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Does the case of the Chilean nitrate boom
support activist or deterministic
interpretations of the ‘resource curse’?

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"Chile, is corroded to the heart by the poison of nitrate. Nitrate has been for Chile like the famous wine of the Borgias: among the grains of the fertile nitrate is hidden the poison that enervates, rots and kills..."

El Diario, Buenos Aires, quoted in El Mercurio de Valparaiso (29.12.1907)

Abstract:

Literature attesting to the existence of a resource ‘curse’ implied that economic prospects for resource abundant nations were poor and out of their hands. Not only had resource abundance created difficult-to-manage structural conditions, but it had also corrupted institutions and, in turn, condemned nations to further negative management of resources in the future. A critical branch of literature rose in opposition, suggesting that the outcomes of resource abundant nations had not been predetermined by their resources, but had been contingent on active institutional management. Correct management could not only have mitigated the immediate structural and institutional impacts of the so-called ‘curse,’ but it could also have prevented the degradation of these virtuous institutional behaviours themselves. This comment will add to the debate by demonstrating which theory applies better to the case of Chile during its nitrate era: which stated ‘curse’ effects struck Chile, and how culpable was institutional management in this process? I find that whilst there are definite ‘curse’ symptoms, institutional management played a larger role than ‘determinists’ would predict, supporting the ‘activist’ strand of argument. This is not to downplay, however, the pressures that resource abundance exerted, even in countries that had a claim to institutional exceptionality.

This paper will investigate the effects of nitrate abundance and its management in Chile from 1880 to 1930. Following the War of the Pacific (1879-1884), Chile acquired the vastly lucrative nitrate fields in the formerly Peruvian and Bolivian territories of the Atacama Desert. Nitrates were a key commodity during this period of global expansion for their uses as fertiliser and explosives. The course

of Chilean development for the consecutive five decades was dictated by the acquisition and management of this ‘white gold’ bounty.¹

The implications of nitrates, and how their trade was executed, on long-term Chilean development have been discussed in depth by scholars of that region. For some, they were the source of Chile’s ‘frustrated development’ (Pinto 1996) and ‘lost future’ (Monteon 2003); for others they were a key driver of its ‘journey towards progress’ (Hirschman 1963).

At the turn of this century, a scholarship took hold mirroring the same question, but on a global scale. This “determinist” position postulated that resource abundance was a ‘curse’ that set nations on a volatile and undesirable development path. Over the previous two decades, critics have argued that the negative outcomes from resource abundance stem, instead, from their poor institutional management. These “activists” prioritised the role of institutional behaviour and policy in defining the impacts of resource abundance.

Chile during the nitrate boom is a worthwhile case study through which to explore, and add to, this debate. Firstly, most cross-country comparisons and country specific accounts have focussed on oil-exporting nations since 1950. There is a clear gap, and contradiction, in the literature on late-19th and early-20th century export-led growth. Latin American historiography condemns it, whilst scholars of wealthy nations like Australia, the US, Canada, and the Nordics credited similar levels of resource exports for their success. Earlier case studies on resource exporting in the periphery are needed to explain these double standards.

Secondly, because of the rapid appearance (and disappearance) of the nitrate industry, it is easier to separate the distinct structural changes courtesy of resource exploitation from fixed effects. In comparison, it would be almost

¹ Christian Ducoing and Marc Badia-Miro, “Chile’s Industrial GDP during the Saltpeter Cycle, 1880-1938.” *Uruguayan Journal of Economic History* 3, no. 3 (2013), p. 12.

impossible to retroactively disentangle the Chilean economy from copper, which has been a foundational element of the economy since 1850.

Thirdly, Chile has a reputation for institutional exceptionalism within Latin America. Its long pre-1890 record of stable civilian rule, based on limited suffrage under the Constitution of 1833,² has inspired comparisons with 18th-century England.³ This factor distinguishes this study from most other ‘curse’ accounts by focussing on a country with relatively good institutions.

Despite the clear relevance of Chile’s nitrate era to this question, there has only been one country-specific attempt to integrate its experience into the wider literature of the ‘curse’. Badia-Miro and Ducoing (2015) was inconclusive, and almost exclusively considered linkages between mining and industry. Palma (2000), too, addressed the ‘Dutch Disease’ in depth—but as only one element of the ‘curse’ this did not situate Chile within the broad ‘curse’ debate. Chile has also been cited in cross-country ‘curse’ studies, but not thoroughly or decisively.⁴

Firstly, the determinist and activist positions of ‘resource curse’ theory will be discussed. Secondly, we will investigate to what degree key ‘curse’ elements emerged during the Chilean nitrate boom, and to what extent they were exacerbated by institutional management.

The Resource ‘Curse’ Literature

‘Rich parents sometimes spoil their children. Mother Nature is no exception.’⁵

We start by defining the positions of two different camps within the ‘resource curse’ literature. The determinists implied that there were intrinsic problems

² Michael Monteón, “John T. North, the Nitrate King, and Chile’s Lost Future.” *Latin American Perspectives* 30, no. 6 (2003), p. 670.

³ Paul Reinsch, “Parliamentary Government in Chile. *American Political Science Review*.” *American Political Science Review* 3, no. 4 (1909), p. 507.

⁴ Stephen Haber and Victor Menaldo, “Do Natural Resources Fuel Authoritarianism? A Reappraisal of the Resource Curse.” *American Political Science Review* 105, (2011), p. 4.

⁵ Thorvaldur Gylfason, “Natural resources, education and economic development.” *European Economic Review* 45, no. 4-6 (2001), p. 848.

with natural resource dependence. They claimed it not only produced challenging characteristics such as volatility and the ‘Dutch Disease,’ but also degraded institutional quality through a variety of channels; patronage, rent-seeking and voracity effects. On the contrary, the activists argued that resource-related negative outcomes were primarily because of the failure of institutions to manage them correctly.

Traditional economic historiography, in line with intuition, regarded resource abundance to be a blessing. Coal and iron ore during the Industrial Revolution⁶ or mining riches in the developing United States were two epochal examples of its potential to drive growth.⁷

The first mention of the dangers of resource dependence appeared in the development literature. Prebisch and Singer (1950) warned that long-term natural resource export-led growth was unsustainable. Primary exporters, they thought, would experience a secular deterioration in the terms of trade for a variety of reasons. However, Cuddington and Ludema (2002) have since proven quantitatively that terms of trade for Latin American economies did not experience the linear deterioration Prebisch and Singer described.⁸ Nonetheless, their theory exerted a key influence on scholarship and policy; it was no longer safe to depend upon natural resource exports for long-term growth, for they were too unsustainable. This was further bolstered by claims that their antithesis, industrialisation, had various positive externalities such as backwards and forwards linkages, presented in the work of Hirschman (1958), Van Wijnbergen (1984) and Matsuyama (1992). This was not yet the resource ‘curse’. However, it highlighted one key problem of resource dependence: Resource industries were generally temporary, and their collapse posed danger to economies that had relied on them at the expense of industrialising.

⁶ Jeffrey Sachs and Andrew Warner, “Natural Resource Abundance and Economic Growth.” *National Bureau of Economic Research*, (1995), p. 3.

⁷ John Habakkuk, *American and British Technology in the Nineteenth Century. The Search for Labour-Saving Inventions*. (Cambridge: Cambridge University Press, 1962).

⁸John Cuddington, Rodney Ludema, and Shamila Jayasuriya, “Prebisch-Singer Redux.” *Working Papers Central Bank of Chile* 140, (2002), p. 2.

The most eminent determinist accounts were Sachs and Warner (1995, 2001). Their empirical test, since much criticised and revised, identified an inverse correlation between share of natural resources in GDP and per capita growth after 1970.⁹ The natural resource sector was ‘crowding out’ other unspecified variables responsible for economic growth. The lines of causality are various, but Sachs and Warner primarily focussed on cross-country overvaluation of currency to indicate ‘Dutch Disease’, which they treat as an ‘established empirical regularity that all countries obey’.¹⁰ The ‘Dutch Disease’ occurred when large resource exports led to a real currency appreciation without corresponding productivity gains in other sectors. This influx of foreign exchange would raise input costs for other tradeable industries, squeezing their margins as they competed in global markets with fixed prices. As a result, the resource sector would suppress the performance of other tradable sectors, the most important being industry.

Another negative characteristic of resource dependent economies cited by the determinist camp was macroeconomic volatility. Due to many primary producers’ overwhelming reliance on international commodity markets, unpredictable global price shifts could cause extreme cyclical variation in their national revenues. The instability might hamper growth by resulting in ‘pro-cyclical fiscal policies and distorting patterns of output, employment, consumption and investment.’¹¹

On top of continuous cyclical volatility, resource dependent nations were particularly devastated by international ‘crises’ resulting in spontaneous and enduring periods of deglobalisation. The brutal collapse of Latin American economies in the aftermath of the Great Depression was severe enough to turn the region from the resource-led model for the consecutive three decades.¹²

⁹ Jeffrey Sachs and Andrew Warner, “The curse of natural resources.”, *European Economic Review* 45, no. 4-6 (2001), p. 827.

¹⁰ Ibid, p. 834.

¹¹ Sachs and Warner (1995), p. 2.

¹² Albeit in tandem with evolving intellectual currents.

Activists have argued that the implications of global market volatility, however, are neither specific to resource producers nor predetermined if managed effectively under functional institutional frameworks. Lederman and Maloney posited that *any* economies heavily geared towards a narrow range of goods were vulnerable to fluctuations in their demand.¹³ Many promulgated the capacity of nations to mitigate these effects using stabilisation and savings funds, as seen in Norway and Kuwait.¹⁴

Manzano and Rigobon (2011) took an activist position. They argued that some destructive contractions, triggered by market volatility, had been imputed to resource abundance although they really reflected irresponsible borrowing and lending practices. The 1980s debt crisis was dubbed by Ocampo the ‘most traumatic economic event in Latin America’s economic history.’¹⁵ Credit markets had allowed governments to use their resources as collateral for debt when commodity prices were high in the 1970s, but when commodity prices fell in the 1980s, they were forced to default.¹⁶ This highlighted the role of poor institutional behaviour in what was originally considered to be a structural problem of resource abundance.

Many determinists have asserted that resource abundance degrades institutions. One way was through sponsoring ‘dysfunctional patronage’¹⁷ as Robinson and Torvik (2014) modelled. Politicians would be more likely to leverage work in the public sector to win constitutional currency,¹⁸ or outsource public sector works to

¹³ Daniel Lederman and William Maloney, “In search of the missing resource curse.” *Economía* 9, no. 1 (2008), p. 5.

¹⁴ By smoothing the revenues from resources, these might prevent large macroeconomic fluctuations or save for future generations; Xavier Sala-i-Martin and Arvind Subramanian, “Addressing the Natural Resource Curse: An Illustration from Nigeria.” *NBER Working Papers*, (2003), p. 19.

¹⁵ Jose Ocampo, “The Latin American Debt Crisis in Historical Perspective.” *Life After Debt. International Economic Association Series*. (London: Palgrave Macmillan, 2014).

¹⁶ Osmel Manzano and Roberto Rigobon, “Resource Curse or Debt Overhang?” *NBER Working Paper Series*, (2001), p. 1.

¹⁷ Ivar Kolstad and Arne Wiig, “It’s the Rents, Stupid! The Political Economy of the Resource Curse.” *Energy Policy* 37, no. 12, (2009), p. 5317.

¹⁸ James Robinson, Ragnar Torvik, and Thierry Verdier, “Political Foundations of the Resource Curse: A Simplification and a Comment.” *Journal of development economics* 106, (2014), p. 196.

build coalitions (as with ghost construction in Nigeria).¹⁹ Neither action would see resources invested into future productivity and may also create negative externalities such as a bloated public sector. Another was through ‘rent-seeking’ effects. Mehlum et. al. (2006) argued that natural endowments would automatically increase the stock of ‘rent-seekers’ in relation to ‘producers’ in the economy, thus lowering aggregate productivity. The ‘voracity’ model in Tornell and Lane (1999) provided another rationalisation; the incentive to capture resource rents would spark conflict between interest groups, not only wasting the rents themselves, but also crowding out productivity and investment. Bardhan (1997) suggested that governments in resource abundant countries would be more prone to corruption, too.²⁰

One significant deterministic position first posited in Mahdavy (1970) was that resource rents had a transformative effect on state fiscal structures and, in turn, government accountability and inequality. The link between resource abundance and authoritarianism has since been strong; there was ‘no representation without taxation’ according to Luciani (1990), and ‘no accountability without representation’ according to Collier and Goderis (2007).

Most ‘effective’ states had implemented internal taxes in times of great fiscal necessity, such as periods of warfare. Often these were exchanged for political concessions and some degree of oversight on their expenditure.²¹ Centeno opines that Latin American states bypassed this step of ‘fiscally penetrating society’ due to their ability to rely on resource rents.²² Haber and Menaldo (2011) represented the activist position and criticised this deterministic claim. They argued that there was no relationship between fiscal reliance on resources and

¹⁹ Hanaan Marwah, “What explains slow sub-Saharan growth? Revisiting oil boom-era investment and productivity in Nigeria’s national accounts, 1976-85.” *Economic History Review* 67, (2014), p. 993.

²⁰ Pranab Bardhan, “Corruption and Development: A Review of Issues.” *Journal of Economic Literature* 35, no. 3 (1997).

²¹ Mark Dincecco, “The Rise of Effective States in Europe.” *The Journal of economic history* 75, no. 3 (2015), p. 901.

²² Anthony Centeno, “Blood and Debt: War and Taxation in Nineteenth-Century Latin America.” *The American journal of sociology* 102, no.6 (1997), p. 1565.

authoritarianism. But even in democratic countries, the profound implications of changes in tax structures have been recognised. Timmons (2005) described the overlap of the distribution of taxes and the distribution of public benefits, drawing the link between taxation and inequality and quality of governance.²³

Gylfason (2001), our final determinist account, posited that resource-abundant nations neglected the development of their human resources because neither government nor community perceived the incentives of investing in education. Another line of causation might be that there were limited ‘learn-by-doing’ linkages derived from generally low-skilled and labour-intensive resource industries. Activists have employed Nordic examples to demonstrate the power of resource sectors to confer considerable educational benefits. Thus, they argued that poor educational outcomes were not an intrinsic quality of resource dependence but a product of failure to channel the positive potential of resources effectively.²⁴

The debate has been well fought between determinists and activists. The lesser covered case study of Chile’s nitrate period can add weight and insights to the established argumentation.

Chile, Nitrates, and the ‘Curse’

Chile’s nitrate era will be considered in order of the key ‘curse’ elements. Firstly, a summary of the era will be provided. It was through the War of the Pacific (1879-1884) that Chile won its nitrate monopoly. Fortunately for Chileans, from 1881 this was waged in Peruvian territory and the newly acquired nitrate fields could resume production, now in Chilean territory. On the brink of Chilean takeover, most Peruvian producers sold their nitrate fields to British investors, the most notorious being John T. North, ‘the Nitrate King’. Despite the majority

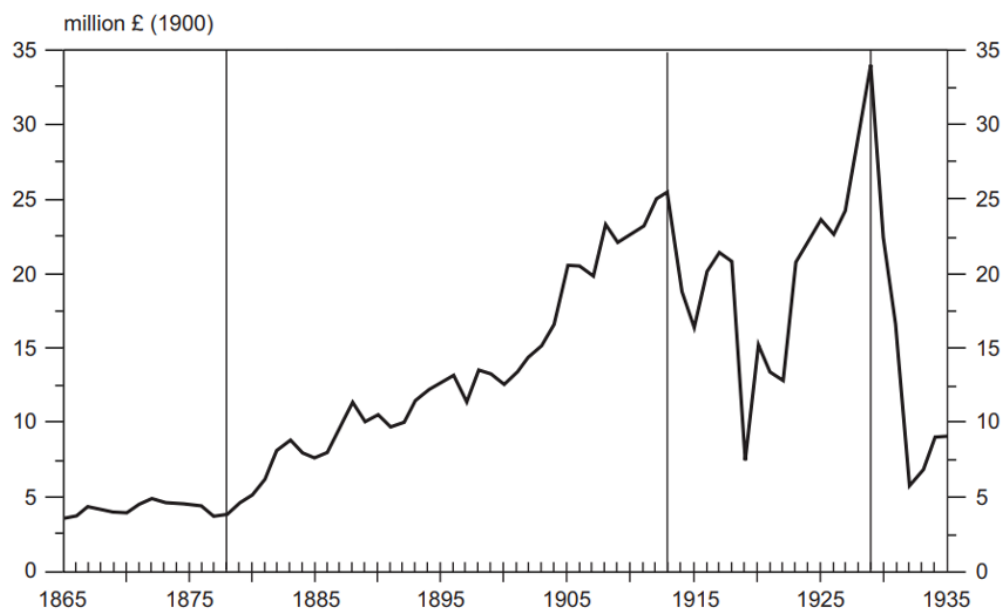
²³ Jeffrey Timmons, “The Fiscal Contract: States, Taxes, and Public Services.” *World Politics* 57, no. 4 (2005), p. 530.

²⁴ Simon Ville and Olav Wicken, “The Dynamics of Resource-Based Economic Development: Evidence from Australia and Norway.” *Industrial and corporate change* 22, no. 5 (2013), p. 1341.

of the nitrates being foreign owned (initially 67.6%), Chile now had in its territory nearly the entire global nitrate supply.²⁵

Chile rapidly became resource dependent; by 1913, 71.3% of its exports were nitrates.²⁶ Figure 1 shows the change of absolute Chilean exports through the period. As nitrate production expanded in the first decade, there was an instantaneous and rapid boom (1880-1890). The second decade saw relative stagnation (1890-1900). After the turn of the century there was more rapid growth until 1913, at which point the First World War led to a dramatic fall in exports. After peace was restored, exports recovered quickly and grew again until 1929, at which point they collapsed for good.

Figure 1: Chilean Exports 1865-1935 (at constant 1900 prices)



Source: Palma (2000)

Terms of Trade and Competition

Prebisch and Singer thought that the terms of trade for primary commodity exporters would inexorably deteriorate. Their economies were predicated on an

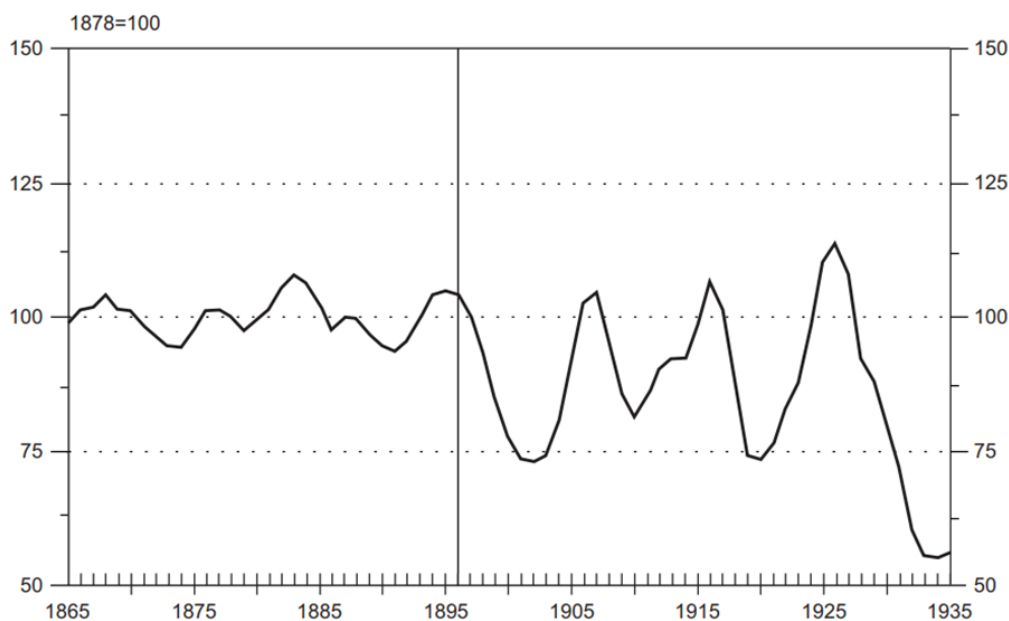
²⁵ Simon Collier and William Sater, *A history of Chile, 1808-2002*. (Cambridge: Cambridge University Press, 2009), p. 165.

²⁶ Victor Bulmer-Thomas, "The Export Sector and the World Economy, circa 1850–1914." *Economic History of Latin America since Independence*, (United States: Cambridge University Press, 2014), p. 65.

unsustainable ‘static comparative advantage’ which would be outpaced by competition. The activist position rejects the deterministic aspect and prioritises the role of institutional management in Chilean decline.

Confirming the conclusion of Cuddington and Ludema for Chile, no linear deterioration was visible in the terms of trade as displayed in Figure 2. Instead, terms changed in cyclical fashion.

Figure 2: Chilean terms of trade, 1865-1935 (three year moving average)



Source: Palma (2000)

Scholarship has posited the Great Depression to be ‘the defining moment’ in Chile’s development.²⁷ In the aftermath, many countries began to produce synthetic nitrates themselves, and then designed tariffs and quotas to induce import substitution, limiting exports from Chile.²⁸ The ‘exogenous decline’ perspective has absolved Chilean institutional management, public and private, of any responsibility — but long before this collapse, there were already considerable issues with the industry.

²⁷ CEPAL (1949), in Lüders, Rolf, and Gert Wagner, “The Great Depression: A defining moment in Chile’s Development?” *Cuadernos de Economía* 40, no.121 (2003), p. 786.

²⁸ *Ibid*, p. 796.

Luders and Wagner (2003) showed that Chile's share of world nitrate production had been declining during the whole period, from over 90% at the beginning to 20% at the end.²⁹ In their account, Chilean producers failed to compete because of the super-optimal export duties levied upon them from 1910. Eventually these 'killed the chicken that laid the golden eggs.'³⁰ If the fiscal structure had been updated to reflect Chile's declining market power, the industry may have survived.

Whilst it is plausible that export duties were too high, their account is not entirely convincing. The counterfactual assumes that tax relief would have either been reinvested into the industry to boost productivity or used to offset more competitive pricing. However, little investment had been directed into the industry for the preceding 20 years, so it was unlikely to suddenly change in 1910.³¹ This long-term neglect considered, there is also no guarantee that producers would have conferred the relief to consumers. Nonetheless— public institutional management was significant to the competitiveness of the industry, even if reducing duties in 1910 would not have revived it.

Whilst Luders and Wagner (2003) blamed the fiscal behaviour of the public sector, O'Brien (1989) highlighted the significance of the private sector in nitrate decline. One observer regarded that 'on the whole there had been less advancement and improvement in the natural nitrate industry than in any other mechanical-chemical process followed on a large scale'.³² The industry's deteriorating efficiency is visible in the fall of worker productivity of 20 percent between 1894 and 1920.³³ This reflected a lack of technical innovation, best

²⁹ Rolf Lüders and Gert Wagner, "Export Tariff, Welfare and Public Finance: Nitrates from 1880 to 1930." *Instituto de Economía*, (2003), p. 8.

³⁰ Rolf Lüders and Gert Wagner, "Nitrate Export Collapse and the Great Depression: Trigger or Chance?" *Cuadernos de economía* 40, no. 121 (2003), p. 800.

³¹ Thomas O'Brien, "Rich beyond the Dreams of Avarice": The Guggenheims in Chile." *Business history review* 63, no. 1 (1989), p. 133.

³² *Ibid*, p. 133.

³³ *Ibid*, p. 132.

demonstrated by the continued use of the Shank's process 'long after it had been superseded in every comparable industry'.³⁴

One cause of this stagnant investment was the power of cartels to form fixed price agreements that raised or stabilised prices through recession, further encouraging the development of synthetic substitutes in Europe. Effective price manipulation deadened competitive incentives to renovate the production process.³⁵ Another was the inability of Chilean labour to win higher wages, as this would have provided extra incentives for the adoption of labour-saving technologies.

An exogenous deterioration in the terms of trade manifestly did not cause the decline of the Chilean nitrate industry. Furthermore, whilst the significance of competition from synthetic nitrates and the Great Depression should not be underplayed, there were problems with it long before those, too. Throughout the period, Chilean nitrates had been becoming progressively less competitive due to public and private management; super-optimal export duties, the monopolistic power of North and the inability of labour to win higher wages all contributed. The Depression was only the last straw. This supports the activist interpretation in prioritising the role of institutional management in ensuring the sustainability of resource-based industries.

Macroeconomic Volatility

Determinists claim that primary commodity exporters are not only consistently more affected by market cycles, they are more vulnerable to exogenous shocks. Activists have highlighted the role of institutional management in either limiting, or exacerbating, these effects.

Resource dependence led to consistent and considerable fluctuations in national revenue. Figure 2 showed that the nitrate era can be split into two phases, with

³⁴ Ibid, p. 132.

³⁵ John T. North, the 'Nitrate King', was particularly successful in this exploit; Ibid, p. 133.

distinct volatility patterns. As nitrate production expanded in the *first* phase, volatility was relatively low. During the *second* phase however, production stagnated and volatility more than doubled. Terms of trade variations created average random shocks in Chile's national income of about 1.5% and 3.5% respectively.³⁶ Unpredictability in national revenues disrupted crucial infrastructure projects and social programs, such as expanding the Northern Railway, which made big advances in boom periods but became underfunded in gluts.³⁷ As expected by determinists, nitrate dependence created macroeconomic volatility in Chile, and exponentially so.

The lower level of volatility in the *first* phase was explained by joint forces of cartel power and the growth of world demand. Between 1884 and 1907, producers' agreements manipulated the market to ensure that nitrates remained a profitable endeavour.³⁸ Whilst this contributed to the industry's eventual decline, for a time monopolistic producers managed to limit, though not fully mitigate, market volatility. However, this had declining effectiveness, and was unsustainable.

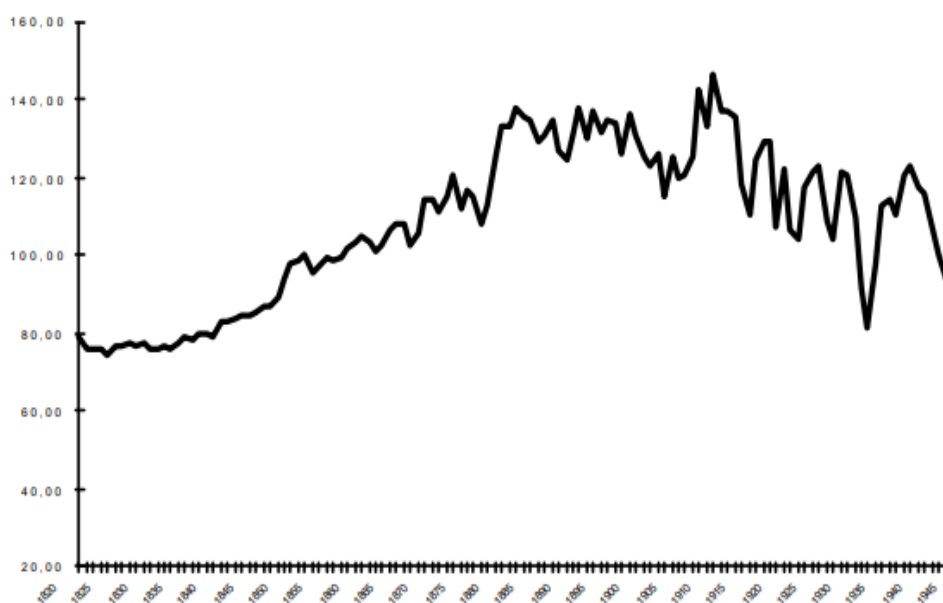
The more notorious effect of volatility has been the fallout from exogenous shocks. Whilst continuous instability in the national budget distorts market efficiency and hampers economic growth, exogenous gluts devastated economies. Determinists claim that this was worse for resource-dependent economies. Figure 3 confirms that Chile fared worse than a sample of other countries following the Great Depression.

³⁶ Gabriel Palma, "Trying to 'Tax and Spend' Oneself out of the 'Dutch Disease': The Chilean Economy from the War of the Pacific to the Great Depression." *An Economic History of Twentieth-Century Latin America*, (London: Palgrave Macmillan, 2000), p. 232.

³⁷ Collier and Sater (2004), p. 151.

³⁸ O'Brien (1989), p. 133.

Figure 3: GDP Per Capita Chile / GDP Per Capita for a Sample of Countries³⁹ 1820-1945.



Source: Braun (2000)

Rothermund (1996) reported that whilst international trade in general ‘receded only by 25 per cent during the depression years, Chile’s exports were reduced by 76 per cent and its imports by 82 per cent.’⁴⁰ In July 1931 it abandoned the Gold Standard and, now floating, the currency’s ratio to gold depreciated by 40%.⁴¹ The government responded by printing paper notes and within two years the money supply had doubled.

Were these effects solely caused by the contraction of nitrate exports and subsequent foreign exchange shock? Lüders and Wagner (2003) argued that the final collapse of the industry, alone, would not have forced Chile off the Gold Standard, and therefore indirectly create the inflation that followed.⁴² Country

³⁹ Countries in sample were Argentina, Australia, Brazil, Canada, Chile, Colombia, Denmark, Spain, Finland, France, Japan, Mexico, Norway, Peru, UK and USA.

⁴⁰ This made it, statistically, the most affected country in the world. Dietmar Rothermund, *The Global Impact of the Great Depression, 1929-1939*. (New York: Routledge, 1996), p. 105.

⁴¹ *Ibid*, p. 9.

⁴² Rolf Lüders and Gert Wagner, “The Great Depression: A Defining Moment in Chile’s Development?” *Cuadernos de economía* 40, no. 121 (2003), p. 790.

context suggests that other contributors exacerbated the painful adjustment to the Great Depression.

One lesser-considered factor is the role of debt. Massive public works between 1928 and 1931 had been funded with foreign loans taken by the ‘unquestionably’ authoritarian General Ibanez, for which the high price of nitrates was collateral.⁴³ After the fall in prices Chile was unable to service this ‘mortgage on Chile’s future’⁴⁴ and in 1931 was forced to ask its foreign creditors for a moratorium. This explains the lagged collapse in GDP per capita viewed in Figure 3, as the money still flowing from foreign loans immediately after the crash provided an amnesty period.

The predictions of the determinist literature on volatility are broadly accurate for Chile on both accounts. Swings in international commodity prices did cause considerable macroeconomic volatility which, in turn, caused distortions. For a while, producers were able to actively limit the damage by manipulating the market, but this was unsustainable. Chile’s fall during the Great Depression was also ‘spectacular’. However, in line with the activist position, institutional management had large import as well. The abandonment of the Gold Standard and the inflationary spiral that succeeded it were not predetermined by Chile’s resource reliance; the irresponsible borrowing of General Ibanez and the willingness of credit markets to lend based on volatile commodity prices played a key role.

‘Dutch Disease’

The determinist literature posits the ‘Dutch Disease’ as a statistical inevitability in countries experiencing a natural resource boom. Activists, on the other hand, have suggested that not all export booms imply ‘Dutch Disease’ (Mikesel 1997).

⁴³ By 1930, Chile owned American, British and Swiss banks more than twice the amount that it had owed in 1920. Collier and Sater (2004), p. 220.

⁴⁴ Ibid, p. 220.

Macroeconomic outcomes were more likely to be determined by the ‘policy mix, the government's priorities, and its capacity to implement consistent policies.’⁴⁵

Most of the Chilean economic history, with the exception of Palma (2000), stated that Chile experienced the ‘Dutch Disease’ during the nitrate period.⁴⁶ In many cases this qualification was made without rigorous analysis, or even by default.⁴⁷

Two indicators of ‘Dutch Disease’ have been employed in the leading accounts. The first is the proposed transmission mechanism between resource boom and ‘crowding out;’ the exchange rate. The second is the outcome; whether manufacturing was *actually* ‘crowded out.’ The significance of the ‘Disease’ in Chile really boils down to whether nitrate exports had a detrimental effect on industrial development.

It is generally agreed that capital deepening only gained traction after the War of the Pacific. Table 1 shows changes in manufacturing imports from the US and UK.⁴⁸ The rapid increase in the first decade of the nitrate cycle implies that the booming nitrate industry gave Chile the ability to import new foreign industrial technology, thereby taking its first steps towards industrialisation. The next two periods— 1891-1900 and 1901-1910 —saw manufacturing imports moving in tandem with nitrate booms and busts. Hence, far from creating industrial shrinkage, the acquisition of nitrates kickstarted capital deepening.

Few of these industrial technologies were direct inputs for the nitrate production process. The process itself was low-skilled labour-intensive and did not require

⁴⁵ Alfredo Saad-Filho and John Weeks, “Curses, Diseases and Other Resource Confusions.” *Third world quarterly* 34, no.1 (2013), p. 15.

⁴⁶ Galvarriato and Williamson (2009), Sater and Collier (2004), Llona (1992), Luders (1998) and Badia-Miro and Ducoing (2015).

⁴⁷ An example is Llona (1992), which found deindustrialisation in the copper industry to be sufficient evidence for Dutch Disease, despite the fact that the theoretical causal link is not clear, and the copper industry had been losing market share since long before.

⁴⁸ Most machinery exports to Latin America came from the US, UK and Germany. These countries accounted for 86.5% of total machinery exports to the region in 1913; Aurora Galvarriato and Jeffrey G. Williamson, “Was It Prices, Productivity or Policy? The Timing and Pace of Latin American Industrialization after 1870.” *NBER Working Paper Series* (2008), p. 9.

large manufacturing inputs or machinery.⁴⁹ It was effectively self-sufficient for two of its key inputs; wood-fuel from the *tamarugo* tree and the explosives necessary to remove *caliche*, which were produced from nitrates. However, there *were* indirect linkages. In the immediate decade following the War of the Pacific, production of non-durable and semi-durable goods grew in response to the increased labour demand from urban centres and *oficinas*. So did transport infrastructure. One example was the creation in Antofagasta of the *Fundicion Orchard Hermanos*, which produced a wide range of metal goods, or the establishment of a subsidiary of the largest global conglomerate for machinery and electrical equipment exclusively for the purpose of suppling the *oficinas*.⁵⁰

Table 1: Growth Rates per annum in Manufacturing Capital Goods imports from the US and UK (%)

Period	Growth Rate
1871-1880	-0.2
	13.9
1891-1900	0
1901-1910	11

Source: Galvarriato and Williamson (2009)

Palma (2000) argued that contrary to deterministic expectation, the Chilean economy during its nitrate era successfully evaded the ‘Dutch Disease.’ Figure 4 shows the exchange rate in the first two decades of the nitrate period (1880-1900), which remained relatively stable. Palma attributed this to the active fiscal policy of government. Despite the huge new revenues from nitrate export duties to the state, between 1880 and 1900 it maintained an average public deficit of 12 per cent.⁵¹ He argued that this compensatory increase in deficit expenditure prevented the accumulation of a surplus in the balance of payments, which

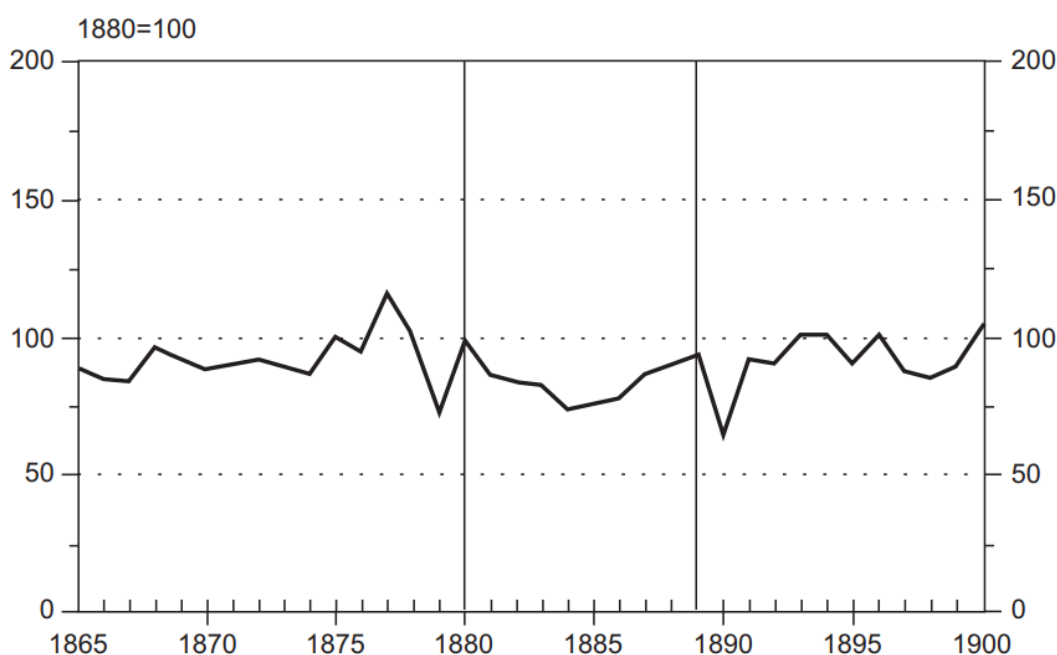
⁴⁹ Palma (2000), p. 227.

⁵⁰ Palma (2000), p. 227.

⁵¹ *Ibid*, p. 236.

would have otherwise pushed for a revaluation in the real rate of exchange.⁵² In this account, Chile successfully achieved both a substantial rise in primary commodity exports while simultaneously developing its manufacturing sector. Fiscal policy succeeded in preventing relative prices from moving against non-resource, tradable production.

Figure 4: Chile: real rate of exchange, 1865-1900 (prices of tradable divided by those of non-tradables)



Source: Palma (2000)

The growth in domestic manufacturing, to which Palma refers, during the first period and First World War is anecdotally supported in accounts of the time. A visitor to Chile in 1920 noted a diverse range of goods available; metal goods, furniture, tinned fruit; chemicals, brown paper, bottles and ships of over 3000 tons.⁵³ However, Palma (2000) did not include any other empirical industrial evidence to support its claim, aside from the exchange rate. Therefore, his position that there was a strong industrial expansion on machinery and intermediates from the First World War to Great Depression is less convincing;

⁵² Ibid, p. 246.

⁵³ Collier and Sater (2004), p. 160.

the exchange rate was clearly more volatile following 1920, even if it was still not obviously linked to nitrate booms and busts.

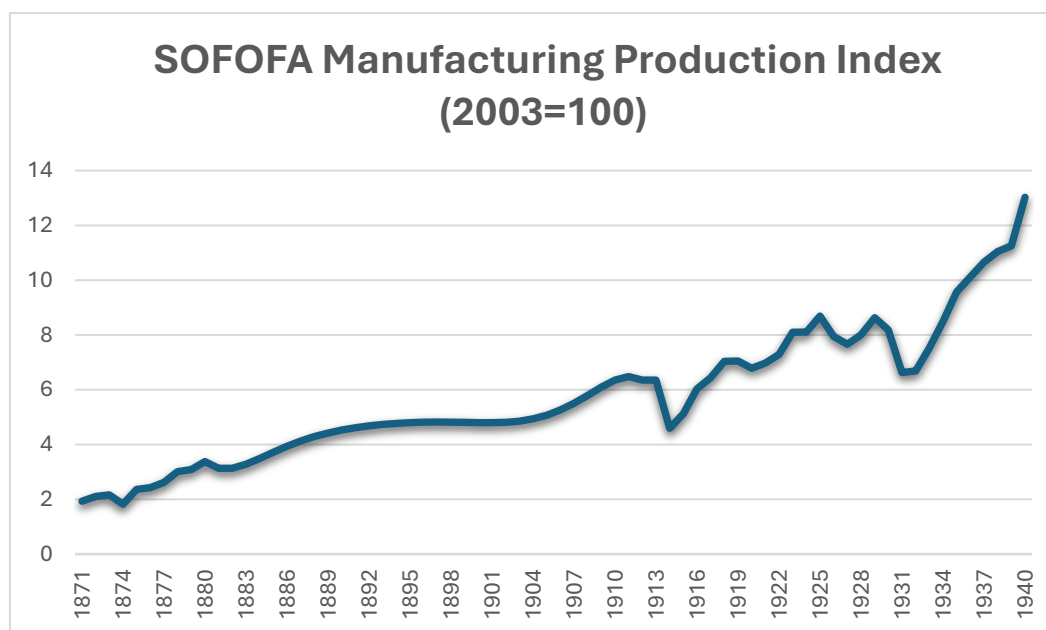
Badia-Miro and Ducoing (2015) argued, to the contrary, that the Chilean economy caught the ‘Disease’. Whilst they acknowledged some degree of industrialisation, they thought that it had ‘weak basis’ and ‘disappeared when the mining cycle ended’.⁵⁴ A deeper analysis shows, however, that their main disagreement with Palma was over his position on post-1920 industrial growth. They argued that any recognisable boost in industrial GDP following the war, which Palma had over-estimated, was a recovery from the shortages of wartime dislocation. The argument, as they defined it, was contingent on whether the industry was a temporary accomplice of the nitrate boom or became a permanent and transformative feature of the Chilean economy.

Neither Palma (2000) or Badia-Miro and Ducoing (2015) used the current or widely accepted estimates for industrial GDP from Diaz (2016) et. al.⁵⁵ Figure 5 shows the Manufacturing Product Index developed by the *Sociedad de Fomento Fabril*, Chile’s primary industrial federation. This index shines some light on how industry evolved through the period and, specifically, to what extent it disappeared after the collapse of nitrates. In line with both accounts, manufacturing production levels expanded in tandem with nitrate production from 1880 to 1913. The index displays an expected drop during the First World War and some volatile growth up until the 1920s, but following the Great Depression it fell back to 1913-levels. It had rebounded to its 1929-level by 1934.

⁵⁴ Marc Badia-Miro and Cristian Ducoing, “The Long Run Development of Chile and the Natural Resources Curse. Linkages, Policy and Growth, 1850-1950.” *UB Economics Working Papers* E14/318, (2014), p. 10.

⁵⁵ As stated in Ducoing and Badia-Miro (2013), p. 12.

Figure 5: Manufacturing Production Index (2003 = 100)



Source: Diaz et. al (2016), my own visualisation.

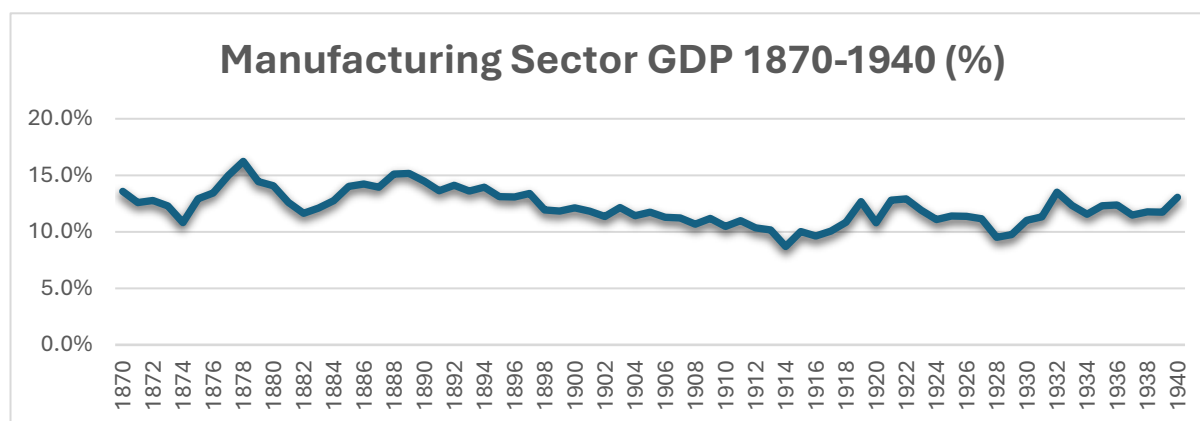
It is prudent, also, to situate this in context by representing the industrial share of the overall economy, represented in Figure 6 from Diaz et. al. (2016). As the nitrate industry grew from 1880-1913, there was a peak in industrial GDP share at 15.2% in 1889, followed by a consistent decline until 1913. The latter would be expected given the growth in the nitrate industry, but it also reflects the relative industrial stagnation seen between 1890 and 1900 in Figure 5. Most significantly, the data suggests that industrial GDP share was the same as the level pre-War of the Pacific, both at the peak of the first phase, in 1913, and at the end of the nitrate era, around 1934.

Industrial estimates are notoriously divisive, so these representations are not decisive.⁵⁶ The lack of a split between tradable and non-tradable manufacturing weakens their explanatory power.⁵⁷ But they are sufficient for mediating between the two established interpretations of Palma, and Badia-Miro and Ducoing.

⁵⁶ Bulmer-Thomas (2003), p. 52.

⁵⁷ A particularly important distinction when testing the Dutch Disease, but also highly subjective.

Figure 6: Manufacturing Sector GDP 1870-1940



Source: Diaz et. al (2016), my own visualisation.

The evidence presented here partially supports the conclusions of Palma (2000). The exchange rate was not causally linked to nitrate booms during the period, and relative manufacturing production expanded, not contracted, in line with resource booms. This contrasts with the deterministic position that Dutch Disease was a structural characteristic of resource exporting. The role of fiscal policy in stabilising the exchange rate is compelling evidence that active institutional behaviour could have an impact on ‘curse’ transition mechanisms.

However, in line with the perspective of Badia-Miro and Ducoing (2015), the percentage share of industrial GDP was the same in 1913, 1934 and pre-War of the Pacific. Whilst the industrial sector was not visibly crowded out, it also did not grow. In the absence of nitrates, perhaps the percentage share of industrial GDP could have increased *above* the line of growth, as is generally desirable for developing economies. Ultimately, as implied by Andersen and Ross (2014) any concrete conclusions about the Dutch Disease are difficult to draw without the comparison of a control group.⁵⁸ Even then, unobservable country effects muddy the picture.

⁵⁸ Andersen and Ross (2014) criticised the lack of a control group in Haber and Menaldo (2011), for they were unable to capture the potential transitions that did *not* occur because of resource abundance.

Fiscal Capacity and Governance

The determinist position predicted that governments in resource rich nations would substitute internal taxes for rents, which would, in turn, reduce their accountability to citizens and lead to poor institutional governance and rising inequality. Collier and Hoeffler (2004) suggested that resource abundance would inspire conflict.

Even before 1879, Chile had been an outlier in Latin America for its relatively low reliance on export duties, befitting of its reputation of institutional ‘exceptionalism’.⁵⁹ In 1879, the government implemented income and inheritance taxes too: ‘For the first time, the burden of taxation was placed upon the often-unwilling shoulders of the affluent, and may have matured into genuinely progressive taxes if carried to their logical conclusion’.⁶⁰ By 1890, nitrates had aborted this movement for tax reform.⁶¹ Resource abundance had interrupted the virtuous fiscal cycle; in this respect, the situation transpired as determinists would predict.

Chile rapidly became a ‘rentier republic’;⁶² nitrates were the largest source of state revenues, estimated at 56% of state income in 1895 and 60% by 1915.⁶³ Did institutional accountability and quality of governance degrade concurrently? Haber and Menaldo (2011) found no relationship, displayed in Figure 7.⁶⁴ Only one drop in their measure, the Polity IV index, was noted in 1925, coincident with the period of political instability that preceded the premiership of the authoritarian General Ibanez. However, the Polity IV metric they used for institutional quality is not appropriate for tracking short term fluctuations.⁶⁵

⁵⁹ It derived most of its income from import levies instead, which fell upon the middle and upper classes; William Sater. *Chile and the War of the Pacific*. (Lincoln: University of Nebraska Press, 1986), p. 225.

⁶⁰ Sater (1986), p. 226.

⁶¹ Sater (1986), p. 227.

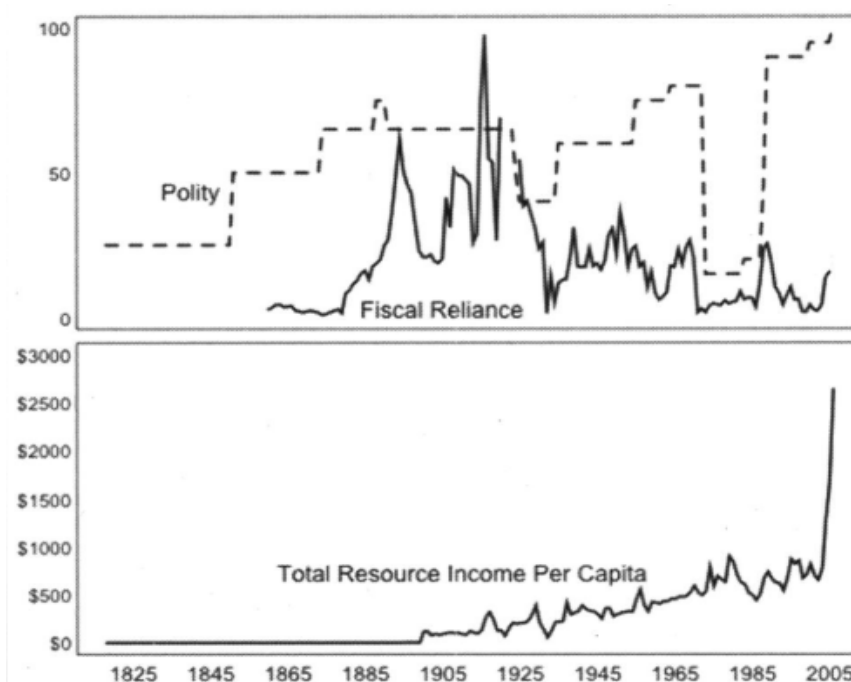
⁶² Collier and Sater (2004), p. 162.

⁶³ Badia-Miro and Ducoing (2015), p. 8.

⁶⁴ Haber and Menaldo (2011), p. 10.

⁶⁵ As stated by its authors; Monty Marshall and Keith Jagers, *Polity IV Project: Political Regime Characteristics and Transitions, 1800-2002*, Dataset User’s Manual, (2008).

Figure 7: Chilean fiscal reliance and Polity IV rating



Source: Haber and Menaldo (2011)

Political context fills the gaps. The nitrate period saw Chile engage in more conflict in one decade than it had through its national history; both the War of the Pacific and Chile's first civil war were fought, in large part, over nitrates.⁶⁶ In 1891, the regime that emerged from the civil war was a 'bastard form of parliamentary rule, rife with bribery and vote buying.. which managed to insulate itself from the public's rage.'⁶⁷ It failed to address the widening 'chasm'⁶⁸ of inequality but was unable or unwilling to reform:⁶⁹ Widespread dissatisfaction was exemplified by the *Santa Maria Massacre*, in which soldiers killed up to 3000 unarmed nitrate labourers. Valdes Vergara said in 1904 that 'those of us who made the 1891 revolution, with the best of intentions, have caused damage that is greater than the benefits promised'.⁷⁰ Mac Iver explicitly connected the decline in 'public spirit' to 'the 'devastating torrent' of nitrates.⁷¹

⁶⁶ Sater (1986), p. 228; Michael Monteón, "John T. North, the Nitrate King, and Chile's Lost Future." *Latin American Perspectives* 30, no. 6 (2003), p. 78.

⁶⁷ Sater (1986), p. 228.

⁶⁸ *Ibid*, p. 227.

⁶⁹ Collier and Sater (2004), p. 147.

⁷⁰ Collier and Sater (2004), p. 191.

⁷¹ *Ibid*, p. 184.

Anecdotal accounts strongly suggest that public institutional quality degraded on becoming fiscally reliant on nitrates; government rolled back progressive tax reform, failed to address social issues and insulated itself from the fallout. This contrasts with the very influential Haber and Menaldo (2011) which deemed the relationship to be ‘inconclusive’. Furthermore, it vindicates Collier and Hoeffler (2004) and Timmons (2005) with respect to conflict and inequality.

Fiscal Expenditure

On the other hand, the aforementioned impression of national decline underplays some successes of Chilean institutions. The determinist camp suggested that resource revenues were likely to be wasted or create negative externalities. Gylfason (2001) posited that resource abundance had crowded out education. Activists reaffirmed the potential of resource rents to improve welfare and invest into future productivity, if managed correctly. One key area where rents can be used is in expanding education.

Traditional Chilean literature purported that Chileans were ‘deprived of all but a tiny portion of the enormous private profits derived from nitrates.’⁷² In this story, even the revenues not siphoned out of the country were ‘frittered away’ on ‘imported playthings’.⁷³ Sater and Collier (2004), the most comprehensive economic history of Chile, asked— ‘why did the state not use its tax windfall to diversify the economy and thus provide alternatives when the nitrate boom ended?’⁷⁴

This impression, however, is somewhat unfair. Half of the surplus generated by nitrate production was appropriated by the Chilean state in taxation.⁷⁵ As previously alluded, public expenditure rapidly expanded and by 1889 investment in physical infrastructure had quadrupled, while that in education increased

⁷² J Brown, “The Frustration of Chile’s Nitrate Imperialism.” *Pacific Historical Review* 32, no. 4 (1963), p. 387.

⁷³ Collier and Sater (2004), p. 159.

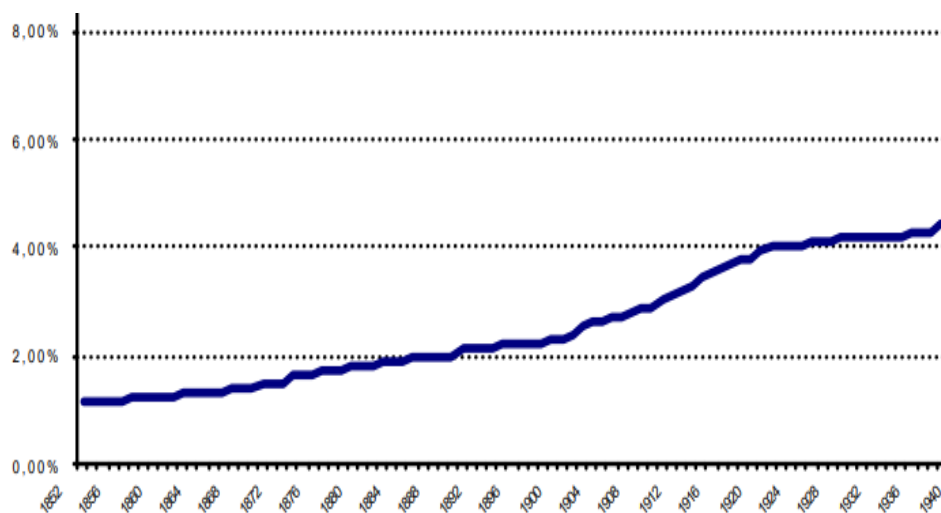
⁷⁴ *Ibid*, p. 162.

⁷⁵ Palma (2000), p. 235.

eight-fold.⁷⁶ Blakemore (1974) reported the objective of Balmaceda's programme: 'to invest the proceeds of the export duty on nitrates, now the chief source of government income ... in public works and education, so that when that source declined as the nitrate deposits were diminished, Chile would have derived permanent benefit.'⁷⁷ Nor did this end with Balmaceda; after the two years of austerity following his overthrow, public expenditure quickly rebounded and had recovered to the same percentage of GDP by 1900.

Activists argued that merely increasing fiscal expenditure during resource windfalls is insufficient; surpluses should be invested *productively* to avoid waste and negative externalities. Chile's educational investment, measured by the Human Capital Index in Figure 8, showed modest growth during the early nitrate boom, followed by a rapid rise between 1900 and 1920. By 1923, the index had nearly doubled on 1880 levels, but then stagnated until 1940.⁷⁸

Figure 8: Human Capital Index: Equivalent University Students as a Percentage of Total Population 1852-1995



Source: Braun (2000)

⁷⁶ Ibid, p. 236.

⁷⁷ Harold Blakemore. *British Nitrates and Chilean Politics, 1886-1896: Balmaceda and North*. (London: Athlone Press for the Institute of Latin American Studies, 1974), p. 71.

⁷⁸ Juan Braun, Matias Díaz, Rolf Lüders, and Gert Wagner, *Economía Chilena 1810-1995: Estadísticas Históricas* (Santiago: Pontificia Universidad Católica de Chile, 2000), p. 6.

An alternative measure is the human capital index based on average years of education in Diaz and Wagner (2020).⁷⁹ This concurs that the dividends were significant, but that they were not statistically recognisable until 1905 and percentage growth saw a four-fold reduction in the succeeding period.

Table 2: Human Capital based on Years in Education (1905 = 100)

Year	Human Capital	Percentage Change
1845	78	
1865	81	4%
1885	90	11%
1905	100	11%
1925	119	19%
1945	126	6%

Source: Diaz and Wagner (2020)

Firstly, this implies that a considerable portion of nitrate revenues were productively invested into human resources, which paid off in educational outcomes. In this respect, Chilean institutions had managed resource rents quite effectively, supporting the activist position. However, it also took over two decades for that investment to translate statistically, and by 1923 educational improvements were stagnating. The magnitude of variation in educational outcomes suggests that any ‘crowding out’ effect on education was not contingent on resource abundance itself, but on either institutional management or unobservable factors.

⁷⁹ Jose Díaz-Bahamonde, and Gert Wagner, “Productivity and Growth in Perspective: Chile 1833-2010”, *Review of Income and Wealth* 66, no.4 (2020).

Conclusion

The first section of this dissertation laid out the two camps in the ‘resource curse’ literature. The deterministic position suggested that resources intrinsically created structural problems and degraded institutional quality. Activists claimed that ‘curse’ effects were primarily a result of failure to manage resources effectively. The second section applied this ‘curse’ lens to Chile during the nitrate period: What were the effects of resources, and what role did institutional management play in them?

The collapse of the Chilean nitrate industry, traditionally attributed solely to the joint pressures of the Great Depression and the innovation of synthetic nitrates, was in fact inseparable from long-term failures in institutional management. The loss of Chilean market share was consequent of super-optimal export duties, the inability of labour to win higher wages, and the market manipulating ability of monopolistic cartels. Thus, we have challenged the position that the unsustainability of the industry was an entirely exogenous event, supporting the activist interpretation.

Determinists expect resource exporters to suffer particularly punitive adjustments after large exogenous shocks. Indeed, Chile may have been, statistically, the most affected country in the world by the Great Depression. However, the role of institutional management was also key here; abandonment of the Gold Standard and the ensuing inflationary spiral may not have occurred without the irresponsible borrowing of General Ibanez. This supports the key activist account of Manzano and Rigobon (2011).

It is unclear if Chile experienced the ‘Dutch Disease’ because we cannot account for growth in the industrial sector that did *not* occur. However, as Palma (2000) revealed, for a time the government managed to stabilise fluctuations in the exchange rate through fiscal policy. This highlighted the role institutional management could have on transition mechanisms of the ‘curse,’ even if the overall outcome was unclear.

As determinists would predict, resource revenues substituted increasingly progressive internal taxes and sparked conflict; institutional accountability and quality degraded concurrently, and social dissatisfaction and inequality rose. However, in line with the activist position, and against the grain of Chilean-specific literature, nitrate revenues were not completely squandered. There was considerable productive investment into human resources, although the dividends were short-lived.

Ultimately, this study has value in providing weight to the different arguments on the activist and determinist positions. For example, a deeper investigation of country context showed that Haber and Menaldo (2011), an influential cross-country study on the resource ‘curse,’ did not accurately represent the relationship between fiscal reliance and Chilean institutional quality. On this, my judgement supports the determinist position. Overall, however, the activist interpretation has been supported by showing that institutional behaviour had a larger role in creating ‘curse’ related effects than is admitted by the deterministic literature.

This case study is also unique because of Chile’s reputation in Latin America as institutionally ‘exceptional’, whilst most country-specific ‘curse’ accounts have taken place in countries with the most immature institutions. This affirms the fact that resource abundance exerted pressures that demanded active and competent institutional management, even in countries that had a claim to ‘exceptionality.’

Labourers use hand tools to break up and select the nitrate-rich *caliche* to be shipped to refineries.



E. Semper and E. Michels, *La Industria del Salitre en Chile*, [Santiago, 1908], reproduced in O'Brien (1989).

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