

Public and Private Firms in Natural Resource Industry:
Comparing the Development of the Lithium Industry in South America

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Abstract

Literature on public and private firms has traditionally focused on the efficiency effects of differing firm ownership, although the literature has been largely dormant since the 1980s. State-led development models in Asia and Latin America warrant continued analysis of this fundamental issue in International Political Economy. This paper attempts to frame debate on natural resource governance by identifying the factors that affect the mix of public and private firms in extractive industry. Historical institutionalism is used as a framework for analyzing policy change, and political economy theory of governance institutions is compared to the traditional economic theory of the firm. Analyzing the lithium industry in Chile and Bolivia as a case study, this paper suggests that temporal factors like historical stability of economic modeling and the sustained protection of property rights are critical in determining the optimum mix of public and private firms. This paper synthesizes existing scholarly contributions with original fieldwork gathered in the region.

Introduction

The South American mineral wealth that financed the western world's industrialization in the 17th and 18th centuries left in its place misery and underdevelopment. Entire mountains in the Andes are on the verge of collapsing, having been hollowed out by centuries of incessant mining. From gold to guano, South America has seen its economic fortunes tied to the booms and busts of natural resource exportation. More recently, the ownership of extractive industries like mining and forestry has alternated between public and private with the changing ideological tides of economic thought. Developmentalist states gave way to waves of neoliberal privatization and now it seems poised to switch once more. The end of the Cold War helped the discourse shed some ideological baggage and pragmatic policymakers across the world are attempting to create their own models. Part of the reason for these shifts is that natural resource wealth has repeatedly proven to impede the development of economic and political institutions more than it helps them over recent history, embodied in resource curse discourse. A part of this reaction has been a backlash against multinational corporations (MNCs), which account for the vast majority of extractive economic activity worldwide, for their globalized structures and ability to influence domestic politics. Resource sovereignty has reasserted itself in Latin America especially, evidenced by popular leftist governments in Bolivia and Venezuela, among others. State-owned enterprises (SOEs) are regaining stature in comparison to MNCs on ideological and practical grounds.

Proper resource governance could minimize the effects of the resource curse and spur development in areas of the world that have suffered the exploitation of colonialism and imperialism for centuries. This paper seeks to understand what factors influence the optimal mix of public and private firms in natural resource industries because of the vast development

potential of resource wealth. I argue that the popular mainstream debate over the inherent efficiencies of state versus privately owned firms is overly reductionist and misses the contextual factors that actually matter: a state's historical commitment to maintaining juridical security, popular perceptions of MNCs, and the nature of government's political base. This paper will examine the lithium industries of Chile and Bolivia as case studies to show what factors influenced the creation of two divergent models of ownership.

Property Rights Theory and Issues of Ownership

Economic theory provides a useful framework for examining public versus private firms. Some approaches focus on ownership incentives and organization within firms; others focus on aspects of market structure. Much of the defining literature on the subject was written during the mid-1980s, reflecting the powerful tide of privatization/deregulation that also characterized political debate at the time. The purely economic perspectives usually attempt to use econometric modeling to compare public and private firms numerically and generally use efficiency as the main, if not sole, measure of success. Indeed, theories of the firm are applied to a huge range of pure economic issues. Although the narrow focus afforded by econometrics is less useful in more inherently holistic political economy analysis, this literature inevitably serves to structure this paper's central question.

It is worth noting here that literature comparing public and private firms is very closely tied with literature on privatization. This paper is focused on state-owned enterprise (SOE) and private enterprise (PE) and does not attempt to understand privatized firms, which are presented with unique ownership issues. Although some of the firms examined in the case studies had at one time partial government ownership, they have been private for nearly 30 years now and for almost the entire time they have been producing lithium, so they will be treated as if they have

always been PEs. Nevertheless, it is hard to ignore many of the general theoretical considerations of privatization literature that can be applied to firms that have always been private.

One perspective that focuses on firm ownership as key is the property rights theory of the firm, which states that SOEs are inherently less efficient because of the attenuation of property rights. Jensen and Meckling generalize this conclusion by stating that the behavior of all individuals, including firm managers, depends fundamentally on the contracts that determine one's property rights.¹ Because they are essentially immune to threats of takeover due to their ownership, SOEs have fewer incentives to optimize management structures and inefficiency results.² The presence of a "takeover market" necessitates efficiency in management in order to stay independent and in operation. SOEs are protected from takeover by their owner and therefore can tolerate higher levels of inefficiency. According to Vining and Boardman, by the 1990s this school of thought had lost some theoretical traction since its inception in the 1960s, though it remains supported empirically. Vining and Boardman compared the 500 largest non-U.S. industrial firms at the time and concluded that "large industrial MEs and SOEs perform substantially worse than similar PCs."³

Property rights theory has developed alongside theories of agency relationships, which attempt to explain how contractual relationships between actors in firm management incur agency costs. The concept of agency costs is a crucial element for literature on the separation of ownership and control, which also applies to the public versus private debate. Fama and Jensen conclude that management structures that separate risk bearers from decision makers lead to problems of agency, although these are outweighed by benefits from specialization. With

¹ Jensen, M. C. and W. H. Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." (1976): 4.

² Alchian, Armen. "Some Economics of Property Rights." *Il Politico* 30 (1965): 816–829.

³ Boardman, A. E. and A. R. Vining. "Ownership and Performance in Competitive Environments: A Comparison of the Performance of Private, Mixed, and State-Owned Enterprises." (1989): 4

separation of ownership and control firms are able to choose managers that are best suited for firm operation.⁴ Alchain had a similarly important contribution to this area of corporate governance, arguing that SOEs run into monitoring problems as well because their degree of ownership concentration is higher than any PE could be (all citizens could be considered owners in a SOE).⁵

One significant challenge in any ownership-focused argument is to understand the behavior of policymakers in SOEs. Understanding the objectives of public firms is one step towards this goal. Whereas PEs are intrinsically profit-maximizers, SOEs also seek to maximize sociopolitical goals like employment, regional diversification, and securing strategic reserves.⁶ Acceleration of technology transfer, reduced inequality, and facilitation of industrialization through central planning are other social goals of SOEs set forth by Choksi.⁷ These goals are not always clear, however, which presents another issue specifically for SOEs: the wide array of possible state objectives are often not clearly stated and the possibility for electoral change creates commitment problems. In their broad summary of privatization literature, Megginson and Netter state that the inherent inability of governments to commit to stable policy reduces operative efficiency. Furthermore, goals based on general socioeconomic welfare principles are difficult to turn into effective policy and are often hard to measure.⁸ Although focusing on these secondary goals generally leads to inefficiencies in a competitive market, market failures can be corrected through state intervention via SOEs.

⁴ Fama, Eugene F. and Michael C. Jensen. "Separation of Ownership and Control." (1983): 27.

⁵ Shirley, M. and P. Walsh. "Public Vs Private Ownership: The Current State of the Debate." (2001). 31

⁶ Fulton, Murray and Larry Karp. "Estimating the Objectives of a Public Firm in a Natural Resource Industry." (1989) 270.

⁷ Choksi, Armeane M. *State Intervention in the Industrialization of Developing Countries*. 1979.

⁸ Megginson, W. L. and J. M. Netter. "From State to Market: A Survey of Empirical Studies on Privatization." (2001): 9.

Market Structure and Competition

Theories of market structure and competition are the contemporary response to the ownership theories that dominated the last decades of the 20th century. In their seminal 2001 literature review, Shirley and Walsh outline this way of thinking in comparison to ownership theory. Theories based on competition focus on incentive effects, which are increased in competitive markets via threat of decreased market share, and information effects, which help owners receive information regarding their costs and managerial performance.⁹ Yarrow, King, Mairesse, and Melitz stress that it is not the ownership, but “the competitive and regulatory environment that shapes the incentives of managers.”¹⁰ Kole and Mulherin’s 1997 analysis of public and private firm performance after the Second World War came to a similar conclusion. Megginson and Netter qualifies this assessment to cases where the state does not play an active role in the firm’s operation, which is clearly a fairly large change.¹¹

Empirical evidence seems to suggest that while the presence of competition can mitigate the inefficiencies of public ownership, it generally does not outweigh them entirely. Shirley and Walsh even outline how SOEs could be incentivized to anti-competitive behavior. The blame is placed on politicians, who are supposedly unable to commit to fomenting competition. In fact, situations of high competition that would be best for SOEs are actively avoided by politicians.¹²

Another important vein of market structure theory focuses on oligopolistic markets and natural monopolies, where a public firm could help solve some market failure. Because of ever-increasing returns to scale, natural monopolies are most efficient with one firm. This has been the justification for state involvement in many developed countries, predominantly in the

⁹ Shirley, M. and P. Walsh. 7

¹⁰ Yarrow, G, M. King, J. Mairesse, and J. Melitz. "Privatization in Theory and Practice. (1986): 323-377.

¹¹ Megginson and Netter 14

¹² Shirley and Walsh (2001) 9

telecommunications industry. In developing nations, the justification for state involvement is related more to general market failures. Shirley and Walsh believe the literature is flawed in these instances by comparing state ownership with privatization only, instead of examining the potential of regulating a private monopoly. The balance there is stated to depend on whether or not contracts are complete. If they are, meaning that they “define all aspects of performance and every possible eventuality,” then a difference should be minimal.¹³ Obviously, this is a high standard unlikely to be met in the majority of cases.

Both of these competing theories of the firm help structure the debate on state versus private-owned industry, though neither ownership nor market structure dominate the theoretical discourse. Similarly, each one shows a disconnect between theory and the empirical data. That is not to say that they are inherently flawed, but rather that, like many purely economic theories, they simply cannot possibly integrate the multitude of variables that influence outcomes. Instead, they enumerate key explanatory concepts like agency costs and takeover markets that help orient the more qualitative, descriptive theories common in political economy literature.

Historical Institutionalism and Theories of Policy Change

Because the ownership of a resource industry is necessarily the result of a state economic policy, understanding how states arrive at their policy outcomes yields powerful clues for analysis. Like the tension between ownership and market structure, policy change literature reflects a struggle for primacy between structure-driven and agency-driven approaches. Structuralism focuses on the constraining effect of institutions on behavior, while agent driven approaches focus on individual rationality. This duality is questioned somewhat by Hay and Wincott, however, who call for reconciliation between the two forces as a way to overturn a

¹³ Shirley and Walsh 11

popular emphasis on institutional inertia.¹⁴ Differing theories of institutionalism exist, varying from sociological institutionalism to rational choice analysis.

Historical institutionalism is another theoretical means to explain policy change, focusing on policy as a result of the way strategic choices by policymakers are influenced by institutional environments and long-term conflicts between actors. The temporal aspect here is a crucial differentiation. Instead of a “break point from equilibria, change is an outcome of concrete historical processes,” according to Singh.¹⁵ Internal contradictions and tensions are inherent in this model and the way they interact over time creates layers of policy. Similarly, Silva argues that models of resource governance are better conceived as a bundle of industrial and social policies than one coherent policy.¹⁶ New policy can either replace existing rules (institutional displacement) or coexist with old rules (institutional layering). There are two other levels of policy change besides specific policy instruments, however: overarching goals and techniques used to obtain these goals. Change in policy orientation can take place on any or all of these levels. Determining the primary medium for change allows one to examine ideational aspects of institutional change as well as the more discrete material sources of change.¹⁷ As such, the adoption of an economic model cannot be viewed as a single, distinct event, but rather as one step in an ongoing process. This emphasizes the effects of historical trends and contextual details over any specific aspects of a given policy. As Singh aptly puts it, “institutional change is not a neat process nor are institutional designs coherent models.”¹⁸ Accordingly, models of resource governance are not monolithic either, but reflect the internal tensions and struggles inherent in policymaking processes.

¹⁴ Hay, Colin and Daniel Wincott. "Structure, Agency and Historical Institutionalism.", 1998): 951.

¹⁵ Nem Singh J.T. "Reconstituting the Neostructuralist State" (2010): 1413-1433.

¹⁶ Silva, Eduardo. "The Import-Substitution Model: Chile in Comparative Perspective." 69.

¹⁷ Nem Singh J.T. "Reconstituting the Neostructuralist State" (2010): 1413-1433.

¹⁸ Ibid

Historical institutionalism is useful for this paper because it structures the analysis of the policy changes that shape resource industry. Understanding how and why current models of industry evolved into their current state is a crucial step towards assessing the implications of public and private firms because their viability is inevitably shaped by the political economy in which they operate. This may seem like tautological, yet it is worth explaining. Silva points to a mistaken conceptualization of political economic models as well-defined, consistent, and most importantly, monolithic. Models of resource governance, like development models, are not implemented in their final form: they are crafted gradually as a response to the historical context.¹⁹ Since identifying what factors influence the formation of these models is the central goal of this paper, the questions prompted through a historical institutionalist approach provide another layer of analysis.

State Autonomy, Capacity, and the Challenges of Economic Regulation

Due to overlap between resource curse and development theories, political economy theory offers substantial contributions to the subject of natural resource industry. Existing literature identifies a number of factors that influence a state's policymaking with regard to extractive industries. That said, the variety of lenses and approaches encompassed in a label like political economy literature warrants further even further differentiation.

At its most basic level the resource curse hypothesis shows high levels of resource abundance correlates with stunted economic development. The discourse came into prominence in the 1980s and has remained a staple political economy subject. Resource curse scholars generally tie the resource curse to the type of political state and its institutions. In her review of a diverse array of resource curse literature, Norman makes it abundantly clear that resource abundance is not inherently problematic, but rather a factor that can exaggerate bad

¹⁹ Silva, Eduardo. "The Import-Substitution Model: Chile in Comparative Perspective." 67.

governance.²⁰ Auty and Gelb are among those who conclude that a strong developmental state can help resource abundant countries maintain economic growth through decisive central planning.²¹ Economic rents, or “the surplus earned by factors of production over and above the minimum earnings necessary to induce their employment,” are a pillar of the resource curse hypothesis and resource governance in general.²² Rents are important even when mining is privatized because governments create the fiscal regime and legislation that magnitude and sharing of rents.²³ Government rents from extractive industries, generate political competition that can lead to factional, predatory states that seek to strategically distribute rents in order to stay in power, leading to incoherent and inefficient economic policy. Even a benevolent state that seeks to maximize long-run social welfare faces pressure to overextend itself.²⁴ The influx of resource rents in an economy generally leads to relaxed market discipline that reduces investment efficiency over time. By contrast, resource poor states cannot afford to overextend themselves in support of inefficient endeavors or an expansive bureaucracy. Furthermore, the lack of natural resources necessitates investment in human and social capital. Contributions to the resource curse discourse are closely tied to discussions on models of natural resource industry because they share the same basic governance issues.

Political autonomy is often identified as one of the key factors in policymaking regarding economic policy. Auty and Gelb’s given solution to the resource curse is a developmental state with sufficient autonomy to maintain a coherent economic policy over the long-term, an argument that applies more generally to natural resource governance as well.²⁵ Government

²⁰ Norman, Catherine S. "Rule of Law and the Resource Curse: Abundance Versus Intensity." (2009) 186.

²¹ Auty, R. M. and A. H. Gelb. "Political Economy of Resource-Abundant States." (2001) 2.

²² Tilton, J. E. *Mineral Wealth and Economic Development* Rff Press, 1992. 62

²³ Ibid 65

²⁴ Auty, R. M. and A. H. Gelb. "Political Economy of Resource-Abundant States." (2001) 7.

²⁵ Ibid 10.

autonomy refers to the degree of insulation of policymakers from societal demands. Without some degree of autonomy, political competition among interest groups would lead to incoherent economic policy. Politically popular but inefficient policies like public employment and import protection are generally preferred in the short-term by social groups over education, infrastructure and other forward-looking policies.²⁶ As Przeworski and Limongi put it, “democracy is always responsive to the pressures for immediate consumption.”²⁷ Silva states that state policymakers rarely benefit from absolute autonomy from social forces and are forced to broker multiclass social coalitions in support of their policies to stay in power.²⁸ The creation of a meritocratic bureaucracy can lead to higher autonomy because policymakers are not elected, but this approach brings concerns of inefficiencies and increased opportunities for corruption.

Political institutions are not the only factors affecting the autonomy of economic policymaking; societal constraints also play a role. Haggard and Moon explain the limits of institutional theories of national level policymaking and the influence that social groups can possess. By relying on generalized, highly aggregate models of political regimes, institutional theories lack the descriptive depth of societal approaches.²⁹ Beyers and Kerremans focus on competing social cleavages to examine how different interest groups mobilize to gain government influence. In their 2004 study of EU politics, they conclude that social cleavages between pro-environment groups and pro-growth groups prevent the development of an effective technocracy. Beyers and Kerremans identify an issue’s potential for mobilizing broad public support as the main factor in determining an interest groups ability to influence policy.³⁰ Social

²⁶ Ibid 2.

²⁷ Przeworski, Adam and Fernando Limongi. "Political Regimes and Economic Growth." (1993): 51-69.

²⁸ Silva, Eduardo. "The Import-Substitution Model: Chile in Comparative Perspective." 70.

²⁹ Haggard, Stephan, and Chung-In Moon. "Institutions and Economic Policy: Theory and a Korean Case Study." *World Politics: A Quarterly Journal of International Relations*. 42 (1990): 210-237.

³⁰ Beyers, Jan, and Bart Kerremans. "Bureaucrats, Politicians, and Societal Interests". *Comparative Political Studies*. 37, No. 2 (2004): 1119-1150.

issues surrounding extractive industries are renowned for their ability to mobilize the formation of competing coalitions. Ballard and Banks see mining as an anthropological discourse that has begun to incorporate new actors from a variety of backgrounds since the 1980s minerals boom generated scholarly interest. What was once a conventional binary contest between states and corporations has broadened to include representatives of local communities, environmental advocates, and others. These coalitions are often unstable and centered on individual projects.³¹ The balance of competing social group constrains a state's policymaking autonomy.

Autonomy is balanced by concerns for accountability, although they are not mutually exclusive. In an interesting overlap with economic theory, Vernon explores the different devices states use to balance concerns of autonomy and accountability. He concludes that states have almost always attempted to separate SOEs from ordinary government ministries rather than fully incorporate them into existing government structures, a direction usually leading to suboptimal results.³² Transparency is a significant aspect of accountability and is especially important in cases of decentralized resource governance. Transparency can also help mitigate the governance concerns of SOEs because firms are less likely to deviate from stated goals and policies when they are public. Accountability can stymie corruption and ensure that government's most basic mandate is fulfilled: to serve the needs of its constituents.

Government capacity is another key factor in natural resource governance, whether public or private in. Where autonomy affects the state's ability to choose policy, capacity refers to the state's ability to effectively implement chosen policy. Singh places capacity and autonomy together as the most important determinants of governance, arguing that "it is state capacity and

³¹ Ballard, Chris and Glenn Banks. "Resource Wars: The Anthropology of Mining." *Annual Review of Anthropology* 32, (2003): 288.

³² Vernon, Raymond. "Linking Managers with Ministers: Dilemmas of the State-Owned Enterprise." *Journal of Policy Analysis and Management* 4, no. 1 (1984): 39-55.

autonomy from societal forces, regardless of political ideology, which permit the state to take a steering role in economic management, specifically through a relatively coherent policy network for implementing state planning.”³³ Economic management here can refer to state-led industry or regulatory processes for private enterprise. State capacity is an obvious necessity for managing and enforcing the royalty regimes affecting PEs in resource industry, as well as other regulatory regimes like environmental agencies.

Privatization also emerged as a major political economy discourse in the 1980s when a slew of resource abundant developing nations began reevaluating the ISI models that predominated in post-colonial resource economies. Discussions of privatization trend towards institutional analysis, focusing on the presence of regulatory institutions as a determinant of success. Fishlow’s assessment of Latin American political economic transformation in the 1980s reacts against the proliferation of literature proclaiming privatization as a panacea for development issues.³⁴

Big push theory also merits mentioning here because of its implications for development through natural resource extraction. Big push reasoning is based upon the presence of low-income equilibrium traps that prevent industrialization due to high fixed costs. Resource industries present a viable solution to this dilemma by providing the initial capital flows necessary to incentivize entrepreneurial activity in the early phases of industrialization.³⁵ Without this initial impetus, developing nations do not have the resources to build the necessary infrastructure. This is a counterpoint to resource curse models that emphasize diversifying resource abundant developing economies away from the export of a handful of primary commodities because it strongly doubts their ability to do so. Big push reasoning does not

³³ Nem Singh J.T. "Reconstituting the Neostructuralist State" (2010): 1413-1433.

³⁴ Fishlow, Albert. "The Latin American State." (1990) 70.

³⁵ Sachs, J. D. and A. M. Warner. "The Big Push, Natural Resource Booms and Growth." (1999): 43-76.

explicitly favor a state-led or private-led approach as long as a significant portion of rents are kept in the producing country to spur this transformation.

The location of the scholarly contributions discussed in the preceding pages is necessary to note before moving on to case studies. In development literature, topics like natural resource management and the role of the state in extractive industry were at their peak in the 1980s and early 1990s and have since been largely ignored. This can partially be explained by the political context, given the cold war's penchant for transforming discourses to fit its own oppositional nature. State-led approaches were juxtaposed with free-market capitalism on ideological grounds as much as their development potential. It is also possible that natural resource management was still a new topic for the many formerly colonial nations seeking to enter the world economy in the quickest way possible. Cheap manufacturing by MNCs has arguably usurped the position of resource extraction as the predominant development concern in poor countries. Either way, there exists a notable lack of interest in the subject since the 1990s, which is problematic given the changing nature of the international economy. I refer specifically to the relatively recent emphasis on environmental and ethnic or regional issues. Environmentalism has reached a threshold worldwide so that MNCs are forced to tailor their activities to face a globalized norm or face retribution by consumer groups and government regulatory agencies. Likewise, discussions of minority ethnic rights and regional autonomy have risen steadily since the end of the cold war as nationalism gave way to the rise of regional and ethnic identities. Rarely can states now endeavor independently to extract resources for the benefit of the nation; rather they must balance the development demands of smaller communities and interest groups. This adds another layer to the governance concerns already identified with resource industries.

Methods

This paper contributes to a fundamental discourse in international political economy by reconciling the established theoretical approaches mentioned previously with the analysis of two case studies predominantly based on in-depth interviews. I conducted on-site, taped interviews between June and August of 2011 on a research trip in Bolivia and Chile.³⁶ Interviews were conducted in English and Spanish.³⁷ Subjects came from a wide array of backgrounds in the lithium industry, ranging from bureaucrats in the Bolivian state-owned mining corporation (COMIBOL) to economists with doctoral degrees from US universities. Due to the wide range of backgrounds and perspectives being examined, interviews were semi-structured and did not maintain a consistent structure. However, fieldwork focused on examining a basic set of issues: how each nation's political economy of lithium had developed, how the subject perceived the current state of their respective nation's lithium industry, and the prospects for future change. I also took a guided tour of COMIBOL's lithium pilot plant.

I chose to use primarily qualitative research methods for a mix of practical and strategic reasons. The opaque nature of the lithium industry worldwide is one important constraint. Although currently almost all lithium producers are publically-traded MNCs, market data remains limited and hard to find. Transactions are made directly between producers and consumers, not on a public commodities market like most minerals. Market estimates of supply and demand are therefore difficult to find. Chilean government tax records are one of the ways to get around this issue to examine sales and profits, but this is more difficult because lithium represents less than 25% of total sales for its producers. Potassium and other chemical products derived from brines have a much larger global market. The state-owned Bolivian enterprise is

³⁶ Funding for the trip came by the University of Puget Sound International Political Economy Program in the form of a Summer Research Fellowship

³⁷ All quotations have been translated to English for the purposes of this paper.

significantly less transparent and publishes little that could be used in quantitative analysis. The relatively small size of the global lithium market is another factor contributing to the dearth of public data.

Strategic considerations also steered me towards qualitative methods. Examining the political economy of lithium in a region so laden with historical and cultural factors inevitably leads to complexities better suited to more flexible, descriptive methods. I felt that limiting my analysis to a number of factors manageable for econometric or other quantitative methods would have been irresponsible. Fieldwork sought to make up for the lack of existing academic research on global lithium industry.

This paper's methodology presents serious limitations as well, however, as focusing on qualitative methods often means foregoing the general applicability of numerical analysis. The conclusions reached in this paper will be difficult to transfer to other specific cases due to the large number of factors discussed. Other studies will require similarly rigorous fieldwork to make use of these conclusions. Even so, the advantages of qualitative research methods remain decisive.

Lithium Industries in Chile and Bolivia: Case Studies

The decision to examine the comparative development of Chile and Bolivia's lithium industries as case studies is a product of current and future conditions. Although lithium is a relatively unknown industry at the moment, it has massive amounts of potential for growth given its applications in energy storage. Lithium-ion battery packs are currently the standard in portable electronics and appear to be the future of electric vehicles. The current market size is estimated to be US \$450 million and 25% of lithium is used in the production of batteries. Glass and lubricants make up the other two largest market sections. The strategy of the Chilean MNC

Sociedad Quimica y Minera de Chile (SQM) for lithium is focused on electric cars. They estimate that as many as eighteen million cars could be using lithium-ion batteries by 2030.³⁸ Other analysts estimate that sales of lithium car batteries could grow by 1000% in the next two decades.³⁹ Car batteries are not the only avenue for growth, as a vast array of electronics utilize lithium ion batteries. Bolivian economist Juan Carlos Zuleta believes that lithium could be the centerpiece of a “clean-tech paradigm” focused on environmental concerns and independence from fossil fuels.⁴⁰

This is not the first time experts have predicted a huge rise in lithium’s importance, however, and the last time was severely overestimated. During the height of the hype on nuclear energy in the 1970s, lithium was seen as a possible key component in fusion power. This led to much of the geological surveys that first established lithium reserve levels in South America and other political regulations that will be discussed later. Fusion power has not yet transitioned into a viable technology some forty years later and it should give some pause to observers. Electric powered cars also went through a boom in excitement during that time period and never materialized on the mass market. Tech analysts freely admit that current lithium ion technology is not yet ready to make the jump into an everyday consumer technology and that it requires further investment towards lower production costs to reach the optimistic forecasts.⁴¹ This growth potential raises the development stakes for states with deposits of the mineral. Like many extractive resources with high value, lithium could spur meaningful economic development, or decline a la the resource curse.

³⁸ Solminihac, Patricio. "Lithium: Strategic Material or Opportunity for Development?" SQM (2010)

³⁹ Hollender, R. and J. Shultz. "Bolivia and its Lithium: Can the Gold of the 21st Century Help Lift a Nation Out of Poverty" (2010).

⁴⁰ Zuleta, Juan Carlos. 2011. Interview by author. La Paz, Bolivia. June 15

⁴¹ Ibid

The recent history of the region's production of lithium also lends it to analysis. Unlike more traditional natural resource industries like copper or tin, the contemporary nature of lithium's latest rise to importance means that its political economy is generally less established. Chile has been producing industrial quantities of lithium for barely three decades and Bolivia has yet to bring any quantity to market. Thus, I believe that their political economy is more "pure" and contains less confounding variables than an industry like copper that has dominated the region's economies for centuries. This is not discounting the role of historical factors in the creation of the respective nations' development strategies, but rather that there exists less of the embedded, institutional obstacles to change that are seen in industries with long histories. These characteristics made lithium a compelling industry for case studies in natural resource economics.

I chose Bolivia and Chile as comparative case studies because although they possess relatively similar resources geologically, their strategies of developing lithium industries could not be more different. Both nations produce lithium from brines under salt lakes in the Atacama Desert of central South America and between them they account for 66% of world lithium resources, according to the most recent estimates by the US Geological Survey (USGS).⁴² This creates a control variable of sorts that allows for more focused analysis on the effects of different forms of government involvement. Because their geographic qualities are similar, varying outcomes of lithium industry must then be a result of political and economic factors.

The fact that Chile and Bolivia share some aspects of their cultural heritage and colonial history is similarly important for analysis. Both nations were colonies under the Spanish empire until the early 19th century and therefore originated with similar institutions. Though the legacy of Spanish influence is perhaps less visible in Bolivia, the lithium-producing regions of both

⁴² Mares, David "Lithium In Bolivia" (2010) 9

nations are inhabited by largely the same ethnic groups. The Aymara are an indigenous people that have lived in the high Andean plateaus of South America since well before the Spanish arrival. They maintain an ethnic majority in both the Potosí department of Bolivia and the Chilean region of Antofagasta, which contain the nation's lithium resources. Both Chile and Bolivia are ethnically heterogeneous nations by region, which makes the locally concentrated nature of the lithium industry more problematic. Questions over how to distribute control over resources and the rents associated with that control are complicated when the populations around production sites are primarily of one ethnic group, in this case the Aymara.

Each nation's lithium reserves are similar but not equal. Simply put, extracting lithium is significantly easier in Chile's Salar de Atacama than in Bolivia's Salar de Uyuni, despite the size of overall reserves. Jaime Claros, a Bolivian chemical engineer at the Autonomous University of Tomás Frías in Potosí, Bolivia, has been studying the Salar de Uyuni for over 20 years and points to several key differences between the two sites: evaporation rates, relative concentrations of lithium to other minerals in the brines, and seasonal precipitation levels.⁴³ The standard production process for lithium carbonate, which is the most common commercial form, requires months of evaporation to reach acceptable concentrations. Lower evaporation rates in Bolivia mean that this phase of the project takes three to five months longer than in Chile. Similarly, southern Bolivia suffers from a nearly five month rainy season, which can flood the evaporation pools and dilute the chemical solution. When I was in Uyuni, the entire Salar was flooded under 50 cm of rainwater. This complicated transportation around the facility and ongoing construction efforts. To contrast, Chile's Salar de Atacama is one of the driest places on earth. The ratio of lithium to magnesium and other minerals is measurably different between the two sites as well. In Chile the ratio of lithium to magnesium is between 1:6 and 1:8, in Bolivia it is between 1:18

⁴³ Claros, Jaime. 2011. Interview by author. Potosí, Bolivia, July 7.

and 1:24.⁴⁴ This makes the chemical extraction process less efficient and drives costs up. All of these factors help make the Chilean industry more efficient and competitive.

The Current State of the Lithium Industry

Despite its potential for growth, lithium currently represents only a tiny fraction of Chile's GDP. Chile is currently the world's largest lithium producer, accounting for some 40-60% of world supply⁴⁵, yet less than 1% of the nation's GDP.⁴⁶ Total production has varied widely in the past decade due to unstable demand around the 2008 crisis but rose in 2010 and that trend is expected to continue due to strong demand in Asia. SQM has an annual capacity of 40,000 metric tons and the German-owned MNC Chemetall SCL trails at 28,000 metric tons.⁴⁷

Chilean production is entirely privatized, exclusive to SQM and SCL, the two MNCs who enjoy special mandates from the central government thanks to a grandfather clause in regulation. Chile followed a worldwide movement in the 1970s and designated its lithium reserves to be strategic resources due to their use in processing nuclear fuel and potential for nuclear fusion, which delegated stricter regulation to the state. The 1979 Decree Law Number 2886 limited the mining, processing, and trading of lithium compounds to the Chilean State or to operating companies via special arrangement⁴⁸.

The two MNCs that operate currently in Chile bought out concessions to mine lithium from the state development agency CORFO. CORFO commissioned two independent projects in the 1980s to explore the economic potential of the Atacama salt flats, the *Lithium Project* and the *Potassium Salts and Boric Acid Project*.⁴⁹ The contracts for both projects initiated as mixed

⁴⁴ Ibid.

⁴⁵ Due to the private client-supplier relationships in the lithium market, this number varies greatly depending on which source you use.

⁴⁶ Tahil, W. "The Trouble with Lithium." (2007).

⁴⁷ Fletcher, Seth. *Bottled Lightning*. 2011.

⁴⁸ Bradley, Ruth. "Chile's Lithium Quandary."

⁴⁹ Ebensperger, A., P. Maxwell, and C. Moscoso. "The Lithium Industry" (2005): 229.

enterprises between CORFO and private corporations. CORFO sold the two concessions gradually during the nation's privatization phase in the mid-1980s and the legislature has not yet amended lithium's status to allow further concessions to be allotted.

According to Jose Ascencio, a professor of mining at the University of Santiago, Chile, the prospect of amending the legislation relating to lithium production is dim, despite its antiquated restrictions.⁵⁰ Nuclear applications of lithium reflect scientific knowledge from the 1970s and Chile still does not use nuclear power, although it has reinitiated talks with France and US to move in that direction. The world is also no closer to viable fusion energy, which was one of the driving forces behind the initial restrictions. Another obstacle in the way of liberalizing the lithium market in Chile is the lack of data on reserves.⁵¹ The government has based its appraisals on USGS surveys from the 1970s, information that must be updated before further concessioning can take place.

The royalty regime affecting production is similarly dated and reflects the incoherent nature of the concessions. SQM pays a combination of a fixed \$150,000 annual rent and a 6.8% of its lithium sales to the Chilean government. Since SCL's contract was more focused on general brine minerals, it pays 10% of magnesium sales and 3% of potassium chloride sales in royalties. Both concessions limit production, although in different forms. The concession owned by SCL expires in 2030 and has a maximum production limit of 180,000 tons of lithium metal, which analysts predict will be fulfilled by 2023. SQM's concession has no expiration year but limits consumption to 200,000 tons of lithium metal.⁵² As a whole, Chilean state income from lithium taxes is tiny in scale.

⁵⁰ Ascencio, Jose. 2011. Interview by author. Santiago, Chile July 27

⁵¹ Ibid

⁵² Bradley, Ruth. "Chile's Lithium Quandary."

In contrast, Bolivia's state-led approach has yet to bring any quantity of lithium to the market. The project began in 2007 under the very public direction of President Morales. Morales laid out a three phase plan for development in 2008 known as the "National Strategy for the Bolivian Evaporate Resources Industrialization." The plan calls for the construction of a pilot plant with limited production capability in phase one, scaled up production of lithium and other evaporate resources in phase two, and the development of value-added industries like batteries and electric cars for phase three.⁵³ Of the three phases, only the final one is open to foreign investment. Evert Villena, the Director of External Relations and Communications in COMIBOL's evaporate division, maintains that Bolivia has the capability to develop the high-tech industry independently and insists that the effort faces no major technological barriers.⁵⁴ The extraction of lithium from the salt flats will be 100% state-owned and based on Bolivian scientific efforts, which many argue are not up to international standards.⁵⁵ Total investment for the first two phases was initially targeted at over US \$500 million, to be covered entirely by the Bolivian central bank and treasury. The production of lithium carbonate is expected to commence in the early months of 2012, more than a year behind schedule.⁵⁶

Ensuring Property Rights and Historical Juridical Security

Historical factors, like the consistent maintenance and enforcement of economic policy over time, are perhaps the most important factors affecting the formation of Bolivia and Chile's current lithium policy. Chile has maintained the same neoliberal economic model established in the early 1970s with few changes, whereas Bolivia shifted from import-substitution

⁵³ COMIBOL. "National Strategy for the Bolivian Evaporate Resources Industrialization." Accessed November 9, 2011.

⁵⁴ Villena, Evert. 2011. Interview by Author. La Paz, Bolivia. June 16

⁵⁵ Every interview subject other than Villena agreed that Bolivian effort was destined for failure without outside technological assistance.

⁵⁶ COMIBOL. "National Strategy"

industrialization (ISI) to liberalism and now back to a more statist model. It is important to note, however, that neither Bolivia nor Chile are perfect examples of their respective economic ideologies. CODELCO, Chile's state owned copper corporation, still accounts for some 30% of the nation's copper production and hundreds of millions of dollars in yearly revenue for the state.⁵⁷ Bolivia similarly licenses out production of petroleum products, tin, and other minerals to MNCs. These seemingly outlying policies underscore the historical institutionalist view of development models as bundles of economic and industrial policy rather than totally coherent, ideological creations. This is an important distinction because both Bolivia and Chile consciously enacted policy specific to the evaporate resources. As historical institutionalism posits, policymakers did not simply apply industrial policy wholesale to the entire economy. Thus, it warrants analysis of why Chile chose to regulate an entirely private industry when Bolivia has stuck to its state owned plans.

Chile adopted its current economic model during the military government of Augustus Pinochet, who brought in US-trained economists famously known as the "Chicago Boys" to implement a market-oriented economic model. By the early 1980s the Chilean government had sold off the majority of the firms nationalized under the previous government of socialist Salvadore Allende and was rapidly pursuing bilateral FTA's and other liberalizing measures. When the Pinochet government was voted out in 1988, the new left-leaning coalition government opted to continue the neoliberal model. Chilean economic policy has largely stayed the same since 1973. This fits with the conclusions that Przeworski and Limongi noted earlier on "developmentalist" dictatorships.⁵⁸

⁵⁷ Riesco, M. "On" Mineral Rents and Social Development in Chile." 2008.

⁵⁸ Przeworski, Adam and Fernando Limongi. "Political Regimes and Economic Growth." (1993): 51-69.

Bolivia pursued fully three separate economic models in the same time frame, beginning with fully three decades of ISI following the 1952 revolution.⁵⁹ Bolivia ran into the same debt problems as its neighbors in the early 1980s, however, and the 1985 elections ushered in the liberal New Economic Policy (NEP). The NEP shared much in common with Chile's neoliberal model, including its origins. Harvard economist Jeffrey Sachs, mentioned earlier for his contributions to big push theory, was instrumental in developing the model. Sachs worked closely with the new government in order to shift towards an outward-oriented economy with liberalized domestic markets and a minimal state.⁶⁰ This phase of Bolivia economic history lasted until the 2005 election of Morales and his Movement Towards Socialism (MAS) party. By 2004, only 11 percent of Bolivians believed in the merits of a liberal market-driven economy.⁶¹ Morales worked quickly to nationalize the natural gas industry and public utilities which were privatized under the NEP. Morales refers to the current economic model as "communitarian socialism" and eschews neoliberalism as a form of imperialism.

Regardless of the effects of any one model, the development benefits of ensuring private property rights through consistent economic policy cannot be overemphasized. Natural resource industries are massively capital intensive, requiring huge initial investment that sometimes is not recouped for decades. If the industrialization is driven by the private sector like in Chile, nationalization, or simply the threat of it, leaves a lasting impression. Infrastructure, technology, capacitation of labor all take time and investment to develop. In developing nations that lack state financing for large infrastructure projects, MNCs bear a greater share of these costs in order to operate. Three decades of consistent economic policy have made Chile one of the best business environments in Latin America. Investors know what to expect and trust that their

⁵⁹ Jenkins, Rhys. "Trade Liberalisation in Latin America: (1997): 311-312.

⁶⁰ Ibid

⁶¹ Ton Salman. "Bolivia and the Paradoxes of Democratic Consolidation." (2007): 121.

property rights and contracts will be protected. The private sector is wary of Bolivia because of its tumultuous past. Doing Business, a project of the World Bank, encapsulated these differences in its 2010 rankings. Out of 183 countries included, Chile was the 39th most business friendly, while Bolivia was 153rd.⁶² Any discussion of changing royalty regimes has been staunchly opposed by policymakers worried about scaring off foreign investors. When then-President Ricardo Lagos tried to introduce a royalty charge based on sales in 2004, politicians balked at the thought. José Piñera, a co-author of Chile's defining 1980 Mining Law, modestly states that his legislation was the "key to riches" because it "sent a message to domestic and foreign investors from that moment that private property was fully guaranteed in Chile."⁶³

While this argument applies more directly to private industry, the nature of the world economy means that even a state-owned approach must interact with private sector actors. In Bolivia, COMIBOL is in the process of finding investors to help develop its lithium industry and is running up against these issues. According to Rolando Jordan, a Bolivian mining economist, the Bolivian government is in a very weak negotiating position with MNCs because it must start from scratch each time it alters policy.⁶⁴ For private sector actors already spooked by Morales' rhetoric on MNCs, negotiating partnerships becomes a very risky affair. Risk lowers businesses rate of return and causes them to negotiate more strictly at the state's expense.

Levels of industrial infrastructure and development have also played roles in the formation of the lithium industry in Chile and Bolivia. Andrés Yaksic, SQM's Marketing Manager for lithium products, said it was impossible to ignore the benefits of Chile's mineral history. Thanks to Chile's large-scale copper mining throughout the 20th century, lithium producers had all of the necessary pieces in place and had drastically reduced start-up costs. Electricity, water, transport

⁶² World Bank. "Doing Business 2012: Chile." 7

⁶³ Piñera, José. "Wealth through Ownership: Creating Property Rights in Chilean Mining." (2004): 295-301.

⁶⁴ Jordan, Rolando. 2011. Interview by author. La Paz, Bolivia. June 17

infrastructure were established in northern Chile's Antofagasta region, which also possesses the nation's lithium resources.⁶⁵ Bolivia also has a long mining history, but not of the modern industrial sort seen in Chile. CODELCO alone exports some 1.8 million tons of copper yearly.⁶⁶ For a smaller industry like lithium, Chilean producers benefit from more than adequate infrastructure. To contrast, Uyuni, the closest town to the Bolivian pilot plant and provincial headquarters for COMIBOL, has only benefitted from consistent electricity in the past decade. Yaksic, Zuleta, and Villena all acknowledged existing infrastructure as one of the most important differences in cost between the two nations.⁶⁷

The legacy of colonialism is the other major historical factor affecting Bolivian and Chilean economic policymaking. Until their independence movements in the early 19th century, the two countries experienced essentially the same colonial experience. As their colonial power, Spain used natural resources extracted from Bolivia and Chile to finance its imperial ambitions.⁶⁸ The most famous example of this exploitation is Bolivia's Cerro Rico, an incredible silver deposit located less than 100 miles from the Uyuni salt flat. Both Bolivia and Chile have remained primary commodity exporting economies long after formal independence. Bolivian economist Milton Lerida believes that Bolivia is worse off in today's capitalist economic structure than during its colonial period because the scale of extractive mining is so much larger.⁶⁹ Indeed, one could argue that the difference in the two nations' reaction to prior exploitation is more due to current economic status and political posturing by the Morales government than differences during colonial times. It is hard to argue that Bolivia had a substantially worse colonial experience, yet the narrative remains much more prominent in

⁶⁵ Yaksic, Andrés. 2011. Interview by author. Santiago, Chile. July 29.

⁶⁶ "Chile's Copper Industry: Reviving CODELCO." *The Economist*, October 21, 2010

⁶⁷ Yaksic, Zuleta, and Villena. 2011. Interviews by author.

⁶⁸ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts." (2010): 21.

⁶⁹ Lerida, Milton. 2011. Interview by author. Uyuni, Bolivia. July 14.

Bolivian policymaking. Ethnicity has also played a part in the development of the discourse. The narrative of white European exploitation of indigenous populations, whether justified or not, is influential. Dennis points to the Bolivian government's use of buzzwords like dignity and sovereignty in describing the project as a means to drum up nationalist sentiment.⁷⁰ Interviews conducted with Bolivian actors revealed that a liberal, privatized lithium industry is not even considered a possibility due to past exploitation by colonial powers.

The role of Washington Consensus actors in Bolivia's failed privatization movements during the 1980 and 1990s also contributed to the public's borderline xenophobic perception of foreign capital. The influence of international institutions grew during the tumultuous two decades prior, which led Burke and Malloy to coin the term national corporatism. Although national corporatism's roots were populist and therefore rhetorically nationalistic, the era's political elites consolidated power with support from the only stable source: western capitalist powers.⁷¹ According to Hollender and Shultz, more than 250 state employees were simultaneously on the payroll of the institutions like the World Bank and USAID during the mid-1980s.⁷² This influence spurred on structural reforms from the IMF and the World Bank, which exacerbated already poor living conditions and were seen as another form of North American imperialism.⁷³ Drastic drops in government revenues due to the privatization of petroleum, natural gas, and water extraction were accompanied by lower social spending, increased foreign

⁷⁰ Dennis, E. "Evo Morales' Lithium Gamble: Investment in Production of a High-Tech Mineral could Bring about a Monumental Shift in Bolivia's Economy." *Dollars & Sense*. no. 293 (2011): 15-16.

⁷¹ Burke, Melvin and James M. Malloy. "From National Populism to National Corporatism: The Case of Bolivia (1952–1970)." *Studies in Comparative International Development* 9, no. 1 (1974): 69.

⁷² Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 48.

⁷³ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts." (2010): 21.

borrowing, and raised taxes. The IMF's push for higher taxes in 2003 led to violent protests that left 34 people dead.⁷⁴

Duopolistic Competition in the Lithium Market

One of the underlying assumptions of economic theory regarding the efficiency of private firms and free markets is the existence of competitive markets. The lithium industry has a number of defining characteristics that make it markedly uncompetitive in this sense. The global lithium market is a duopoly thanks to SCL and SQM's dominant market share.⁷⁵ The two firms accounted for 70% of lithium produced from brines in 2010, or some 40,000 tons of lithium carbonate.⁷⁶ Furthermore, production in Chile, Argentina, and Australia account for 82% of total lithium carbonate on the market.⁷⁷

Duopolistic production has a number of consequences for market access and firm behavior because SCL and SQM have such considerable market power. Rüttinger and Feil point to three possible negative consequences of the current lithium market structure: ruinous competition, collusion, and supply disruptions due to geographically concentrated production in a geologically unstable area.⁷⁸ SQM demonstrated its market power in 2009 by lowering its lithium prices by 20%, widely viewed as a move targeted towards emerging producers under the auspices of controlling oversupply.⁷⁹ The firm identified 14 projects worldwide currently in development phase.⁸⁰ Chilean producers are thought to have the lowest costs of any and are producing at just over half of their capacity, which gives them further market power to adapt to a

⁷⁴ Spronk, Susan and Jeffery R. Webber. "Struggles Against Accumulation by Dispossession in Bolivia: The Political Economy of Natural Resource Contention." *Latin American Perspectives* 34, no. 2 (2007): 31-47.

⁷⁵ Yaksic disputed the conclusion that the market supply is duopolistic based upon the growing number of firms producing Lithium in China. There were ten Chinese firms producing lithium chemicals in 2010, three of which from brine resources. Together they account for some 13% of global production capacity.

⁷⁶ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 16.

⁷⁷ Ebensperger, A., P. Maxwell, and C. Moscoso. "The Lithium Industry" (2005): 222.

⁷⁸ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts." (2010): 5.

⁷⁹ Ibid 7

⁸⁰ Solminihac, Patricio. "Lithium: Strategic Material or Opportunity for Development?" SQM (2010)

changing market.⁸¹ The ability of Chilean firms alone to handle the predicted demand spikes due to electric vehicles depends on who you talk to. Yaksic is confident that SQM and SCL will be able to meet global demand at least through 2020 before adding capacity.⁸² Zuleta believes water shortages in the region will limit their ability to increase production on the level necessary.⁸³

For the Bolivian project which is already at least a year behind schedule, the duopoly of Chilean producers presents a major obstacle that is exacerbated by the closed nature of lithium markets. Because lithium is not a publically traded commodity like many mineral resources, existing client-producer relationships are even more important. As Asencio puts it, “this is not a free market; this is more like a client-producer relationship. It is more direct. The price is not tied to other conditions; a producer can drive prices and control them more.”⁸⁴ In a perfectly competitive commodity market it would not matter if Bolivia’s production was viewed as unreliable due to political concerns about public ownership. Unfortunately for Bolivian prospects, continuing with the established Chilean firms makes more sense in a duopolistic producer-client structured market.

Political Trends and Leadership Problems

The presence of national populist movements in Bolivia presents further difficulties for developing a public industry. This conclusion is strongly supported empirically by interviews as well as existing scholarly analysis. MAS came to power in 2005 with the backing of rural coca farmers, the urban poor, and indigenous ethnic communities and by many accounts has struggled to maintain autonomy from social groups in economic policymaking. Bolivia’s ever-present nepotism has grown to a point that Morales acknowledged in 2009 that corruption and

⁸¹ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 17.

⁸² Yaksic, Andrés. 2011. Interview by author.

⁸³ Zuleta, Juan Carlos. 2011. Interview by author.

⁸⁴ Asencio, Jose. 2011. Interview by author.

bureaucratic ineffectiveness were the most serious challenges facing his second term as president. Bolivia was 120th out of 180 countries for public-sector corruption in Transparency International's 2010 rankings.⁸⁵ Part of this is due to a ballooning public sector funded by natural gas revenues, but the diverse makeup of the ruling coalition also lends itself to nepotism. The state-owned natural gas and oil corporation (YPFB) is itself the site of frequent accusations of corruption.⁸⁶ The nature of multiparty political competition also feeds patronage, as public employment is used to ensure cooperation. As such, the majority of management personnel in executive ministries end up being political appointees instead of meritocratic hires.⁸⁷ As theory predicts, individual interests have led to suboptimal policymaking.

Leadership and management concerns, usually due to nepotism, were voiced in all of my Bolivian interviews. The massive logistical and technological expertise inherent in a project of this magnitude necessitates utilizing the best talent available. The management inefficiencies presented in theories of the firm appear to be fully present in Bolivia. Zuleta pointed specifically to lack of a clear organizational structure and confusion over responsibility.⁸⁸ Hollender and Shultz explain how decision-making regarding lithium must travel between a myriad assortment of government ministries and committees, each vying for increased power and influence.⁸⁹ Reynaldo Cuadros, a member of the Bolivian Socialist Party in the provincial legislature and former Ambassador to the Organization of American States (OAS), identified a lack of formal education as a key cause of governance problems.⁹⁰ For example, President Morales never graduated from secondary school.

⁸⁵ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 49.

⁸⁶ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts."(2010): 19.

⁸⁷ Barr, Robert R. "Bolivia: Another Uncompleted Revolution." (2005): 81.

⁸⁸ Zuleta, Juan Carlos. 2011. Interview by author.

⁸⁹ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 24.

⁹⁰ Cuadros, Reynaldo. 2011. Interview by author. Cochabamba, Bolivia. July 6.

The exclusion and alienation of leading scientific figures is another symptom of the management deficiencies facing the Bolivian lithium industry. Bolivian petrochemical engineer Saul Escalera knows firsthand how complicated Bolivia's public sector work can be. In 2006 Escalera was appointed by Morales to be YPF's Director of Industrialization, specifically charged with developing domestic industries related to petrochemical derivatives. Escalera, who holds two patents for petrochemical refinement processes, resigned from his post in 2009 and published a scathing reprisal of the Morales government's management of the state-owned corporation. Escalera bemoans the politically-motivated leadership purges that led to six company presidents in three years, the inability of management to think outside the box and take risks, and the priority of political concerns over the company's administration and market position. His central concern, however, is the lack of technical expertise on the part of political appointees.⁹¹ Escalera recounted how his best engineering students that went to work for the state ended up doing manual labor instead of advanced science because of their lack of political connections. He remains an outspoken proponent of state ownership despite the disappointing behavior of the current government: a common position among Bolivian academics.⁹² Hollander and Shultz ran into similar stories in their research, commenting that "Bolivian experts with decades of experience in evaporitic resources complain that they have been intentionally excluded from the project due to political differences."⁹³ COMIBOL representatives point to a scientific advisory committee that is supposed to offer technical consulting to the project as evidence that participation is encouraged, but as the committee offers no financial compensation it is not a terribly realistic option for academics with advanced degrees. Considering that there already exists a fierce debate over whether or not any Bolivians have sufficient knowledge to

⁹¹ Escalera, Saul. "Retiro de Saul Escalera de YPF." *Alminuto*. (2009)

⁹² Escalera, Saul. 2011. Interview by author.

⁹³ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 48.

successfully industrialize lithium production independently, the inefficient use of expertise due to political concerns is a significant failure. Again, these failures are not inherent in Bolivia's state-owned approach, but due to the nepotistic pressures facing a populist government.

By comparison, the private Chilean firms are relatively independent from political pressures. They face the same management concerns of any MNC, but have complete autonomy in management affairs. It is ironic, however, that SQM's entry into lithium market was a clear case of nepotism and political influence. The current Chairman of the board of directors is Julio Ponce, son-in-law of Pinochet. Ponce headed the privatization process of CORFO in the early 1980s when it owned the lithium concessions before buying SQM from the government in 1988 for what a government investigation later said was less than a third of its market price.⁹⁴ Ponce has headed the majority stakeholding group in SQM since that time.

The key difference between this example of corruption and what is currently happening in Bolivia is the established nature of Chilean technocracy at the time. Chilean technocrats like Ponce were college educated and had experience running private enterprise before entering the public sector following the military coup in 1973. As was true for the Pinochet regime in general, the technocrats economic successes came at the expense of income equality as the state reduced social expenditures during privatization. Copper is once again a confounding variable, however, and a poignant counter-narrative to Pinochet's neoliberal ideology.⁹⁵ The Pinochet regime continued the nationalization process initiated under deposed socialist president Salvador Allende and would receive anywhere from 10-25% of yearly government revenue from copper

⁹⁴ Fletcher, Seth. *Bottled Lightning*. 2011.

⁹⁵ The Chilean copper industry is a clear example of Jeffrey Sachs' big push hypothesis and the advantages of SOEs in developing nations, but it is also a topic that has been the subject of intense scholarly debate for decades and entirely too large of a topic to examine fully in this paper.

sales, depending on commodity prices.⁹⁶ In Bolivia currently, Morales' MAS party is replacing the existing bureaucracy with his primary support base: rural indigenous farmers.⁹⁷ While Morales' other efforts to combat income inequality and embedded racism against indigenous Bolivians have been widely lauded, the appointment of inexperienced, uneducated party members to bureaucratic positions has led to predictable management failures.

Decentralization and Regional Involvement

Distribution of policymaking responsibility between central and regional political institutions plays a large role in determining the development implications of the lithium industry. Like most extractive industries, lithium is geographically concentrated in both nations. In both cases, lithium production is centered in some of the most developmentally challenged regions. Chile has always been a unitary state, while Bolivia has become increasingly decentralized politically under the MAS government. All mining legislation and regulation in Chile must pass through the national congress in the capital, regardless of its impact on region where the activity actually takes place. It follows that decentralized resource governance has a better chance of capturing economic benefits for the regions affected by the environmental costs of economic activity. Andersson et al explain that decentralized resource policies come predominantly in two forms, one seeking to devolve property rights to local communities, the other seeking to allocate formal powers to subunits of the government. According to Andersson et al, the form of decentralization changes incentives for local actors and that determines how successful efforts are.⁹⁸

⁹⁶ Riesco, Manuel. "On Mineral Rents and Social Development in Chile." *United Nations Research Institute for Social Development* (2008).

⁹⁷ Cuadros, Reynaldo. 2011. Interview by author. Cochabamba, Bolivia. July 6.

⁹⁸ Andersson, K., C. Gibson, and F. Lehoucq. "The Politics of Decentralizing Natural Resource Policy." (2004): 421.

The Potosí province of Bolivia has the nation's highest poverty rate and about 46 percent of the local population works in agriculture and livestock.⁹⁹ Although the Chilean region of Antofagasta has the infrastructure in place for the mineral mining industries, it also lacks employment and trained labor. The direct impact of the lithium industry on other economic activity is unfortunately minimal, as there are few linkages to other economic activity. This is due to the rather unique nature of evaporative mining, which needs relatively small amounts of labor and minimal skilled labor. This leads to a crucial question: how to best distribute the rents associated with the lithium industry. While these two regions would clearly benefit from further development, there are doubts about the ability of local government's ability efficiently use resources.¹⁰⁰ Lerida, who lives in Uyuni, believes the provincial government of Daniel Campos technically owns the rights to the lithium resources and should use rents to start a university cluster that could further the development potential of the resource for local residents, not the government in the capital. Lerida's position is closely tied to his own ancestry in the region; he calls the salt flat by its Aymaran name Tunupa instead of Uyuni and scorns what he sees as short term thinking by the central government. Such an important opportunity needs to be viewed in terms of centuries or millennia, not decades, according to Lerida.¹⁰¹

Transparency and accountability are necessary components of decentralized resource policy as responsibility is shuffled around. Andersson et al assert that these approaches need institutions that tie local politicians closely to their constituents.¹⁰² Zuleta emphasizes the role of what he calls "social control" of the government's effort, essentially accountability to make sure

⁹⁹ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts."(2010): 23.

¹⁰⁰ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 38.

¹⁰¹ Lerida, Milton. 2011. Interview by author. Uyuni, Bolivia. July 14

¹⁰² Andersson, K., C. Gibson, and F. Lehoucq. "The Politics of Decentralizing Natural Resource Policy." (2004): 421.

the project is meeting its targets and following through on policy.¹⁰³ In this instance, accountability and transparency are less about autonomy and more about minimizing the lack of incentives caused by separated ownership and control. Hollender and Shultz expands the role of transparency and ties it to the success of the entire Bolivian effort. They call for tripartite transparency of formal oversight by political institutions, distribution of information by the media, and an informed citizenry.¹⁰⁴

Localization of Environmental and Social Impacts

The limited geographic scope of lithium mining means that the social and environmental implications are concentrated in specific populations. The environmental effects of lithium mining have not been rigorously discussed, yet the Chilean industry seems to indicate serious externalities. Water consumption will be the most pressing concern in the short term, especially in the Chilean Atacama desert. According to Zuleta, producing two liters of lithium brine to evaporate requires 98 liters of fresh water.¹⁰⁵ Refining processes drain the limited water supply further and have potential for contaminating aquifers. Lerida and Claros allege that the Chilean industry is drilling diagonally under the border and illegally siphoning water from Bolivia to meet its need, an allegation that has not been discussed in the press.¹⁰⁶ Dennis indicates that draught in the region has already caused some local farmers to abandon their efforts.¹⁰⁷ Concerns over water scarcity are amplified because the water reserves in the region are classified as non-renewable due to the low rainfall.¹⁰⁸ Hollender and Shultz cite more dire reports that community wells have dried up in recent years, although the nearby San Cristobal silver and zinc mine also

¹⁰³ Zuleta, Juan Carlos. 2011. Interview by author.

¹⁰⁴ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 52.

¹⁰⁵ Zuleta, Juan Carlos. 2011. Interview by author.

¹⁰⁶ Lerida, Milton and Jaime Claros. 2011. Interviews by author

¹⁰⁷ Dennis, E. "Evo Morales' Lithium Gamble: Investment in Production of a High-Tech Mineral could Bring about a Monumental Shift in Bolivia's Economy."

¹⁰⁸ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts."(2010): 24.

plays a large role in local water consumption. Local backlash against the project, which is owned and operated by a Japanese MNC, led to violent protests in April of 2010. Furthermore, Hollender and Shultz point to the Chilean and Argentinian lithium industries to demonstrate the possibility for toxic contamination.¹⁰⁹

The environmental impacts of the lithium industry have resounding social effects as well given the dependency of local Bolivian populations on agriculture and tourism.¹¹⁰ Tourism provides a living for 23% of the local population and visits to Uyuni are rising.¹¹¹ This adolescent industry depends on the natural beauty of the salt flats and may be decimated by large scale industrial activity. Chilean production has led to massive piles of mineral tailings and hundreds of square kilometers of artificial ponds and piping. Lerida recognizes the importance of maintaining a balance between industry and tourism in order to help the region avoid becoming over dependent on any one industry.¹¹² Seasonal tourism industries are certainly not the most stable forms of employment, but the loss of tourism would be devastating to the surrounding communities.

Conclusion

Examining Bolivian and Chilean lithium industries as case studies, the optimal mix of public and private firms in natural resource economies is determined more by historical and political factors than economic theory would suggest. The defining factor in the development of each industry has been historical political trends, while political transparency appears to be the most key to advancing development goals. The lithium industry presents a unique opportunity

¹⁰⁹ Hollender, R. and J. Shultz. "Bolivia and its Lithium" (2010): 40.

¹¹⁰ Chile's lithium production takes place farther away from population centers. The Chilean Salar de Atacama is not a tourism destination like its Bolivian counterpart due to differences in its geological makeup that cause it to appear a muddy brown color as opposed to a brilliant white.

¹¹¹ Rüttinger, L. and M. Feil. "Sustainable Prevention of Resource Conflicts."(2010): 23.

¹¹² Lerida, Milton. 2011. Interview by author.

for Bolivia to independently exploit a natural resource from the beginning, whereas lithium remains relatively insignificant to Chilean development in comparison to copper. Moving forward, the development of a state-owned lithium industry in Bolivia faces a number of difficult obstacles, particularly maintaining a necessary degree of autonomy from political influence.

The case studies showed that political economic theory and historical institutionalism provide the most nuanced analytical tools, whereas different versions of firm theory prove more useful as theoretical structures than empirical tools. Application of the arguments presented here to other cases is more difficult because of the quantitative approach adopted, however. Perhaps the most useful lesson is that issues of general economic efficiency are not the defining factors affecting a state's development of natural resource policy and that they more often are misrepresented with ideological justifications. The role of the state cannot be reduced to the all or nothing ideologies that predominated during the Cold War.

Rising income inequality throughout Latin America and the rest of the world lend a new sense of urgency to the debate. Efficient state ownership of extractive industries would be a powerful tool in helping to level the playing proverbial playing field and reallocate wealth, if it can be done successfully that is. Likewise, the impact of environmental degradation is growing as global consumption continues to rise and resource stocks begin to dwindle. Are states inherently more environmentally conscious producers or are they better suited to regulating the private sector? Given the right conditions, state ownership of natural resource industries offers potential remedies for these important global issues as well as basic welfare-enhancing development goals.

There exists significant potential for further study of public and private firms in extractive industries because of the aforementioned lack of scholarly focus since the 1980s and

the renewed willingness of state's to consider state-led development. Draibe and Riesco discuss the advent of a new development strategy emerging in Latin America, repositioning the state once more as a leading strategic and regulatory actor alongside modern civil society.¹¹³ The prevalence of state-led natural resource extraction in China presents another interesting case study. Indeed, some of the interviewees for this paper mentioned China as evidence of a new model of statist industrialization.

¹¹³ Draibe, Sô and Manuel Riesco. "Social Policy and Development in Latin America: The Long View." *Social Policy & Administration* 43, no. 4 (2009): 335.

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