



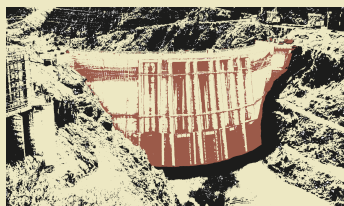
HISTORIA INDUSTRIAL

INDUSTRIAL HISTORY REVIEW

87

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CONTENTS – CONTENIDOS

ARTICLES – ARTÍCULOS

- Electricity and the role of the state: New Zealand and Uruguay before
state-led development (1870-1930) 11
RETO BERTONI; HENRY WILLEBALD

- Migration, bankers, and social capital. The rise of a Basque “industrial
cowboy” in the American West: John Etchart, 1900-1943 45
IKER SAITUA

- Institutional constraints to the development of the Spanish fishing sector
(18th and 19th centuries) 81
ERNESTO LÓPEZ LOSA

- The role of economic policy and foreign investment: product innovation
in the Spanish metalgraphic industry (1959-1975) 111
JESÚS GIRÁLDEZ RIVERO; PEDRO VARELA-VÁZQUEZ

- El crédito bancario y el fomento industrial: realizaciones del banco estatal
durante la industrialización de Uruguay, 1941-1959 145
CECILIA MOREIRA

REVIEWS – RESEÑAS

- Luiz Eduardo SIMÕES DE SOUZA y Maria de Fátima SILVA
DO CARMO PREVIDELLI, (orgs.). 2022. *História econômica do Brasil
contemporâneo*. Niterói / São Paulo: Eduff / Hucitec, 552 pp. 183
Fábio Farias de Moraes

Ricardo ROBLEDO. 2022. <i>La tierra es vuestra. La reforma agraria. Un problema no resuelto. España: 1900-1950</i> . Barcelona: Ediciones Pasado y Presente, 611 pp.	195
Luis Garrido-González	
Rafael VALLEJO POUSADA. 2021. <i>Historia del Turismo en España 1928-1962. Economía, política y administración turística</i> . Madrid: Sílex, 742 pp.	199
Elvira Lindoso Tato	
Josep COLOMÉ-FERRER; Jordi PLANAS y Raimon SOLER-BECERRO (coords.). 2022. <i>Vins, aiguardents i caves. La comercialització de la producció vinícola catalana (segles XVIII-XXI)</i> . Tarragona / Vilafranca del Penedès: Universitat Rovira i Virgili / Vinseum-Museu de les Cultures del Vi de Catalunya, 308 pp.	203
Juan Piqueras Haba	
Jesús María VALDALISO (dir.); Carlos ALVARADO GARCÍA y Patricia SUÁREZ. 2022. <i>Nortegas (1845-2021): Historia de la industria del gas en el Norte de España</i> . Madrid: Marcial Pons, 542 pp.	207
Mercedes Fernández Paradas	

ARTICLES – ARTÍCULOS

Electricity and the role of the state: New Zealand and Uruguay before state-led development (1870-1930)

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ABSTRACT

The configuration of a “modern” production structure requires there to be sufficient energy supply at competitive costs. Since the last third of the nineteenth century, coal production and better natural conditions for generating electric energy at low cost explain – at least partially – the differences in favour of New Zealand with respect to Uruguay. However, institutional arrangements are another relevant factor of differentiation. Our argument is based on the concept of endogeneity of natural resources, and we use it to prove the different roles of states in electricity systems: state intervention aimed at improving welfare conditions in Uruguay without paying enough attention to aspects related to production conditions; while, in New Zealand, productive development was the focus of public action. As a result, a more extensive and denser electrical network was consolidated in New Zealand which, potentially, would have created better conditions in terms of diversification and rural production.

KEYWORDS: settler economies, endogeneity of natural resources, role of state, electric system, electricity and development.

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1. Introduction

The configuration of a “modern” production structure requires there to be sufficient energy supply, at competitive costs, to justify exploiting the available natural resources. New Zealand has had better economic performance

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than Uruguay since the last third of the 19th century (Álvarez and Bértola 2013, Willebald 2013), and the differences in terms of energy endowments would explain, at least partially, the divergent trajectories. Two factors had a direct impact on this differential in favour of New Zealand: the existence of coal mines (which came to cover 80% of the domestic demand), and the wide presence of waterfalls, which implied lower relative costs for hydroelectric generation (Bertoni and Willebald 2016).

New Zealand's advantage in energy endowments facilitated the development of a dairy sector, certain energy-intensive manufactures, and a more efficient use of railways that reinforced the differences between both economies. However, endowments are not the complete story, and the institutional arrangements are another relevant factor of differentiation. Our argument is based on the concept of endogeneity of natural resources, and we use it to prove the hugely different roles of states in the creation and management of electricity systems.

These differences were not related to the extent of state intervention – given that both states attempted to and in fact did intervene in the electricity markets – but rather the outcomes of this action. The result was the creation of different production conditions that explain the long-run divergent economic performance in terms of sector diversification, international competitiveness, and social conditions in favour of New Zealand.

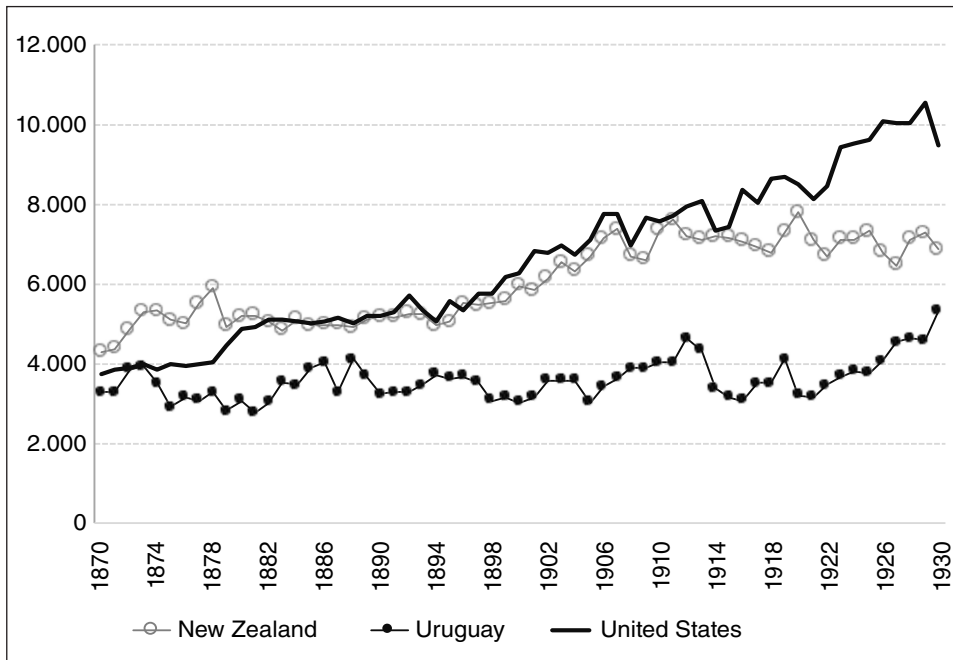
The article is ordered as follows. First, we present our conceptual framework based on the notion of the endogeneity of natural resources and a brief characterization of the economic conditions of both countries (Section 2). After that, in Section 3, we propose our hypothesis and an empirical strategy based on three analytical stages: (i) examination of arguments and concepts offered by the literature to understand the evolution of the electricity system in each country; (ii) review of laws, norms and qualified arguments that represented the tenor of public policy on the matter; and (iii) considering the electrical grid of each country as evidence of the different governmental actions. Initially, we present a review of those factors and conditions that we know about endowments, supply and demand of electricity (Section 4). Then, we consider a brief description of the creation and management of the electrical system (Section 5), we review the legal norms related to the implementation of the electricity system (Section 6), and show evidence of the extension and coverage of the electrical network in both countries (Section 7). In Section 8, we conclude.

2. Endogeneity of natural resources

The Industrial Revolution was at the root of the “golden age” of settler economies. This was a process based on intensive technological advances that changed social and economic relationships on a world scale. When these economies were exposed to the effects of the First Globalization, they took advantage of their abundant natural resource endowments and received the “blessing” of their natural capital. They grew quickly from the closing decades of the nineteenth century until the First World War, encouraged by dynamic international demand and inflows of production factors (labour and capital). Uruguay and New Zealand are typical new settlement economies in the sense defined by Lewis (1983, p. 209) and constituted, together with Argentina, Australia, Canada, Chile, South Africa and the US, the “temperate economies” that Foreman-Peck (1983, p. 195) identifies as “the group of non-European countries which in [the beginning of the] twentieth century can be classified as developed”.

In the last third of nineteenth century, New Zealand and Uruguay showed income levels close to the “core” of the world economy – similar to the US and around 72 per cent of it, respectively – but the gap in favour of New Zealand was significant and endured over time (Figure 1).

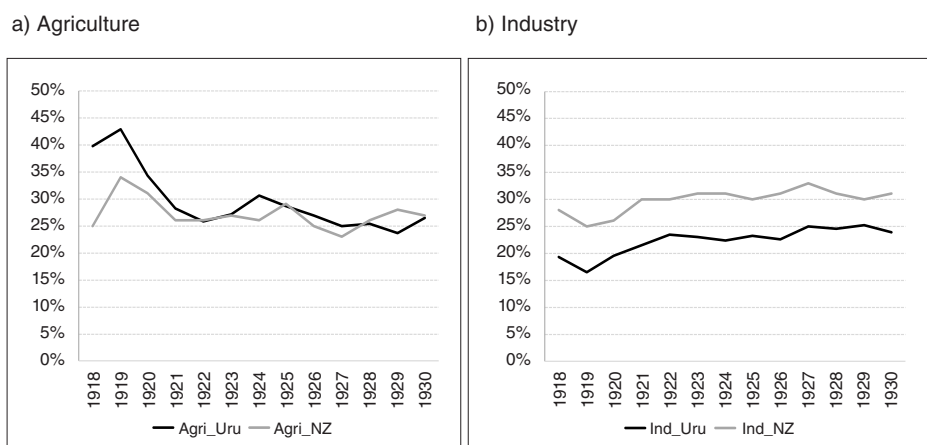
FIGURE 1 • Real GDP per capita in 2011US\$, multiple benchmarks



Source: Bolt et al. (2018).

As regards production structure, both economies had a high and decreasing share of agriculture value-added during the early decades of the twentieth century, with similar levels and dynamics. However, in terms of industry the differences were more notorious, with relatively important shares of mining and manufacturing in New Zealand (Figure 2).

FIGURE 2 • Sectoral shares on GDP, in percentage (current prices)

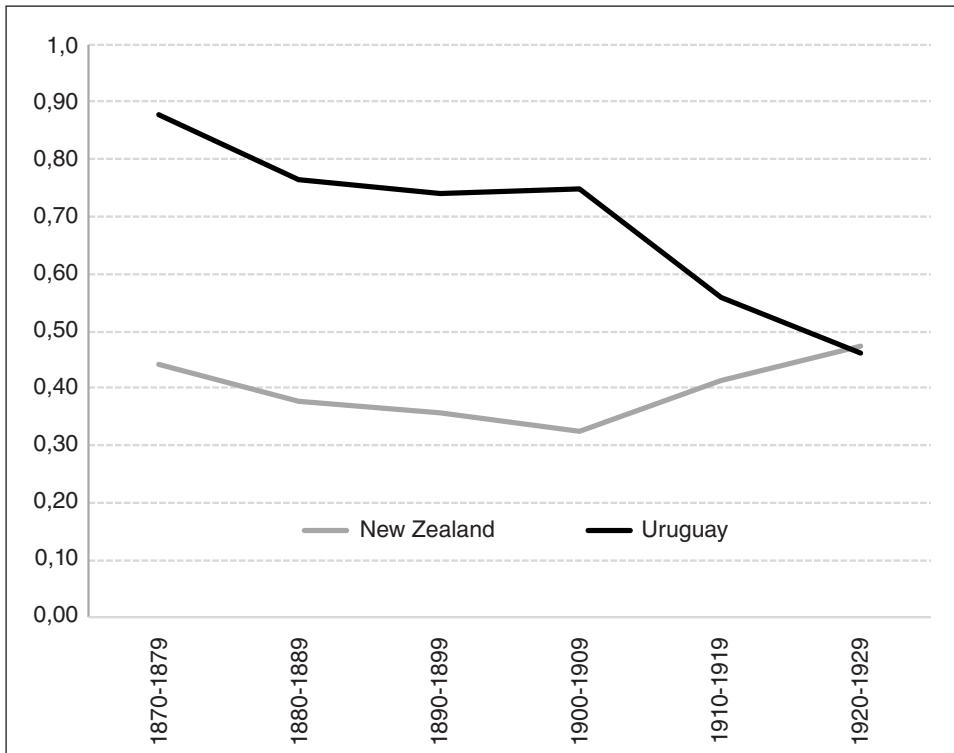


Source: NZ: Linehman (1968); Uru: Román and Willebald (2021).

These features in production structure developed parallel to export structure. In New Zealand the share of commodities other than pastoral and agriculture goods increased continuously to the First World War, giving as a result a more diversified composition of trade (Figure 3).¹ Uruguay remained dependent on primary products and the trend in manufactured goods began to increase just after the First World War, coinciding with the definitive installation of meat packing industries (several decades after New Zealand).

In sum, the two countries had a similar development pattern but New Zealand had a richer and more diversified economy. These differences, probably, opened diverse opportunities in terms of technological progress and state actions in the potential relation with the natural resources, the environment and the capacity to sustain economic growth. The conceptualization of these relationships deals with the role of natural capital in economic development, and the endogeneity of natural resources is part of the discussion.

1. We calculate a Herfindahl–Hirschman Index according to the following export shares by decade: mineral, pastoral, agricultural and manufactured (see Bertoni and Willebald 2016). This index represents a concentration ratio; then lower values are related to more diversified (less concentrated) productive structure.

FIGURE 3 • Export diversification, Herfindahl–Hirschman Index

Source: NZ: Bloomfield (1984); Uru: Bonino et al. (2015).

Abundance of natural resources is not a question of endowments but of the productive application of resources and, in this sense, abundance is an endogenous process. We emphasize that an abundance of natural resources is not a fixed situation but a process that reacts to changes in the structure of commodity prices and factor endowments (Williamson 2011), technical progress (Wright 2015) and suitable institutional arrangements (Acemoglu et al. 2001). Therefore, this abundance is not a given but is part of the evolution of the economic system. This idea is not new and it goes back a long way.

Resources are highly dynamic concepts; they are not, they become, they evolve out of the triune interaction of nature, man, and culture... (quoted in Ding and Field 2004, p. 2, from Zimmerman 1933, p. 4).

[Natural resources] should not be seen as merely a fortunate natural endowment, but rather as a form of collective learning, a return on large-scale investments in exploration, transportation, geological knowledge, and the technologies of mineral extraction refining, and utilization (Wright and Czelusta 2007, p. 186).

In economics, it is usual to consider natural resources as initial endowments that remain unchanging in time. However, endogeneity of natural capital is an obvious result of an historical analysis. History teaches us that “curses” and “blessings” are constructions – they are the result of the socioeconomic system – and the exploitation of natural resources means to address opportunities and challenges with profound consequences in the historical process of societies (Willebald et al. 2015).

Some successful experiences of economic development (such as Australia, Canada, Sweden) highlight the fact that institutions promoting the interaction between enablement and receiving sectors are fundamental to science-based and innovation-driven growth in resource-based economies. Therefore, it is crucial for institutional structures to evolve in ways that support knowledge capabilities and efficient uses of energy in the growth of natural resource-based industries.

In the field of energy economics, the exploitation and value of energy resources, transport and marketing, as well as satisfying the energy needs of production and households, are closely related to virtuous linkages between natural resources, technology and institutional arrangements. In the case of electric power, an additional factor can be considered. Given the existing technology in the first decades of the twentieth century, the electricity provided by a public utility generates a natural monopoly in generation and transmission. Particularly, long distance electricity transmission constituted a natural monopoly because a single firm could satisfy the entire market demand at lower cost than any other combination of firms.

Historically, electric power systems have been publicly owned and operated because of their natural monopoly characteristics... Only the appearance of new generation technologies, particularly gas turbines, reversed the scale economies in the sector (Dubash 2004, p. 256).

As a result, state intervention has constituted a key feature both as a producing agent and as a regulatory entity, both of which are valuable for understanding the long-run performance of societies and economies. However, the type or modality of the state intervention could vary from place to place, whether regulated private ownership was viable, or whether municipal ownership was the default depending on a variety of factors. In the case of settler economies, the availability of the open frontier (“moving frontier” in the words of Di Tella 1982) pushed the balance of advantage more towards utilities and less towards municipality ownership (Newbery 2001). This happened because entrepreneurship and private finance both required private property rights and institutions of capitalism that, clearly, were absent – or in construction – in open frontier economies.

3. Hypothesis and empirical strategy

In the concept of endogeneity, the role of the state is a central matter and the modalities of action of the government regarding natural resources have fundamental differences between Uruguay and New Zealand. This idea is not new. Previously, other scholars have applied concepts similar to one of the main components of the abundance of natural resources of settler economies, namely land as the main natural wealth of these economies.

Indeed, though similar in many respects, Uruguay and New Zealand appear to have had substantial differences with respect to institutions governing both accesses to land and distribution of agricultural incomes. In New Zealand, the Crown adopted a policy that strongly facilitated access to land for white colonizers and European descendants. This in turn allowed an increasing number of landowners, which expanded along with immigration and population growth. Instead, in Uruguay land was heavily concentrated in the hands of a small group of landowners that benefited from massive transfers of public lands (Álvarez et al. 2011). Moreover, Uruguayan landowners obtained a larger share of agricultural output (in terms of land rents) than their New Zealander counterparts (Willebald 2015). We present a similar concern but instead of focusing on land we base our analysis on energy natural resources.

Our hypothesis is that the different results derived from state action in terms of natural energy resources and the electricity supply strategy explain, at least partially, an expanded and networked electrical system at an earlier date and with better articulation with the productive structure in New Zealand than in Uruguay.²

To test this hypothesis, we propose to proceed through three analytical stages. Initially, we examine the arguments and concepts that the literature offers to understand the long-run evolution in the creation and management of the electricity systems in each country. Second, we illustrate the differences with a review of laws, norms and qualified arguments that represent the *tenor* of the public policy in terms of creation of development conditions. Finally, one outcome of this process is the electrical reticulation of each country, shown as the extension and coverage of the systems in terms of public and residential lighting and motive-power purposes for farming, manufacturing, commerce and other productive activities.

2. Our methodological option has been dividing the subject of study in three stages; initially, we dealt with the role of the natural resources (Bertoni and Willebald 2016); in this article, we address state action and, in the next stage, we will combine both with demand factors.