of El Mutún.

How does the obsolescing bargain provide insight into the lithium puzzle?

Looking towards lithium development, the Morales government may have retained the business-friendly Mining Code of 1997 because it thinks it can incentivize foreign companies to invest in lithium development (even if in the beginning this lithium development investment is not profitable). This policy is an extension of the broader mining taxation policy; itself a reaction to the FDI fallout after the 2006 hydrocarbon nationalization. This explanation is plausible insofar as Sumitomo is one of the 7

[259] "Producto Interno Bruto a Precios Constantes Segun Actividad Economica (En Miles De Bolivianos De 1990)," Instituto Nacional de Estadistcia, http://www.ine.gob.bo/indice/visualizador.aspx?ah=PC01010301.HTM.
[260] "Participacion De Las Actividades Economicas En El Producto Interno Bruto a Precios Corrienteds (En Porcentaje)."
[261] Minera San Cristobal, "Press Releases - Mining Operation."

companies that have submitted proposals to the Bolivian government to develop the Salar de Uyuni.[262] While the Morales government has rejected Sumitomo's initial offer and has claimed that COMIBOL is capable of developing the lithium project, this decision may be a concerted effort to improve the terms of the proposed deal. With 7 companies competing for Bolivia's lithium, the Morales government can demand improved contract terms. It is important to note that Morales' demands for 60% of the lithium earnings does not necessarily preclude an attractive taxation policy for foreign lithium partners. If the Bolivian government were to take on a foreign lithium company as a minority partner, it could provide attractive taxation terms of the foreign company's share of the profits while maintaining control of 60% of the earnings. The Bolivian government could offer to finance the majority of the venture and allow the foreign minority partner to reduce its financial risk while the foreign partner would provide the technical expertise needed to overcome the Salar de Uyuni's unfavorable chemical composition.

Additionally, President Morales' claim that the Salar de Uyuni contains 100 MT of lithium can be interpreted as a means of spurring increased interest among foreign investors. The currently accepted reserves estimates for the Salar de Uyuni (8.9 MT) were established in 1989. While the divergence between these two figures casts the Morales administration as out of touch with reality, the Morales administration is implicitly claiming that more recent exploration efforts by COMIBOL have revealed dramatically larger reserves.

[262] "Bolivia: No Foreign Firm Fits Bill to Be Lithium Partner," La Prensa, http://www.laprensasa.com/309_america-in-english/890767_bolivia-no-foreign-firm-fits-bill-to-be-lithium-partner.html.

Section III. The Resource Regionalism Puzzle

The lithium puzzle must also be understood in the context of resource regionalism within Bolivia.

What is Resource Regionalism?

Resource regionalism is defined by rent-seeking behavior on the part of all levels of government. The divisive resource regionalist discourse is a product of the unequal taxation policies in the hydrocarbons and mining industries, and the desire that all Bolivians share to maintain sovereignty of natural resources.

Bolivia's Governmental Structure

The Bolivian government is divided into three levels of administration. Below the national government, Bolivia is divided into nine departments, each with its own government, known as a prefectura. Each department is divided into different territorial municipalities; there are 352 municipalities in total.[263] Bolivia's nine departments are commonly grouped into the Media Luna (Santa Cruz, Tarija, Beni, Pando) and the Western Highlands (Potosí, Oruro, La Paz, Cochabamba, and Chuquisaca).

[263] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 26.

Resource Revenue Inequalities Within Bolivia

Today, Bolivia's natural resource wealth is concentrated in two major extractive industries (hydrocarbons and mining) that are geographically segregated. The departments of Tarija and Santa Cruz dominate the hydrocarbon industry. In 2006, Bolivia had 440 million barrels of proven crude oil reserves. The department of Tarija

contains over "80 percent of the country's total reserves."[264] As of 2006, proven natural gas reserves were 26.7 trillion cubic feet, making Bolivia's natural gas reserves the second largest in South America.[265] The crude-oil rich department of Tarija also contains 85 percent of Bolivia's total natural gas reserves.[266] The remaining natural gas is divided between the department of Santa Cruz (10.6 percent) and the department of Cochabamba (2.5 percent). In addition, Vice President Alvaro Garcia Linera has advocated for the development of the hydrocarbon reserves extant in the Amazonian region in the north of the department of La Paz.[267] In 2009, the hydrocarbon industry constituted 5.50% of Bolivian GDP.[268]

The mining industry is geographically concentrated in the departments of the Western Highlands, particularly the departments of Potosí and Oruro. In 2009, the mining industry constituted 6.71% of Bolivian GDP.[269]

Unequal Resource Taxation and Distribution

Despite the fact that the extractive industries of the Media Luna and Western Highlands are essentially equal in terms of their contribution to GDP, the predominant extractive sector of the Media Luna (hydrocarbons) contributes 5 times as much revenue to all levels of government as does the predominant extractive sector of the Western Highlands (mining). Hydrocarbon nationalization increased government revenues by

[264] Langdon D. Clough, "Energy Profile of Bolivia," The Encyclopedia of Earth, http://www.eoearth.org/article/Energy_profile_of_Bolivia.
[265] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 2.
[266] Clough, "Energy Profile of Bolivia."
[267] Denise Humphreys Bebbington and Anthony Bebbington, "Anatomy of a Regional Conflict: Tarija and Resouce Greivances in Morales's Bolivia," *Latin American Perspectives* 37, no. 140 (2010): 155.
[268] "Producto Interno Bruto a Precios Constantes Segun Actividad Economica (En Miles De Bolivianos De 1990)."
[269] Ibid.

approximately $1.7 billion annually. After nationalizing the hydrocarbon industry, the Morales administration has adopted a fundamentally different approach to managing the mining sector. Owing to this low taxation policy, the mining industry contributed only $505,480,000 bolivianos (1990 prices), as compared to $2,405,630,000 for the hydrocarbon industry.[270] From 2006-2008, hydrocarbon revenues accounted for an average of 31.1% of total government revenue.[271] Over that same period, revenues from the mining industry accounted for only 7.1% of total government revenue.[272]

In light of the fact that royalties collected from the mining sector constitute such a comparatively small percentage of government revenue, the hydrocarbon sector's level of importance in national politics has become magnified. Bolivian hydrocarbon production is disproportionately high in the Media Luna, with the departments of Tarija and Santa Cruz producing the vast majority of hydrocarbons (despite accounting for 29.3% of the national population).[273] While hydrocarbon production is predominately concentrated in the departments of Tarjia and Santa Cruz, 4 other departments have some form of hydrocarbon production. The departments of La Paz, Oruro, and Potosí are the only non-hydrocarbon producing departments; they get their meager hydrocarbon departmental revenue from transfer payments.[274] The 50/25/25[275] hydrocarbon revenue distribution

[270] "Regalias, Segun Actividad Economica ", Instituto Nacional De Estadistica, http://www.ine.gob.bo/indice/general.aspx?codigo=40306 .
[271] Fabian Valnecia and Fabian Bornhorst, "Bolivia: Selected Issues," (International Monetary Fund, 2009), 11.
[272] "Regalias, Segun Actividad Economica ".
[273] Sandoval, "The Distribution of Bolivia's Most Important Natural Resources and the Autonomy Conflicts," 2.
[274] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 29.
[275] 50% for the departmental government, 25% for the national government, and 25% for YPFB.

policy ensures that Tarija and Santa Cruz enjoy substantially higher revenues than the remaining 7 departments.[276]

The hydrocarbon nationalization and the change to a 50/25/25 revenue distribution policy have given individual departments the incentive to push for greater autonomy. The Morales administration is constrained in its hydrocarbon taxation policy because of the massive contribution of the Media Luna to government revenue outside of the hydrocarbon sector; Santa Cruz supports Bolivia's robust agricultural export industry. In 2009, the department of Santa Cruz contributed 28.7% of total Bolivian GDP,[277] and the department of Tarija contributed 10.0% of total Bolivian GDP.[278]

Resource Regionalism – Contemporary Political Conflict

The policies President Evo Morales' has advocated in his first term in office magnified the antipathy between Bolivia's Media Luna and Western Highlands and within individual departments, over the control of natural resource revenues. These policies have increased total resource revenue and provoked Bolivians across the political spectrum to demand a larger percentage of the revenues from the natural resources under their feet.

The National Autonomy Referendum

President Evo Morales campaigned on the promise that he would organize a national referendum on autonomy. True to his word, the Bolivian government coordinated a national referendum on July 2, 2006. While the departments of the Media

[276] See Appendix 2 for full data.
[277] Instituto Nacional de Estadistica, "Actualidad Estadistica Departmental - Estadistica E Indicadores Socioeconomicos Del Departmento De Santa Cruz," (2010), 7.
[278] Instituto Nacional de Estadistica, "Estadisticas Socioeconomics Del Departmento De Tarija," (2010), 12.

Luna all voted in the affirmative, (the department of Santa Cruz voted 71 percent in favor of departmental autonomy),[279] the referendum was defeated 56-44 due to the greater population of the western departments, where it lost.[280] With the consolidation of the Western Highlands under Morales' political party MAS (Movimiento a Socialismo), the electoral calculus did not give the Media Luna a good chance to implement its desired policies on the national level, at least through direct democratic means.

Bolivia's New Constitution

After the autonomy referendum was defeated, members of MAS and other political organizations met to rewrite the Bolivian constitution. The new constitution was written without the input of most of Morales' political opponents, who refused to take part in the drafting process in an effort to detract from the legitimacy of the proceedings. The decision against negotiating the details of the new constitution was potentially damaging to the interests of the Media Luna, insofar as the new constitution included a process for departmental autonomy; without oppositional input, this clause was less aggressive than political leaders in the Media Luna might have preferred. Without the support of the Media Luna, members of the MAS party provisionally approved the Constitution in Oruro on December 9th, 2007.[281]

The new Bolivian constitution repudiated the neoliberal policies of the recent past. Instead, it advocated increased government control of the economy and improved rights for Bolivia's indigenous majority. The new Bolivian constitution, which was

[279] Upside Down World - Andean Information Network, "Illegal Autonomy Referendum Deepens Division in Bolivia," http://upsidedownworld.org/main/bolivia-archives-31/1251-illegal-autonomy-referendum-deepens-division-in-bolivia.
[280] Eaton, "Backlash in Bolivia: Regional Autonomy as a Reaction against Indigenous Mobilization," 82.
[281] Network, "Illegal Autonomy Referendum Deepens Division in Bolivia."

drafted in 2007, but not ratified until 2009, is also significant in that it set forth provisions for greater departmental and municipal autonomy. The autonomy provisions in the new Bolivian Constitution have exacerbated this drive to draw economic power (natural resource revenues) away from the national government. The following section discusses the relevant constitutional autonomy statutes, and highlights the political mobilizations that have been triggered by efforts to increase departmental autonomy.

Departmental Autonomy Debate

Bolivia's new constitution sets forth an aggressively socialist agenda aimed at serving the needs of Bolivia's long subjugated majority indigenous population. Beyond commitments to a social safety net for the poor, the majority of which are indigenous peoples, the constitution recognizes the right of self-determination for indigenous groups throughout Bolivia. The constitution is noteworthy in that it officially renames Bolivia as the Plurinational State of Bolivia. This designation was made in an effort to recognize the existence of indigenous polities that predated the creation of the independent Bolivian state in 1825. Article 2 of the Bolivian constitution gives indigenous groups the following rights:

> Article 2. Given the pre-colonial existence of nations and peoples of indigenous origin and their ancestral domain peasants on their lands, self-determination is guaranteed under the state's unity, which is their right to autonomy, self-government, their culture, recognition of their institutions and the consolidation of its territorial units, under this Constitution and the law.[282]

[282] Xavier Albo and Carlos Romero, "Autonomias Indigenas En La Realidad Boliviana Y Su Nueva Constitution," (Vicepresidencia del Estado Presidencia del Honorable Congreso Nacional, 2009), 1.

With 62% of the Bolivian population recognizing itself as a descendant of these 'pre-colonial' nations,[283] the ramifications of a popular demand of self-determination could have dramatic consequences on the stability of the Bolivian state.

The autonomy issue is singularly important in Bolivian politics because of the ramifications it has on the distribution of resource rents. The indigenous populations of both the eastern and western departments could constitutionally claim indigenous autonomy, abandoning their allegiance to departmental authority; as of now eleven autonomous indigenous territories have been formed in the departments of Chuquisaca, La Paz, Oruro, Potosí, and Santa Cruz.[284] Depending on the interpretation of the autonomy clause (Article 2) by the Bolivian Supreme Court, indigenous autonomy could diminish the national government's and the departmental governments' control of resource revenues. As of this writing, the eleven indigenous territories have not sought to increase their share of resource revenues in a legal challenge.

The Constitutional Definition of Autonomy

Bolivia's new constitution presents both departmental and municipal autonomy clauses. However, the national government retains control of natural resources, land distribution policies, and key legislative faculties (Article 298).[285] Departments that legally pass departmental autonomy referendums are given the right to "manage a significant amount of central government revenues, to collect their own taxes, to carry out development planning, build infrastructure and pass laws that do not contradict

[283] Ibid., 2.
[284] Estado Plurinacional de Bolivia - Ministerio de Autonomia, "Autonomias - Indigenas Originario Campesinas," http://www.autonomia.gob.bo/portal3/content/municipio-de-charagua.
[285] "Republic of Bolivia - Constitution of 2009," Edmund A. Walsh School of Foreign Service - Center for Latin American Studies (Georgetown University), http://pdba.georgetown.edu/Constitutions/Bolivia/bolivia09.html.

national legislation passed by the Pluri-national Assembly (Article 272)."[286] In this, departmental government cannot decide upon the taxation policies for the natural resources produced within their departments.

The Media Luna Moves To Assert A Radical Form of Departmental Autonomy

Reacting to an increasingly unattractive political climate, and a constitutional draft they considered to be illegal, the Santa Cruz Civic Committee helped organize more than one million people to protest the national government and approve departmental autonomy statutes.[287] The December 15, 2007 protest led the department of Santa Cruz to organize its own departmental autonomy referendum. Despite pressure from the Morales administration to boycott it and an electoral court injunction against it, the department of Santa Cruz conducted a vote for departmental autonomy on May 4th, 2008.[288] About 60% of Santa Cruz voted, with 80% voting in the affirmative.[289] Neither the national government nor any international body recognized the vote as legitimate. Similar autonomy votes in Beni, Pando, and Tarija (the remainder of the Media Luna) in June 2008 received similar levels of approval.[290] The Morales administration and the Bolivian Supreme Court viewed these votes as illegal, citing the fact that the new constitution set forth a legal process by which departments could gain autonomy. [291] However, the new constitution had yet to be ratified.

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[286] Doug Hertzler, "Debunking Myths Part Ii: Bolivia's Autonomy Initiatives," Andean Information Network, http://ain-bolivia.org/2010/02/debunking-myths-part-ii-bolivia%E2%80%99s-autonomy-initiatives/.
[287] Network, "Illegal Autonomy Referendum Deepens Division in Bolivia."
[288] Hertzler, "Debunking Myths Part Ii: Bolivia's Autonomy Initiatives."
[289] Ibid.
[290] "Bolivian Regions 'Back Autonomy'," BBC News, http://news.bbc.co.uk/2/hi/americas/7429630.stm.
[291] Network, "Illegal Autonomy Referendum Deepens Division in Bolivia."

Departmental autonomy has been interpreted in a more radical light by the Media Luna's political and business leadership. According to their version, autonomy would allow each department to decide on all policies other than those related to defense, currency, tariffs, and foreign relations. This broad interpretation of departmental autonomy would grant greater control over natural resources and allow the departments of the Media Luna to achieve their goal of keeping two-thirds of all tax revenues generated within the region.[292] In the case of hydrocarbons, a shift towards keeping two-thirds of all tax revenues, (currently individual departments keep 50%) would redistribute approximately $260 million annually (2007 data) from the national government and YPFB to Tarija and Santa Cruz, the two largest hydrocarbon producing departments.[293]

How does resource regionalism puzzle provide insight into the lithium puzzle?

1. Lithium development, or the promise of lithium development, can act as a means of balancing the economically powerful Media Luna

Recognizing the preeminence of the Media Luna in hydrocarbon production, and fearing the increased revenue generation from the development of the iron mine at El Mutún, the Morales administration hopes to balance the Media Luna's economic power with a lithium mining and processing industry at the Salar de Uyuni. President Morales' lithium plan calls for the development of value-added industries (lithium battery factories). If Bolivia were to succeed in producing 30,000 metric tons of lithium carbonate and used all of this lithium carbonate to produce lithium-ion batteries for

[292] Eaton, "Backlash in Bolivia: Regional Autonomy as a Reaction against Indigenous Mobilization," 74.
[293] See Appendix 2 for hydrocarbon revenue distribution data.

automobiles, annual revenues would be approximately $2.23 billion.[294] Success in industrializing the Salar de Uyuni's lithium would elevate lithium's revenue generation to the level of the hydrocarbon industry; in 2008, total hydrocarbon revenues were approximately $2.65 billion.[295]

It is possible the people of the Media Luna are not aware of the degree to which President Morales is being unrealistic in his rhetoric; the importance of the magnesium-to-lithium ratio may have been drowned out by the massive size of Bolivia's lithium reserves. If they do not know that Morales is being unrealistic, they may fear the threat of lithium development on their ability to push for greater control of hydrocarbon revenues at the departmental level. The development, or talk of development, of an industrialized lithium capability at the Salar de Uyuni may stop the Media Luna from continuing to demand 2/3 of the hydrocarbon revenues on the departmental level.[296]

2. Lithium rhetoric may pay political dividends in the department of Potosí because successful lithium development would help assuage political tension in Potosí related to economic underdevelopment.

As has been previously noted, there have been popular protests related to the Morales administration's natural resource management policies within the Western Highland departments (President Morales' political base). In addition to frustrations over Sumitomo's attractive taxation agreement with the national government, and its subsidiary's wasteful use of invaluable water resources, the massive strikes in Potosí during the summer of 2010 (July 29th-August 16th) were focused on increasing

[294] I use the same assumptions for the ratio of lithium carbonate value to lithium-ion car battery value as I did in Chapter 4.
[295] Filho and Rodrigo Santaella Goncalves Clayton Mendonca Cunha, "The National Development Plan as a Political Economic Strategy in Evo Morales's Bolivia: Accomplishments and Limitations," *Latin American Perspectives* 37, no. 177 (2010): 185.
[296] Eaton, "Backlash in Bolivia: Regional Autonomy as a Reaction against Indigenous Mobilization," 74.

"government investment in the region for long-promised economic development projects, including an international airport, a cement factory, a metal processing plant, roads and infrastructure, and the preservation of Cerro Rico (the mountain where Potosí's world-famous silver mines are located, now in danger of collapse due to centuries of over-exploitation). They also sought resolution of an inter-departmental boundary dispute with neighboring Oruro, following the discovery of significant limestone deposits — used for cement — in the contested area."[297] The protests included up to 100,000 protestors, and included members from throughout Potosí's diverse interest groups: indigenous peasant associations, neighborhood councils, and mining cooperatives. It appears that the Morales administration has not been as successful as it would have hoped in improving the lives of its citizens in Bolivia's most impoverished department.

Rising mineral prices over the past 5 years have not produced a corresponding improvement in infrastructure and poverty alleviation. This lack of change has frustrated people within the department of Potosí because the Bolivian mining industry is centered in Potosí. In addition, the Morales administration's decision to maintain its predecessor's pro-business taxation policies on the mining industry has diminished mining revenue distribution to the department. The disconnect between rising mineral prices and stagnating mineral proceeds for Potosí's development has provoked substantial backlash.

If the Morales administration's lithium industrialization plans were to be successfully implemented, the department of Potosí would receive three things is desperately desires: industry, vastly improved infrastructure, and increased revenues to spend on poverty alleviation. Even if the Morales administration's proposed lithium

[297] Achtenberg, "Bolivia: The Lessons of Potosi."

revenue distribution policy (i.e. 5% of total revenues to the department of Potosí) were to be implemented, the national government could use some of its lithium proceeds to fund development projects in Potosí. In this, Morales' lithium rhetoric may act as a means of assuaging political tension in Potosí related to economic underdevelopment.

Fetishization of Lithium and the "Magical State"

President Morales can only gain politically from his lithium rhetoric if the Bolivian populace believes in Bolivia's lithium potential. While a rational analysis of the Salar de Uyuni in the context of the global lithium market has revealed the uncertainty of Bolivia's lithium potential, President Morales may be so irrationally attuned to prospective lithium revenues that he cannot internalize the unattractive nature of Bolivia's lithium reserves.

Natural resources, to a greater extent than nearly any other commodity, have the tendency to become fetishized, especially in the developing world. According to Michael Watts, "a fetish is a material object invested with magical powers."[298] Natural resources have the magical power to transform a state's economic development at a faster rate than nearly any other commodity. A commodity bonanza, triggered by a discovery of previously unknown resources or a dramatic increase in the price of a natural resource, can grant the developing state substantial developmental capabilities. The importance of this developmental bonanza is best understood in the context of oil-rich Venezuela in the midst of the 1973 oil price shocks:

[298] Michael Watts, "Commodities," in *Introducing Human Geographies*, ed. Philip Crang Paul Cloke, Mark Goodwin (New York: Oxford University Press Inc. , 2005), 314.

> While the quadrupling of oil prices at the tend of 1973 led to visions of economic and political decline in the metropolitan centers, in Venezuela, as in other oil-producing nation, it created the illusion that instantaneous modernization lay at hand, that torrents of oil money would change the flow of history and launch the country into the future. Pérez proposed transforming the oil bonanza into a vast project to develop Venezuela at an unparalleled scale and speed, to achieve, in effect, a leap into autonomy.[299]

In Venezuela, oil rents provided the illusion of 'magical' developmental capabilities that could provide the nation with 'instantaneous modernization.' Perhaps most importantly, the oil boom promised to lift Venezuela out of its subservient economic role to the developed world and launch it into 'autonomy;' the oil bonanza created the illusion of a "Magical State"[300] capable of achieving these lofty ideals.

There is substantial evidence that a similar fetishization of lithium is taking place in contemporary Bolivia. First, President Morales has publicly stated that Bolivia's lithium is "the hope…for the whole of humanity."[301] This assertion is irrational not only because of the unfavorable chemical composition of Bolivia's lithium reserves, but more importantly, it is irrational in how it characterizes lithium as having 'instantaneous modernizing' capabilities. The global interest in lithium is predicated on its use in electric vehicles (that do not emit global warming gases). However, lithium in and of itself does not produce this 'clean energy;' a dramatic redevelopment of global energy production must take place before lithium can realize its 'magical' power of achieving environmental sustainability.

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[299] Fernando Coronil, *The Magical State: Nature, Money, and Modernity in Venezuela* (Chicago: University of Chicago Press, 1997), 10.
[300] Ibid., 12.
[301] Morales, "Industrializacion Del Litio - Uyuni Potosi - Bolivia 2/2."

The international media's attention to Vincent Bollore's comments that Bolivia is primed to become "the Saudi Arabia of Lithium"[302] speaks to both the size of Bolivia's lithium reserves and more importantly, the political dividends gained by states that control the world's vital natural resources. President Morales may very well see lithium as the new oil, a substance so valuable for global prosperity that possessing it can propel Bolivia into a geopolitically powerful position of 'autonomy.' That lithium is more geographically concentrated than oil adds to its geopolitical significance. In light of President Morales disdain for the West, believing in this myth is especially salient.

Additionally, President Morales' public remarks about natural resource wealth ("those who took our natural resources now are very rich, the looted are left very poor"[303]) indicate a simplified conception of natural resource wealth and developmental outcomes. By implying that now that the Bolivian government retains sovereignty over its natural resources (specifically lithium), it has the capability to become 'very rich.' This understanding of the relationship between resource ownership and developmental outcomes overlooks the resource curse theory. Instead, it focuses in on natural resources as the source of the Western world's developmental preeminence. This conception of natural resource imbues them with a 'magical' developmental quality that empirical research has refuted.

Finally, there is reason to believe that Bolivians may share this fetishization of lithium with their President. Besides being supplied by hyperbolic rhetoric from President Morals and the international media, Bolivians have reason to believe in the developmental magic of natural resources. In the department of Potosí, stories of the

[302] Craze, "Lithium for 4.8 Billion Electric Cars Lets Bolivia Upset Market."
[303] Morales, "Industrializacion Del Litio - Uyuni Potosi - Bolivia 2/2."

glorious past – in which silver wealth transformed an outpost in the Andean foothills into a city comparable in size and wealth to London – remains a part of popular discourse. The average citizen may not understand that this apparent wealth and rapid development was not prefaced on sustainable economic practices, but they may have heard of Potosí's former glory.

The citizens of the Media Luna, despite their political opposition to the Morales government, may also fall under the spell of lithium fetishization given their recent hydrocarbon boom and developmental success. In the 1950's, the Media Luna was Bolivia most underdeveloped region.[304] Today, the Media Luna is Bolivia's most prosperous and economically developed region. That this transformation was due in large part to a sustained spending effort on the part of the national government[305] may be lost on the average citizen of the Media Luna. If citizens of the Media Luna consider their developmental success to have been the product of the recent hydrocarbon boom (1990s), they may also accept the power of lithium, given their political opposition to the prospective lithium-producing region.

President Morales may be simultaneously fetishizing lithium and hoping to benefit politically from Bolivians' susceptibility to natural resource fetishization.

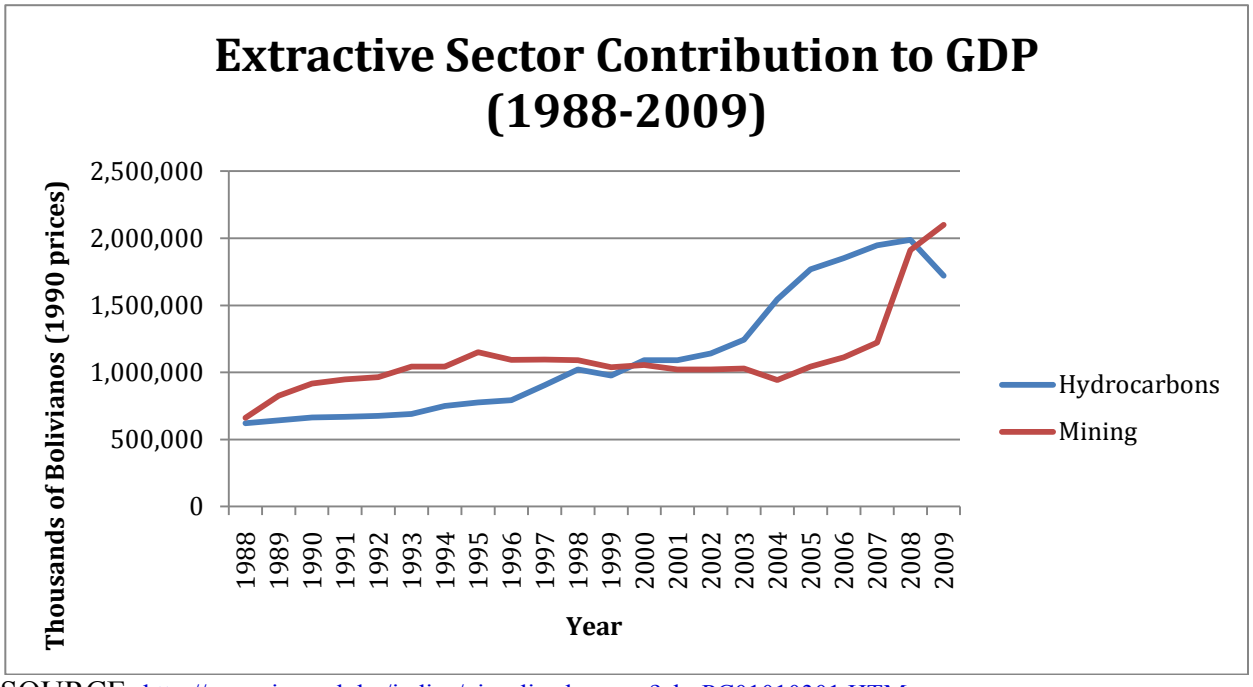
Conclusion

President Morales' natural resource management strategy has revealed himself to be a rational political actor, concerned with balancing his ideological predilection towards resource nationalism with pragmatism aimed at maintaining the trust of foreign mining companies that may prove instrumental in developing Bolivia's lithium

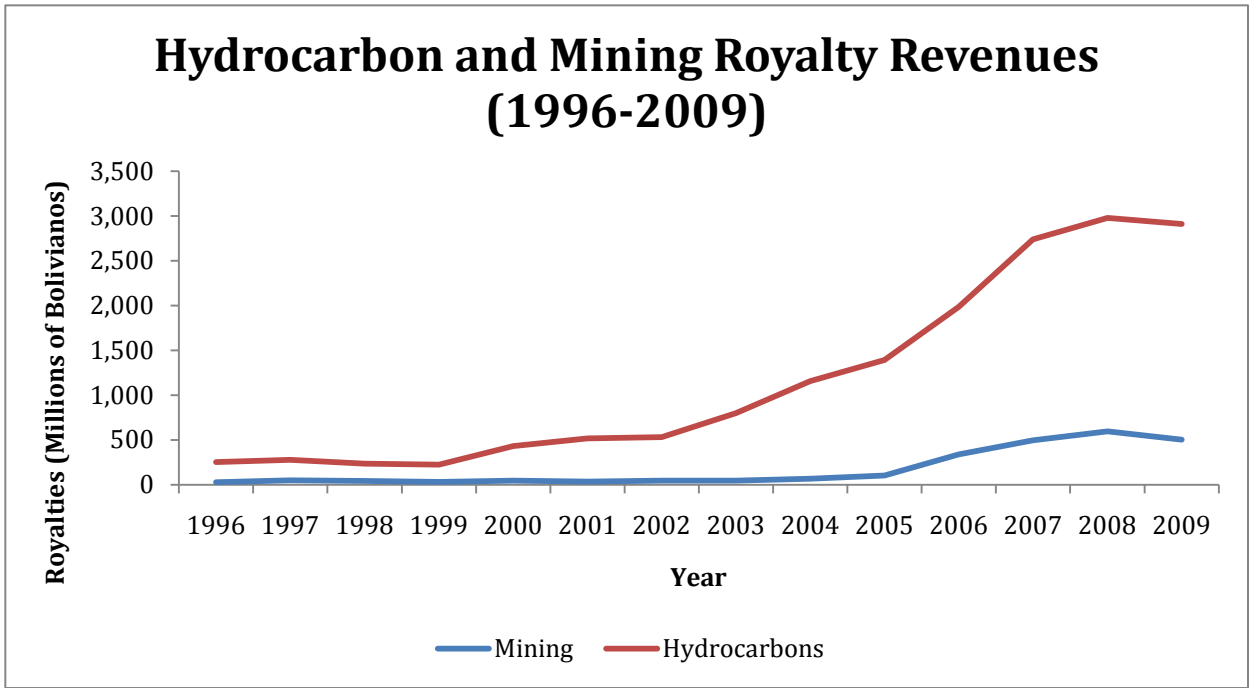
[304] Dunning, *Crude Democracy : Natural Resource Wealth and Political Regimes*, 250.
[305] Ibid.

capability. Within Bolivia, President Morales has used lithium rhetoric as a means of placating the economically dominant Media Luna and the politically frustrated department of Potosí. Each of these political goals can only be accomplished if the populace believes in lithium's developmental capacity. It is within this requirement that the irrationality of Morales' lithium rhetoric readily emerges. Specifically, President Morales' political goals require the Bolivian populace to conceive of lithium as a magical commodity that can imbue the Bolivian state with a transformative developmental capacity.

Appendix 1.



SOURCE: http://www.ine.gob.bo/indice/visualizador.aspx?ah=PC01010301.HTM



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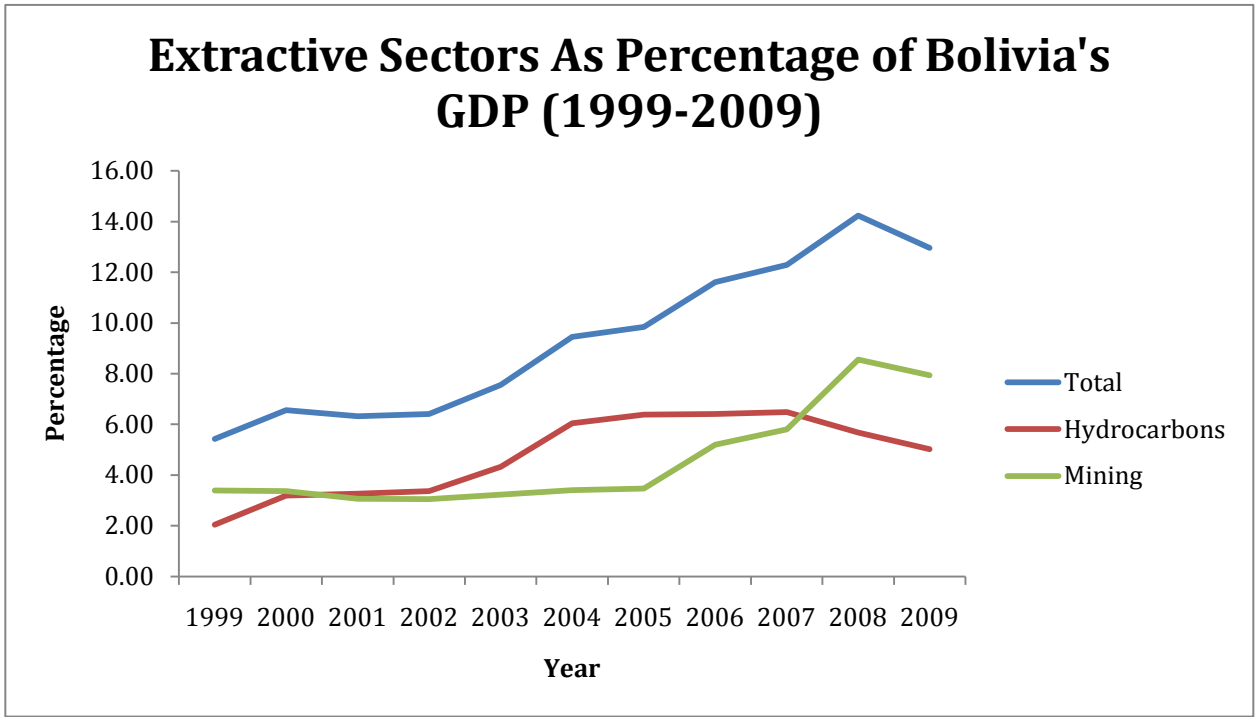

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Chapter 6: Conclusion – Synthesizing the Lithium Puzzle and Assessing Its Implications on Bolivian Development

Introduction

Having posited plausible political explanations for the lithium puzzle, I will conclude this thesis with a discussion of the inconsistencies within President Morales' lithium rhetoric and developmental plans. In so doing, I seek to draw attention to the conflict between President Morales' fetishization of lithium, the decentralized hydrocarbon revenue distribution policy, the proposed centralized lithium revenue distribution policy and the political backlash this proposal has caused. After commenting on the ways in which President Morales' lithium rhetoric and developmental plans are unlikely to pay political dividends over the long-term, I turn my attention to the implications of Bolivian's broader natural resource management policy on its national development goals. Through this analysis, I propose that the rent-seeking behavior that is animating Morales' lithium rhetoric is also likely to undermine the national government's attempts to manage Bolivia's natural resource towards poverty-alleviating and economically-developmental ends.

Section I. Political Implications Of The Lithium Puzzle

For all his speeches about maintaining the sovereignty of natural resources, President Morales is not an orthodox resource nationalist. The Morales administration's natural resource development strategy has demonstrated President Morales' ability to make compromises on his socialist ideology to achieve what he perceives to be better long-term prospects for his country (maintaining low mining taxation as a means of

ensuring continued relationship with Sumitomo for lithium development). Morales is using lithium rhetoric to placate the department of Potosí's developmental desires and the Media Luna's secessionist impulse, but there is substantial risk that these efforts will fail.

Political Risks

While there is evidence that President Morales has an unrealistic conception of the promises of natural resource wealth in promoting national development, it is unclear how long the Bolivian public will continue to believe in the "Magical State." Already, the decentralization of hydrocarbon revenues to the departmental level has diminished Bolivians' financial reliance on the national government for their developmental needs. Perhaps as a reaction to hydrocarbon revenue decentralization, the Morales administration has advocated a lithium revenue distribution policy that centralizes revenues in the national government.

The proposed lithium revenue distribution policy (which would give the department of Potosí only 5% of the lithium revenues) is shocking in the context of the existing hydrocarbon revenue distribution policy. The simplest explanation for this divergence is that the Morales administration thinks it can take advantage of its political base in Potosí without drawing backlash. This assumption is misguided in light of the Potosí protests of the summer of 2010. The people of Potosí have become frustrated with the national government's failures to stimulate economic development even though the department of Potosi produces hundreds of millions of dollars in mining royalties for the national government. In this climate of political frustration, the Morales administration cannot rationally believe that it can succeed in divorcing the department of Potosí with the vast majority of the lithium revenues, nor gain political dividends for even proposing

such a policy. By asserting a centralized lithium revenue distribution policy, the Morales government is redoubling its efforts to present itself as a "Magical State."

In response to the proposed lithium revenue distribution policy, the Potosí Civic Committee has vowed, "the next mobilization will be in defense of lithium."[306] This response is most significant in that it implies that the department of Potosí is concerned with 'defending' its resources from the national government. The growing political cleavage between the national government and the department of Potosí reveals that the people of Potosí are becoming less invested in the myth of the 'Magical State' or at least that they don't trust the national government to be this 'Magical State.' President Morales runs the risk of increased political fragmentation and/or pressure to decentralize mining revenues to the same extent as hydrocarbon revenues.[307]

[306] Achtenberg, "Bolivia Bets on State-Run Lithium Industry."
[307] Recall that the department of Potosí receives 35.8% of mining royalties from Sumitomo's San Cristobal mine while Media Luna receives 50% of all hydrocarbon royalties accrued within these departments.

Coda

Section II. Evaluating the Natural Resource Development Strategy In the Context of the Resource Curse

While understanding the lithium puzzle was the principal analytical goal of this thesis, my research into Bolivia's natural resource management strategy and its implications for Bolivia's economic development requires brief attention. The case study of Bolivia's natural resource management theory and the political conflict that has shaped this policy provides nuance to the natural resource curse theory.

Despite the aforementioned difficulties of natural resource-led development, the Morales administration appears to have committed itself to following some of the strategies to avoid the resource curse. These efforts (the development of value-added industries, macroeconomic reform of the state subsidy system, and decentralization of natural resource revenue distribution) have been largely unsuccessful in accomplishing their intended developmental and poverty-reduction goals.

The Development of Technical Expertise And Value-Added Industries

Historically, Bolivia has been as a primary product producer, without value-added industries. The Morales administration has pursued a natural resource development strategy that attempts to escape the economic deprivation caused by this position. In achieving this goal, the Morales administration ensured that 96% of workers employed at

Jindal's El Mutún iron ore and steel operation are required to be Bolivian citizens.[308] In addition, the El Mutún deal includes plans to build a steel mill capable of producing 1.7 million metric tons/year.[309] El Mutún's iron resources are so massive that Bolivia can demand to be a part of the value-added production process; Jindal will produce all Mutún-related steel within Bolivia.

Macroeconomic Reform of the State Subsidy System

Elected on a platform of social spending, indigenous rights, and natural resource nationalization, President Morales has recently governed with a macroeconomic pragmatism that has damaged his popularity. Oil and gas consumption subsidies cost the Bolivian government between $300-$500 million annually.[310] Recent efforts to end these subsides (Supreme Decree 748 of December 26th, 2010) were met with widespread protest, leading to a reversal of the policy within weeks of its announcement. The end of fuel subsidies increased the price of hydrocarbons between 57% and 82% and "led to a nationwide bus and transport strike that paralyzed the country…Bolivian groups have been almost unanimous in denouncing the gas-hike, even the coca growers union which Evo [Morales] used to lead decided to block the Cochabamba-Santa Cruz road."[311] In response, Morales not only repealed the Decree on December 30th, he promised a freeze on gasoline prices until 2013.[312]

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[308] ComunicaBolivia, "Evo Morales Promulga Ley Para Explotar El Mutun."
[309] "Jindal Steel Seals $2b Bolivian Deal."
[310] "Vice President Continues to Battle Gasoline Subsidies on Television ", http://www.boliviaweekly.com/vice-president-continues-to-battle-gasoline-subsidies-on-television/1351/.
[311] "Evo Reverses 180: Gasoline Subsidies Will Continue," Bolivia Weekly, http://www.boliviaweekly.com/evo-reverses-180-gasoline-subsidies-will-continue/1339/.
[312] "Mas Congela Precio De La Gasolina Hasta 2013," El Diario, http://www.cedla.org/obess/content/4842.

Despite the popular mobilization, the Morales administration has continued its attempts at macroeconomic reform in 2011. On February 1, 2011, the government-run food company EMAPA announced that it would raise sugar prices by roughly 40%, in an effort to end unsustainable state subsidies. This massive price increase came on the heels of another 23% increase on January 14th.[313] The sugar price hikes have put upward pressure on other basic foodstuff prices, triggering another round of countrywide protests and looting of state-owned food stores.[314]

The Morales administration's decision to reform the state hydrocarbon and sugar subsidies drew a backlash across the country and the political spectrum. President Evo Morales' approval rating is at an all time low of 30% according to Santa Cruz based Captura Consulting.[315] While the Captura Consulting poll is conducted by telephone, (and therefore disproportionately represents Evo Morales' opponents), Morales' approval rating within this poll have dropped from 52% in September 2010.

Morales' macroeconomic pragmatism speaks to his commitment to bypass the common pitfalls that result in the resource curse. The Morales administration has attempted to revoke state-funded hydrocarbon and food subsidy programs due to their unsustainable nature. If they had been successfully implemented, the subsidy reforms would have reallocated the consumption of hundreds of millions of dollars of non-renewable natural resources towards desperately needed infrastructure and educational investment. The failure to maintain these subsidy reforms has recommitted Bolivia's

[313] "Sugar Prices Rise 90% in January, Food Insecurity and Inflation Serious Threats," http://www.boliviaweekly.com/sugar-prices-rise-40-food-insecurity-and-inflation-serious-threats/1428/.
[314] "Widespread Looting in Llallagua," Bolivia Weekly, http://www.boliviaweekly.com/widespread-looting-in-llallagua/1393/.
[315] "Morales Approval Rating at All Time Low," Bolivia Weekly, http://www.boliviaweekly.com/morales-approval-rating-at-all-time-low/1361/.

long-term development strategy to an unsustainable path. The Morales administration's policy-making autonomy was constrained by his political party's ideology and Bolivia's economic underdevelopment, which ensures the public's desire to use hydrocarbon rents for consumption purposes.

Decentralization of Hydrocarbon Revenue Distribution

The Morales administration is constrained in its hydrocarbon taxation policy because of the massive contribution of the Media Luna to government revenue outside of the hydrocarbon sector; Santa Cruz supports Bolivia's robust agricultural export industry. In 2009, the department of Santa Cruz contributed 28.7% of total Bolivian GDP,[316] and the department of Tarija contributed 10.0% of total Bolivian GDP.[317] The Morales administration advocated the 50/25/25 distribution policy to placate the Media Luna's secessionist rhetoric.

Unfortunately, by delegating hundreds of millions of dollars of hydrocarbon revenues to departmental governments, the national government is perpetuating Bolivia's dramatic income inequality and disjointed infrastructural development. Owing to East-West inequalities in hydrocarbon production and population, Bolivia's departmental governments have dramatically unequal hydrocarbon revenues to spend per capita.

[316] Estadistica, "Actualidad Estadistica Departmental - Estadistica E Indicadores Socioeconomicos Del Departmento De Santa Cruz," 7.
[317] Estadistica, "Estadisticas Socioeconomics Del Departmento De Tarija," 12.

Department	Population[318]	Hydrocarbon Revenues (2007)[319]	Hydrocarbon Revenues per capita
Chuquisaca	531,522	$58,100,000	$109.31
La Paz	2,350,466	$73,300,000	$31.19
Cochabamba	1,455,711	$86,700,000	$59.56
Oruro	391,870	$46,100,000	$117.64
Potosi	709,013	$46,100,000	$65.02
Tarija	391,226	$237,300,000	$606.55
Santa Cruz	2,029,471	$117,900,000	$58.09
Beni	362,521	$62,400,000	$172.13
Pando	52,525	$54,200,000	$1,031.89
Total	8,274,325	$782,100,000	$94.52

The current policy is rational only in its low per capita distribution to Santa Cruz; Santa Cruz has the lowest departmental poverty rate with less than 10 percent of people living in extreme poverty and 31 percent of people living in poverty.[320] Tarija has the second lowest departmental poverty rate,[321] but supports a per capita hydrocarbon revenue distribution ($606.55) more than 6 times larger than the departmental average ($94.52). On the other hand, Potosí, where nearly 80 percent of people live in poverty (more than 50 percent in extreme poverty), per capita hydrocarbon revenues are the third lowest. The distributional disparities between departments are exacerbated because the national government, only receives 25% of total national hydrocarbon revenues.[322] Continuing

[318] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 31.
[319] Sandoval, "The Distribution of Bolivia's Most Important Natural Resources and the Autonomy Conflicts," 2.
[320] Velasquez-Donaldson, "Analysis of the Hydrocarbon Sector in Bolivia: How Are the Gas and Oil Revenues Distributed?," 37.
[321] "Bolivia - Situation of Poverty in the Country," UNICEF.
[322] Sandoval, "The Distribution of Bolivia's Most Important Natural Resources and the Autonomy Conflicts," 2.

income inequality and disjointed infrastructural development ensures that Bolivia will not achieve its developmental potential.

Conclusion

An examination of the Morales administration's natural resource development strategy provides additional nuance to the basic framework of the resource curse because it requires a dual consideration of political and economic expediency. The Morales administration has been tasked with developing a natural resource development strategy that can achieve economic growth, while still providing for state subsidy programs, without infringing upon perceived departmental rights of resource revenue distribution. Achieving a balance between these competing interests/ideals has proven exceedingly difficult; these goals may in fact be mutually exclusive. Despite its strong institutions, Bolivia's positive political outcomes in the presence of natural resource wealth do not ensure that the resource curse's adverse economic impacts will also be avoided. Bolivia's intractable economic issues (economic underdevelopment, disjointed infrastructural development, and high levels of income inequality) are actually exacerbated by the Morales administration's natural resource management strategy.

Bolivia's deficient natural resource development strategy is the product of Bolivians' intense resource regionalism. Resource regionalism is the product of Bolivia's troubled resource history. Now the same resource nationalist attitude that led to popular victories in the Bechtel Water War and Gas War is being used for destructive and divisive ends. In Bolivia's case, the high level of democracy is damaging the national economy's development. Future empirical research in this realm should seek to establish

the relationship between resource abundance, resource revenue distribution policies, and economic growth.

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