# Structural Transformations and State Institutions in Latin America, 1900-2010

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**Abstract**

I argue that the context in which countries implemented the income tax law, was a critical juncture, promoting (or undermining) long-term economic and political development. Leveraging the dual sector model of economic growth, and the fiscal sociology paradigm, I explain how balanced sectoral growth, and income taxation, promoted economic growth and state-building in the early 20th century Latin America. Since taxation affected landowners and industrialists in different ways, economic elites were divided on their preferences towards fiscal policy—and consequently—state centralization. In cases where the implementation of the income tax reflected this sectoral cleavage, the political incorporation of both sectors was more likely, expanding both state capacities and sustained balanced economic growth. In turn, balanced growth promoted higher levels of sectoral equality, precluding sectoral dominance on both sides. However, where the sectoral conflict was too weak to trigger the political incorporation of industrial political elites, institutions kept reproducing the post-colonial order that benefited the landowning class, compromising both state-building and economic development. My empirical strategy leverages economic history data since the 1900s for a number of Latin American countries, time-series analyses, and the Chilean case during the 1920s to contextualize the causal mechanism.

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> *Practically all governments are engaged in promoting one [group]. There are [...] landlord governments against the peasants and the industrialists*
>
> Lewis [1965, 410]

The literature on the relationship between political and economic development is vast. Without surveying all of it, there is an agreement in that strong institutions cause better economic performance. Indeed, North [1990, 3] explains that the fact that "institutions affect the performance of economies is hardly controversial." Unfortunately, however, most explanations of economic success focus on property rights protection.[1] I find that a limitation. For instance, authoritarian regimes with little (or no) respect for property rights, grow at levels that sometimes even surpass democratic countries.[2] While I still think that institutions matter for economic growth, this paper seeks to contribute to this literature by emphasizing the positive effects of sectoral conflicts between the industrial and agricultural political elites, on political and economic development.

In addition, scholars have traditionally focused on socio-economic cleavages between a *homogeneous* ruling elite, and politically excluded segments of the society, traditionally peasants or the bourgeoisie. Moore [1966], Tilly [1992], Boix [2003], Stasavage [2008] and Acemoglu and Robinson [2009] are among the most prominent examples supporting this view.[3] Alas, the study of sectoral divisions—conflicts *among* the elite—and political and economic development, has been overlooked. There are some important exceptions, however. Ansell and Samuels [2014] and Boix [2015] examine the role of economic inequality/equality among the elite on democratization, Saylor [2014, 8] looks at the "coalitional basis of state building," and Mares and Queralt [2015] examine how income taxation in Europe was associated with inter-elite conflicts, particularly between the landed elite and the industrial elite. While political economists have already studied the role of sectoral conflicts in the context of political development, most of the times the focus has been on democratic development. Using the same sectoral approach, this paper stresses how structural conflicts are associated with state-building and economic development.

Hirschman [1958, 66] explains that "tensions, disproportions and disequilibria" among the industrial and agricultural sectors promotes development. Building on that, in this paper I underline the conditions under which higher levels of sectoral contestation between the industrial and agricultural political elites are more likely to foster fiscal development and long-term economic growth. I

[1] Johnson and Koyama [2016].

[2] For an extended criticism, see Clark [2009].

[3] For example, Acemoglu and Robinson [2009, 293] explain that "all members of the elite have identical endowments so there is no heterogeneity among the elites." However, later in the book (p. 289) they briefly consider the preferences of industrialists and agriculturalists towards democratization.

theorize from two bodies of literature. First, I build on the fiscal sociology paradigm to argue that fiscal institutions have been the main *engine* of state-making. Second, borrowing from the dual sector model of economic growth, I document how the secular structural transformation—e.g., the gradual emergence of the industrial sector—fostered the reversal of the backward institutional order implemented during colonial times. The paper exploits sectoral outputs from 1900 to 2009 for a number of Latin American countries,[4] vector autoregressive models, Granger-causality tests, impulse response functions, and the Chilean case to illustrate the causal mechanisms. The results amply suggest that when the implementation of the income tax coincided with lower levels of sectoral inequality—e.g., higher levels of sectoral contestation—both economic and political development were promoted. That is, higher levels of sectoral contestation acted like a scope condition in the foster of economic and political development.

## I. State-Making and Economic Growth: The Role of Sectoral Contestation

I argue that both balanced sectoral growth and income taxation, promoted sustained levels of economic growth, and state-building, since as early as the 20th century in Latin America. Economic expansion does not refer to a higher GDP *per capita*, but to a *long-term* growth equilibrium between the industrial and agricultural sectors. Specifically, balanced growth consists of an inter-sectoral synergy where one sector expands in reaction to the other, and vice versa, over time. And since the economic forces altered the balance of political power of the elites invested in each of these two sectors, the theory of (un)balanced economic growth offers also a theory of political (under)development. The mechanism advanced in this paper explains that balanced levels of economic growth had positive—and long-lasting—consequences for political development. Particularly, the argument explains how balanced growth promoted higher levels of sectoral equality, not only precluding sectoral dominance on either side, but also fostering higher levels of tax compliance among the elites, encouraging inter-elite cooperation and state-making—hence the circular arrows in Figure 1.

On the one hand, the implementation of the income tax generated positive spillover effects for state-making, particularly, rising economies of scale of the operational efficiencies of the bureaucracy. The same bureaucracies that were sent to collect and administer the tax, learned to execute other state(*making*) practices. Particularly, the development of the fiscal system required deploying skilled bureaucrats able to keep up with accounting books of every firm, as well as the employment structure of every factory. It also required knowledge on investments, levels of production, exports, among

[4] The actual data availability varies by case.

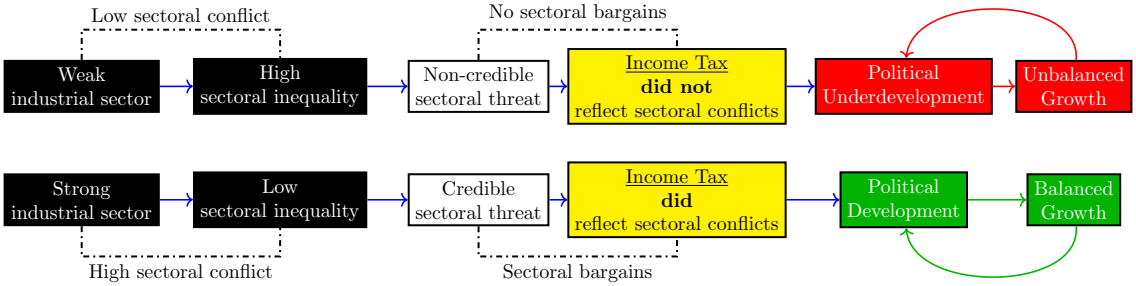


**Figure 1:** *Causal Mechanism*

others. All these tasks shared important *technical complementarities*[5] with other state activities, such as solving land disputes, dispensing justice, providing infrastructure, etc. Hence, the crux of this portion of the argument is that tax collection rose the capacity utilization of the bureaucracy regarding other state tasks.

On the other hand, the mechanism also contends that the context under which countries implemented the income tax law, was an important critical juncture for the foundation of the Latin American states. While virtually all countries in the region imposed the tax, it only fostered state development when it was implemented under circumstances of high sectoral conflict. The nature of the conflict had to do with the sectoral losses or gains associated with fiscal expansion. Since taxation has affected landowners and industrialists in different ways,[6] economic elites have systematically been divided on their preferences towards fiscal policy,[7] and consequently, state centralization. As land fixity increases the risk premium of their main asset, agriculturalists have typically resisted taxation.[8] In contrast, industrialists' preferences toward taxation have been more elastic as capital can be reinvested in nontaxable sectors.[9] This sectoral cleavage was more likely to resolve in favor of direct taxation when income inequality among the elites was low.[10] In fact, the emergence of the industrial sector, a sector which is highly dependent on infrastructure, caused industrial elites to be more willing to "pay" for those by imposing an income tax on themselves. Beramendi et al. [2016, 18] find that as industrialists depended more on infrastructure implemented at the local level such as roads, railroads and bridges, they "[*preferred*] to shoulder a higher tax burden through progressive direct taxation."

[5] This is "a situation where an increase in the output of [a] commodity [...] lowers the marginal costs of producing [other] commodity" (Hirschman [1958, 67]).
[6] Acemoglu and Robinson [2009, 289].
[7] See for example Llavador and Oxoby [2005].
[8] Robinson [2006, 512].
[9] Hirschman [1970] and Ronald Rogowski in Drake and McCubbins [1998, ch. 4]. However, see Bates and Lien [1985, 15].
[10] Tani [1966, 157] explains that the absence of "wealth groups" makes passing an income tax law easier.

Importantly, where both economic sectors were equally developed, both of their corresponding political elites had the same means—and leverage—to voice these strategic preferences about taxation.[11] Consequently, higher levels of inter-sectoral equality fostered the political incorporation of both sectors under politically egalitarian conditions. And given that the post-colonial legacies had reproduced the advantages of the landowning sector, the political incorporation of both economic elites was fundamental for state-making. In sum, the economic structural transformation characterized by the "secular decline of agriculture and substantial expansion of manufacturing"[12] imposed tight constraints on the way politics was run by the incumbent landowning class. Since industrialists had less negative attitudes towards taxation, sectoral incorporation played a big factor in state development, crystallizing a series of reforms that replaced the backwards post-colonial institutional order. However, where the sectoral conflict was too weak to trigger the political incorporation of industrial political elites, institutions kept reproducing the post-colonial order that benefited the landowning class. Even when the income tax law was implemented eventually in practically all Latin American countries, it did not reflect the sectoral fiscal conflict, which I argue was foundational for state-making. In these cases, the post-colonial institutional order was left unaltered, and the political advantages the landowning elites enjoyed since colonial times were preserved.

For instance, the implementation of the income tax law in Chile responded to endogenous sectoral domestic pressures, securing the political inclusion of both elites. The Chilean internal revenue service is among the finest tax institutions in Latin America. In contrast, Guatemala imposed the income tax law in 1963, and by 1967 the national income tax office employed 194 people, and only 9 of whom had graduated from college.[13] While Guatemala did implement the tax, the institution was not product of the inter-sectoral conflict. In fact, the law responded to exogenous factors, being imposed by the US-backed dictator Colonel Enrique Peralta Azurdia. As industrialists were too weak to pose any credible threats, landowners were never challenged. There were less pressures to implement an income tax, and the backwards post-colonial institutional order was reinforced. Next section explains the dual sector theory, focusing on how balanced growth happens, and why it is important for political development.

[11] For instance, Boix [2015] makes the case for similar military capacities. Under these circumstances, war was most likely to exhaust all existent assets without producing positive outcomes for either sector (Richard Salvucci in Uribe-Uran [2001, 48]).

[12] Johnston and Mellor [1961, 567].

[13] Di John [2006, 5].

# II. Structural Transformations and the Dual Sector Economy Model

> *When by the improvement and cultivation of land [...] the labour of half the society becomes sufficient to provide food for the whole, the other half [...] can be employed [...] in satisfying the other wants and fancies of mankind*
>
> Smith [1904, I.11.59]

The *dual sector* or *balanced growth* model explains the mechanics of modern economic growth[14] by emphasizing the importance of macro-structural gradual transformations. The theory argues that the economy is divided into two sectors loosely defined as 'advanced or modern sector' or 'manufacturing sector,' and 'backward or traditional sector,' or 'agriculture.'[15] The basic intuition of this paradigm is that in order for the industrial sector to develop it needs *first* an efficient and strong agricultural sector. As I explain later, contingent on efficient agricultural productivity, the industrial sector rises its productivity relative to the agricultural sector's. If the agricultural sector lacks economic efficiency, the industrial sector hardly develops, leading to a stagnant economy. This literature is vast. While this section explains just the core, there are many current theoretical and methodological applications and extensions of the dual sector model. Just to name a few, Thirlwall [1986], Mathur [1990], Hatton and Williamson [1991], Blunch and Verner [2006], Tiffin and Dawson [2003], Kanwar [2000] and McArthur and McCord [2017] study sectoral growth, shock persistence, and other related topics using the same theoretical framework and methodology I employ in this paper (or some variation of it). Notably, Ansell and Samuels [2014] use this model in political science to explain democratization.

It was Lewis [1965, 151] who popularized the idea that "[t]he secret of most development problems is to maintain a proper balance between sectors." The dual nature of the economy has been widely accepted and forms part of "a long tradition in development economics."[16] And while dichotomizing the entire economy in just two sectors might sound as too much of an oversimplification, I follow Dixit [1973, 325] in that the dual economy model provides a significantly better description of the

[14] Gollin et al. [2002, 160].

[15] Jorgenson [1961, 311]. Importantly, I follow Kuznets [1967, 87] in that "mining is combined with [...] industry because of the large scale of its productive unit, its close connection with manufacturing, and the distinctive trend in its share in product and resources." Similarly, Debowicz and Segal [2014, 237] includes mining within the industrial sector.

[16] Kelley et al. [1972, 8].

economy because "it reflects several vital social *and* economic distinctions."[17] Johnston and Nielsen [1966, 280] also explain that "[t]he reality found in most underdeveloped countries approximates this dichotomy [...] sufficiently." In fact, Lindert and Williamson [1985, 354] explain that the dual-sector model is "the dominant paradigm used by Third World observers." However, "balanced growth is almost axiomatic as a desirable objective, for both developed *and* under-developed countries."[18] For example, Bergquist [1986, 8] explains that "Colombia's two traditional political parties crystallized in the 1840's and reflected in many respects the dual nature of the Colombian economy." While this is a stylized model, Dixit [1973, 326] is right in that a "major drawback of dualistic theories [...] is the total neglect of the service sector." However, the literature is consistent in that the third sector necessarily develops *after* the industrial sector is developed.[19]

Economic development depends on the emergence of the industrial sector which in turn depends on the development of a productive agricultural sector.[20] As Kuznets [1961, 59] puts it, "economic growth is *impossible* unless there is a substantial rise in product per worker in the agricultural sector."[21] Similarly, Hayami and Yamada [1969, 105] argue that "[i]ndustrialization and modern economic growth are basically *conditioned* by the level of agricultural productivity."[22] There are two main reasons for why agricultural development is a prerequisite of industrial development: efficient agricultures are more likely to supply the industrial sector with cheap foodstuff and cheap labor. In Johnston [1951, 498]'s words, "[e]xpanded agricultural productivity releases people from the land for employment in industry [and] provides food for the growing population." If the expansion of the agricultural sector is compromised, it will necessarily compromise the expansion of the industrial sector as well.[23] The political correlate of the inter-sectoral dependence proposed in this framework is that a weak inter-sectoral structure (e.g. a lack of structural complementarity) will truncate the emergence of a strong political challenger (industrialists) able to contest the landed elites. I contend that inter-elite contestation is important for political development. As Hechter and Brustein [1980, 1085] explain, "state formation will be more likely to the degree that powerful individual actors form two groups on the basis of divergent economic and political interests." Here I explain how these sectoral dynamics helped to form the Latin American state, fostering economic growth as well.

The first reason for why a productive agricultural sector is key to industrial development is that

[17] Emphasis is mine.
[18] Streeten [1959, 169]. Emphasis is mine.
[19] Galenson [1963, 506-507, 513] and Baer and Herve [1966, 95-96].
[20] Johnston and Mellor [1961, 567] argue that this process "seems to be a necessary condition for cumulative and self-sustaining growth."
[21] Emphasis is mine.
[22] Emphasis is mine.
[23] In fact Landon-Lane and Robertson [2003, 2] find that an important source of growth in developing economies is "derived through the reallocation of resources [particularly] by drawing labour moving out of traditional sector employment into the modern sector."

more efficient agricultural techniques make agricultural production less labor intensive, allowing landowners to free workers which the industrial sector can rely on. The need for an improvement in agricultural production as a necessary step prior to industrialization "has been termed the 'prerequisite' hypothesis."[24] Technologies such as "crop rotation, pest control, seed breeding [and] fertilizer use [represent] the major potential source of agricultural labor productivity,"[25] increasing also "non-agricultural value added per worker."[26] Nicholls [1961, 339-340] shows that advanced industrial countries initially had relatively more developed and productive agricultural sectors. In fact, Gallo [1991, 57] finds that in Bolivia, *a primarily agricultural economy*, "[t]he tools employed in production were few and rudimentary, the use of fertilizers was minimal, and methods for conservation of the soil were practically unknown until the beginning of the 1950s." However, highly industrialized countries such as Japan, the U.K., the U.S.S.R. and Taiwan adopted *prior industrialization* very efficient agricultural technologies such as higher-yielding varieties, fertilizers and other activities that improved farm practices.[27] In fact, Serrano and Pinilla [2016] find that in Latin America there has been a declining role of agricultural exports as industrialization levels have increased.

Surplus of labor naturally leads to a reallocation of redundant workers into the industrial sector, which is the crux of economic development.[28] Nurkse [1953] in fact argues that development *means* to employ the surplus labor.[29] The literature coincides in that the 'natural' role of the agricultural sector is to provide labor to the industrial sector.[30] For example, Dixit [1973, 326] argues that the "agricultural sector *must* fulfill [...] its dual role of supplier of labour to industry and of food for the industrial labour force."[31] While Lewis [1954] in his canonical work argued that there existed an "unlimited" supply of agricultural labor, a word of caution is in order. The meaning of the supposedly "unlimitedness" of labor should *not* be taken literally as in reality means *redundant labor force*.[32] In fact, Nurske [1961, 225] points out that the concept "is commonly used to denote all types of rural unemployment."[33]

[24] Kelley et al. [1972, 133].
[25] Ranis and Fei [1964, 62].
[26] McArthur and McCord [2017].
[27] Johnston and Mellor [1961, 571] and Johnston [1951, 507-508]. Similarly Caselli [2005, 723] explains that poorer economies have inefficient agricultural sectors which at the same time are the mayor source of employment.
[28] Ranis and Fei [1964, 7] and Leibenstein [1957b, 51].
[29] Similarly, Matsuyama [1991, 621-622] points out that "[i]ndustrialization [*consists of*] a shift of resources from agriculture to manufacturing."
[30] Ranis and Fei [1964, 114] argue that "labor reallocation [...] is the *inevitable* and *natural* consequence of the continuous expansion of agricultural labor productivity." Emphases are mine.
[31] Emphasis is mine.
[32] See Ranis and Fei [1964, 203] and Jorgenson [1967, 289].
[33] Or as Leibenstein [1957a, 102-103] puts it, "where the existing labor supply could cultivate more land without loss of efficiency." In any case, Sen [1966] explains that a number of important predictions made by the dual sector model do not need this assumption to hold for the model to work. On a separate note, Ranis and Fei [1964, 99], Skott and Larudee [1998, 280] and Fields [2004, 730] argue that a pool of *redundant* agricultural workers (a "reserve army")

The second reason for why a productive agricultural sector is key to industrial development is because efficient techniques in agricultural production are able to supply cheaper foodstuff.[34] "It is *self-evident* that without increasing food output, the capitalist sector must remain in a stationary state."[35] Food surplus is a direct consequence of efficiency, and it is just as important as labor reallocation. In sum, as Kuznets [1961, 60] explains it, if "output per worker in agriculture does not rise substantially, economic growth in the first case will be stopped by scarcity of agricultural products, and in the second case by scarcity of labour."

I argue that balanced economic growth is important for political development because it fosters a *level* 'playing' political field. When the economy is structured in a way where both economic sectors are mutually dependent, each sector's corresponding political arm has the same military resources and similar access to other bargaining assets, fostering inter-elite cooperation. As section III explains, higher relative levels of dependence on public infrastructure of the industrial sector promoted the implementation of the income tax. In turn, following the fiscal sociology paradigm,[36] I contend that the tax was a state-*making* institution, particularly when the preferences of both elites were incorporated into this institution important for state-building.[37] However, *un*balanced economic growth promoted an *unleveled* 'playing' political field. Following the inertia of post-colonial institutions, unbalanced growth helped with the persistence of the advantaged position of the landed elites. The income tax when implemented did not necessarily reflect the foundational sectoral-economic cleavage, and the incentives of having an efficient income tax were low. Since industrial elites were too weak to pose credible threats to agricultural incumbents, the equilibrium was to rely on import taxes, compromising both state expansion in the long-run and long-term economic growth.

## III. Dualism in Chile: A Brief Illustrative Case

Historically, agriculturalists had been a hegemonic group protected by norms and institutions that originated in colonial times. Those norms had survived due to institutional inertia, perpetuating the advantaged position of the landed elites.[38] Collier and Collier [2002, 106] argue that the "national

is what prevents a rise in industrial wages.

[34] See Jorgenson [1961, 312] and Ranis and Fei [1964, 157].

[35] Ohkawa [1961, 21]. Emphasis is mine.

[36] For a review, see Martin and Prasad [2014].

[37] I agree with Kurtz [2009, 484] in that "the incorporation of upper-class actors into the national political system is crucial to enabling cooperation in state building and public-goods provision activities, despite whatever other cleavages might divide them."

[38] This idea also applies for Mexico. "The principal source of [Mexico's] wealth was not its mines, Humboldt noted, but agriculture." Amaral and Doringo, in Uribe-Uran [2001, 13].

government was dominated by [...] owners of large agricultural holdings."[39] Similarly, while Zeitlin [1984, 13] explains that "landowners controlled both the vote and the labor power of the agrarian tenants [and] peasants [...] and this was the *sine qua non* of their continuing political hegemony," Baland and Robinson [2008, 1748] explain that "[c]ongressional representation was heavily weighted in favor of rural districts." In the presidency also, landowners were the single most represented group.[40]

Historians still debate whether agriculturalists and industrialists comprised two *different* elites. Some claim that this dualism is incorrect.[41] They argue that since landowners also invested in industry,[42] there was a blurry class division between the mining, banking and agricultural sectors.[43] Perhaps the most cited reference regarding this issue is Veliz [1963, 231-247]. I contend that there are a series of stylized facts that strongly suggest that there was indeed a structural economic cleavage which led to the consolidation of two separate sectors. First of all, there were certain practices that mask the existence of a sectoral dualism. For example, it was common that industrialists invested in real state. However, in many instances they did so *just* to obtain credit. Kirsch [1977, 59] explains that "in a *rural society* land offered one of the best guarantees for loans [since] loans could not be secured by equipment, machinery, or inventory. Only real estate was acceptable collateral."[44] In fact, this practice shows how the credit system was oriented to give unfair advantage to the landed elites. Similarly, Zeitlin [1984, 174] finds 'the combined ownership of capital and landed property was a distinctive quality of *certain* [elites] actors,'[45] not something that was generalizable to *the* elites. There were also other instances where miners invested in banking. Yet, Segall [1953] argues that Chilean bankers, after the crisis of the mining sector around the 1870s, had acquired a number of mineral deposits given as collateral years before. Similarly, but for the Argentinean case, Hora [2002, 609] explains that 'the image of an entrepreneurial elite with assets *scattered throughout several spheres of investment* does not appear entirely correct.'[46] In fact, Freeman and Quinn [2012] explains that while most political development theories run short due to their purely domestic nature, asset diversification constitutes a later development "in international markets [roughly after 1980]."

[39] See also McBride [1936, 15] who argues that "Chile's people live on the soil. Her life is agricultural to the core. Her government has always been of farm owners. Her Congress is made up chiefly of rich landlords. Social life is dominated by families whose proudest possession is the ancestral estate."

[40] Bauer [2008, 45].

[41] See for example Mamalakis [1976, 125].

[42] Kirsch [1977, 57, 95] who cites Bauer [2008]. See also Coatsworth and Williamson [2002, 23] argue that "[t]he only landowners that mattered in 19th century Latin American politics were those for whom land represented but one asset in a much broader portfolio." In the same vein, Bauer [2008, 180] argues that "[m]iners and merchants bought haciendas but landowners in turn invested in banks, insurance companies, commercial firms and the incipient industrial sector."

[43] Bauer [2008, 30, 44, 94, 108].

[44] Emphases are mine.

[45] Emphasis is mine.

[46] Emphasis is mine.

In addition, I find here that the agricultural sector's role in the economy is to supply labor to the industrial sector, limiting agriculture's expansion relative to industry's growth,[47] evidencing the lack of incentives of crossed investments. I contend that the nature of the main factors of production of agriculturalists and industrialists (land v. capital), in addition to their preferences over fiscal policy, produced a strong sectoral cleavage. I find little evidence in this paper in favor of the conventional wisdom, e.g. elites in Chile had one single fracture, particularly, regarding the role of the state versus the catholic church on society.

Agricultural hegemony promoted biased public investments. For instance, the existent public infrastructure mostly benefited the agricultural sector.[48] However, lower levels of inter-elite inequality (granted by industrial expansion) posed credible threats to Chilean agricultural elites. Initially, both elites confronted each other in two civil wars. Zeitlin [1984, 23] argues that the civil wars challenged a "large landed property [elite against a] productive capital [elite]." Importantly, lower levels of inequality allowed both elites access to similar military capacities. For instance, while *Balmacedistas* managed to secure the support of the army, *congresistas* (the anti-Balmaceda group) gathered support from the navy. However, war was not sustainable over time. For example, there were a number of *aborted* coups in 1907, 1912, 1915 and 1919,[49] suggesting an equilibrium where no elite had more capacities than the other elite. The requirement of better public investments for Chilean industrialists forced both the agricultural and industrial elites to reach political compromises. The keystone of these inter-elite compromises was the implementation of the income tax. In 1924, industrial elites accepted to be income taxed by agriculturalist incumbents in exchange of having more *state services* and being included in state politics. As others have explained, the non-agricultural sector "accepted taxation, *while demanding state services and expecting to influence how tax revenues were spent* [...] *Consultation and cooperation were relatively institutionalised between the two sides.*"[50] This is why the expansion of political rights *among the elite* and the rise of the industrial sector share the same timing. As Collier [1977, 683] has pointed out, "the real story of Chilean industrialization belongs to the Parliamentary period" (1891-1925).

The tax was not only important because of the new revenue it collected, however. While Humud (1969, p. 154) explains that the income tax generated considerable resources for the Chilean treasury,[51] following the fiscal sociology paradigm, the tax was important because it replaced the old institutional order, promoting state-making as well. Musgrave [1992, 99] argues that since taxation

[47] Bahamonde [2017].
[48] For example, Zeitlin [1984, 41] explains that "the Montt regime did invest in the construction of Chile's railways but only in the Central Valley and south-central zones [b]ut there was no public investment [...] in railroads built in the Norte Chico mining provinces."
[49] Collier and Collier [2002, 109].
[50] Carmenza Gallo, in Brautigam et al. [2008, 165]. Emphases are mine.
[51] Bowman and Wallerstein [1982, 451-452].

(especially on incomes) requires such a high degree of state penetration, public finances offer the key for a theory of state-building. Indirect taxes are easier to levy, and hence this kind of revenue is generally considered "unearned income"[52] or "easy-to-collect source of revenues."[53] Given the relatively lower costs states have to incur to collect them, indirect taxes have a very low impact on state-building.[54] For example Krasner [1985, 46] explains that "tariffs and export taxes are easier to obtain than direct taxes, which require high levels of bureaucratic skill and voluntary compliance." In fact, when early Latin American states depended heavily on trade taxes, the state apparatus tended to be less developed.[55] Since customs administrations have always been concentrated in a few critical locations, especially ports, tariffs and customs duties did not require an elaborate fiscal structure.[56]

The very implementation of the income tax produced a secular accumulation of know-how, particularly, of better technologies able to monitor individual incomes. Unlike 'regular' institutions, income taxation infiltrates the state's coercive sovereignty unto the individual itself. Not only observing individual economies, but transforming them into public property is what fostered state expansion.[57] This argument goes in line with Besley et al. [2013] who explain that implementing the income tax law is "associated with investments in public administrative structures that support tax collection" in a number of countries, including Chile. I contend that the knowledge and expertise the state accumulated were transfered to other state institutions via spillovers, augmenting the overall levels of *stateness*. For instance, it was necessary to send official emissaries to check on accounting books of the refinery in the north, the winery in the central valley and the *hacienda* in the south. Eventually, these delegations became more complex, increasing the density of state presence in the territory. For instance, Strayer [2005] explains how official state delegations traveled the territory dispensing judicial decisions, fostering state centralization. Also, Dincecco [2015] explains that states became effective organisms upon centralizing a system of direct taxation and implementing some kind of checks-and-balances system. Others find that the *introduction* of the income tax is associated with state expansion too. For instance, Dincecco and Troiano [2015, 3] find "a positive and significant relationship between the introduction of the income tax and (1) per capita total expenditures, (2) per capita education expenditures, and (3) per capita health expenditures." Analytically, the *effectiveness* of income taxation on fiscal *capacities* increased due to

[52] Moore [2004b, 304].
[53] Coatsworth and Williamson [2002, 10].
[54] Moore [2004a, 14].
[55] Campbell [1993, 177].
[56] Bertola and Ocampo [2012, 132].
[57] Musgrave [1992, 98] and Moore [2004b, 298]. While Kurtz [2009, 2013], Soifer [2015] situate the relevant state-building critical juncture at the end of the colonial period, before the class compromises I identify in this paper, I argue that the implementation of the income tax was an important building block in this process.

the nature of the implementation of the income tax. Aghion et al. [2004, 566] explain how optimal institutional choices result from political settings where all involved actors "had a voice in the choice of institutions," essentially contributing to an equilibrium of quasi-voluntary compliance.[58]

## IV. Time Series Analyses: Vector Autoregressive Models and Granger Causality Tests

> *what a sector does is not fully attributable or credited to it but is contingent upon what happens in the other sectors*
>
> Kuznets [1961, 41]

> *Structural change is clearly an endogenous process, driven by a variety of economic forces [...] also in the statistical sense*
>
> Temple and Wößmann [2006, 212]

**Granger-causality Tests** The theory should pass a number of tests. Before the emergence of the industrial economic sector and their corresponding political elites, the landowning elites enjoyed the advantages of the post-colonial order, generating economic growth in a way that mostly benefited the agricultural sector. However, in cases where the industrial sector was strong enough to pose credible threats to the political system controlled by the landed elites, we should see a reversal of the political order. Institutional change is depicted with the implementation of the income tax law, which was particularly important for industrial development. As the Chilean case illustrates, industrial elites were willing to implement an income tax on themselves in exchange of the delivery of local public goods and access to state politics. In this section I show evidence of how the incorporation of the industrial elites changed the institutional order, fostering economic growth of *both* sectors (balanced growth). Empirically, in the first set of cases we should see that the agricultural sector grew *at expenses* of the industrial sector *both before and after* of the implementation of the income tax. However, in the second set of cases we should see that *after* the income tax was implemented there was a *reversal* of the flow of inputs, generating growth *from* the agricultural sector *to* the industrial sector (balanced growth). Importantly, in these countries the industrial sector did not grow *at*

[58] Levi [1989].

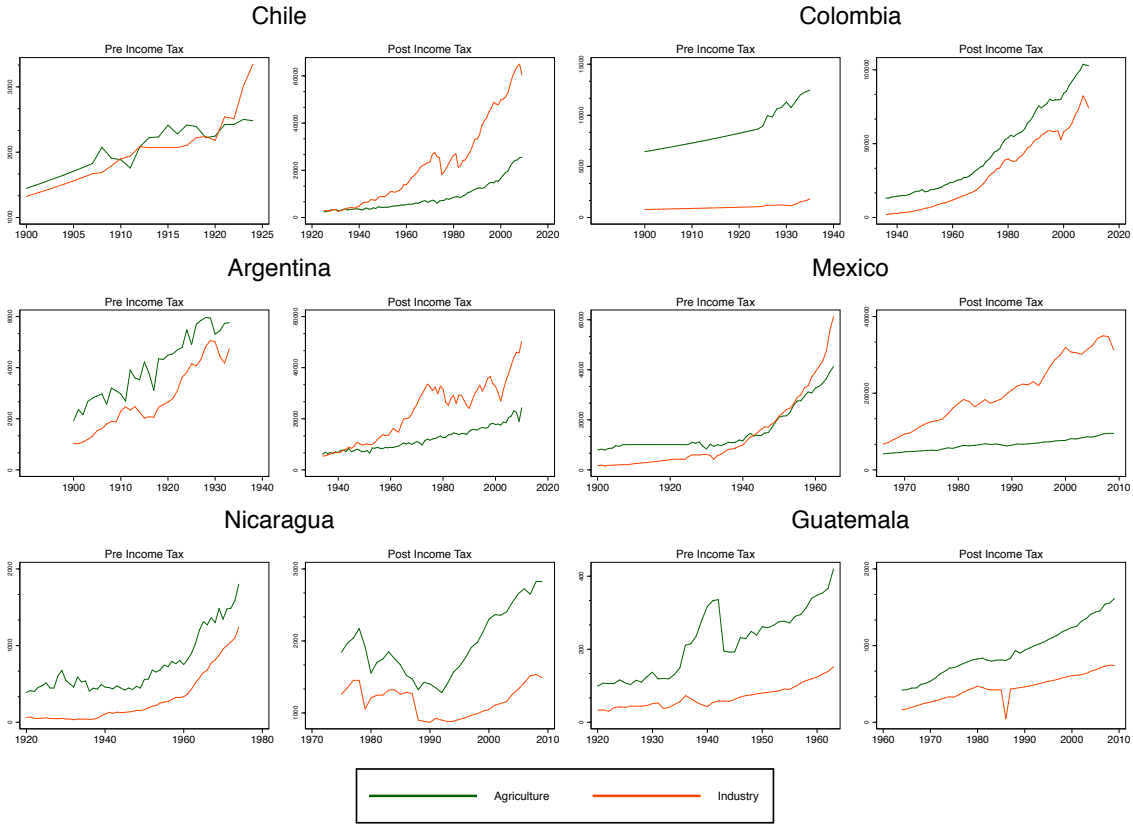


**Figure 2:** *Sectoral Outputs Before and After the Implementation of the Income Tax Law*

*expenses of* agricultural development but *because of* agricultural development. In econometric terms we should see that the income tax reversed the way in which one sector 'Granger-caused' the other.[59]

I utilize the MOxLAD data, particularly the *agriculture value-added* and *manufacturing value-added* variables.[60] The dataset spans from as early as 1900 to as late as 2009.[61] Table A1 specifies the country-specific available time spans. Using secondary sources, the table also states *when* the income tax was implemented, what the law was and its corresponding source(s).[62] Following Mahoney [2010, 5] I consider two 'advanced' economy countries (Chile and Argentina), two 'intermediate'

[59] Lutkepohl [2006, 42] explains that if some variable $X$ forecasts variable $Y$ (and not vise versa), $X$ is said to 'Granger-cause' $Y$. According to Granger [1980, 349], this concept of 'causation' is based on the idea "that the future cannot cause the past." See also Durr [1992, 197] for a similar definition. Both Beck [1992, 241] and Angrist and Pischke [2008, 237] Granger-causality is not really *causal*.

[60] The former measures "the output of the sector net of intermediate inputs and includes the cultivation of crops, livestock production, hunting, forestry and fishing." The later "[r]eports the output of the sector net of intermediate inputs."

[61] According to Astorga et al. [2005, 790], this dataset provides extended *comparable* sectoral value-added series in constant purchasing power parity prices.

[62] Some countries implemented some kind of income tax before, however these laws lacked enforcement, they were weak or not at all followed. In Table A1 in the Appendix section I establish the year that the literature seems to agree for when the law was implemented and properly enforced.

countries (Mexico and Colombia) and two 'less advanced' countries (Guatemala and Nicaragua). Figure 2 shows the sectoral outputs for each country, both before and after the income tax law was implemented. The econometric analyses in this section intend to recover Mahoney's typology, linking the mechanics of economic development with fiscal expansion. I expect *advanced* countries to have *balanced* economic growth *after* the implementation of the income tax, and *less advanced* countries to have *unbalanced* economic growth *both* before *and* after the implementation of the tax (null results in favor of a reversal in sectoral Granger-causation).

In Table 1 I test for Granger-causality both prior and after the implementation of the income tax law.[63] The results strongly suggest that in *advanced* countries, particularly Chile, Colombia and Mexico, the implementation of the income tax was associated with the reversal of economic backwardness institutions that promoted unbalanced economic growth. In these cases, before the income tax law, industrial growth Granger-caused agricultural growth, but after the income tax law, the agricultural sector Granger-caused industrial development (all p-values are significant at the .05 level).[64] These results suggest that the implementation of the income tax was associated with the reversal of the economic structure, going from an economic backwardness equilibrium to a balanced growth equilibrium. I interpret this change in the mechanics of economic growth as the overthrowing of the political institutions and practices that permitted agricultural expansion at expenses of the modern sector. Following the fiscal sociology literature, I contend that when the income tax was implemented under contexts of sectoral contestation this institution fostered the expansion of state institutions. In turn, these kinds of institutions set in motion a path of long-term economic development (Figure 1).[65] In Nicaragua and Guatemala, however, the tests suggest the exact opposite (all p-values are significant at the .05 level).[66] The implementation of the income tax in these countries did *not* reverse the initial economic backwardness equilibrium. I contend that when implemented, the tax did not reflect the inter-sectoral economic cleavage proper of contested political economies. The industrial sector never had enough economic leverage to politically confront the landowning elite and hence industrialists never posed credible threats to the status quo, relaxing the endogenous incentives to invest in state institutions. The Argentinian case is different. The Granger tests are inconclusive, and no significant results were found, suggesting a weak inter-sectoral cleavage structure.

**Vector Autoregressive Models (VAR) and Impulse Response Analysis (IRF)** Once we have determined the directionality of economic growth changes upon the implementation of the

[63] Specifically, the tests were computed after estimating the reduced form VAR specified in Equation 1.
[64] Except for the Mexico after the implementation of the income tax (p-value = .06).
[65] See especially next section.
[66] Except for the pre income tax period test of Guatemala, which is significant at the .1 level.

| Country | Pre/Post Income Tax | Sample | Directionality | chi2 | P-value |
|---|---|---|---|---|---|
| Chile | Pre | 1905 - 1924 | Agriculture → Industry | 3.55 | 0.47 |
| | | | Industry → Agriculture | 12.13 | 0.02 |
| | Post | 1928 - 2009 | Agriculture → Industry | 11.92 | 0.00 |
| | | | Industry → Agriculture | 5.37 | 0.07 |
| Colombia | Pre | 1902 - 1935 | Agriculture → Industry | 4.96 | 0.03 |
| | | | Industry → Agriculture | 10.44 | 0.00 |
| | Post | 1938 - 2009 | Agriculture → Industry | 4.32 | 0.04 |
| | | | Industry → Agriculture | 1.63 | 0.20 |
| Argentina | Pre | 1903 - 1933 | Agriculture → Industry | 4.19 | 0.12 |
| | | | Industry → Agriculture | .42 | 0.81 |
| | Post | 1937 - 2010 | Agriculture → Industry | .18 | 0.91 |
| | | | Industry → Agriculture | 1.37 | 0.50 |
| Mexico | Pre | 1902 - 1965 | Agriculture → Industry | .73 | 0.39 |
| | | | Industry → Agriculture | 11.57 | 0.00 |
| | Post | 1969 - 2009 | Agriculture → Industry | 5.56 | 0.06 |
| | | | Industry → Agriculture | 1.32 | 0.52 |
| Nicaragua | Pre | 1923 - 1974 | Agriculture → Industry | .48 | 0.79 |
| | | | Industry → Agriculture | 6.83 | 0.03 |
| | Post | 1977 - 2009 | Agriculture → Industry | .014 | 0.91 |
| | | | Industry → Agriculture | 4.96 | 0.03 |
| Guatemala | Pre | 1924 - 1963 | Agriculture → Industry | 2.18 | 0.54 |
| | | | Industry → Agriculture | 6.72 | 0.08 |
| | Post | 1966 - 2009 | Agriculture → Industry | .58 | 0.45 |
| | | | Industry → Agriculture | 6.05 | 0.01 |

**Table 1:** *Granger Causality Wald Tests*

income tax law only in countries where the industrial sector was strong enough to challenge the agricultural status quo, it is necessary to establish the inter-sectoral long-run economic equilibrium. This section tests whether the implementation of the income tax is associated with long-run economic development, and how/if this relationship is associated with fiscal expansion. Given that the implementation of the income tax reflected a number of inter-elite political compromises, I expect this institution to have caused deeper state development, fostering long-run economic growth. In non-advanced cases, the tests should show null results.

The study of the sectoral component of economic growth is an endogenous one.[67] If this endogeneity is not accounted for, the error term and the regressors will be correlated, and so OLS will be inconsistent. Additionally, growth rates are usually integrated. Integrated series are processes whose deviations from the mean tend to persist, cumulating or growing in time. In addition to that, integrated vectors that are mutually endogenous (like industrial and agricultural growth) imply a 'cointegrated' CI(1) relationship, imposing additional statistical restrictions. While the economic literature generally coincides in that economic growth is an I(1) process and that sectoral development is a CI(1) process, these are assumptions that should be tested. The first step is to find strong evidence of integration in each of the series. Table A2 shows several unit root tests.[68] The table indicates that all variables, periods, sectors and countries have I(1) processes, satisfying one important assumption of CI(1) vectors. The second step is to find evidence of cointegration.[69] Substantively, cointegration means that there is a long-lasting mutual inter-sectoral economic *dependence*, allowing *both* sectors to grow in a balanced fashion. Lack of evidence in favor of cointegration implies a relationship of economic backwardness between the two sectors. Consequently, I expect to find evidence of cointegration only in "developed" cases.[70] Following Johansen [1988], Table 2 indicates that all "developed" and "semi-developed" countries have cointegrated series, while "less developed" countries do not have cointegrated series,[71] suggesting that industrialists in "developed" and "semi-developed" countries were able to pose enough credible threats to agricultural incumbents, challenging the post-colonial institutional order and causing long-term economic growth. Less developed countries in turn lacked of an economic/political sectoral-based conflict, and consequently the political order beneficial for the landed elites remained unchallenged, compromising long-term economic growth.

To estimate the relationship of long-run inter-sectoral economic growth I use the vector-autoregressive (VAR) approach specified in Johansen [1988] which is estimated via MLE and not requiring the specification of the number of cointegrated vectors (as opposed to error correction models).[72] Formally, I fit Equation 1 in differences, one per country, both before and after the income tax law was passed.[73]

[67] Tiffin and Dawson [2003, 33].

[68] I show the test statistic and its associated MacKinnon approximate p-value in parenthesis for the ADF and Phillips-Perron tests. Both trend and drift were tested in all tests, when applicable. As I did not find any differences, I show the test statistic with no trend nor drift and one lag. The lags in the KPSS test were selected via an automatic procedure. "†" indicates that the test is barely significant or non-significant.

[69] I use VAR regressions, which do not necessarily need cointegrated vectors (see Box-Steffensmeier et al. [2014, 161, 164]). Cointegration, however, is important from a substantive standpoint in this paper.

[70] Given that the maximum number of cointegrated vectors in bivariate cointegrated series is 1, I only test for the minimum number of cointegrated relationships. See Box-Steffensmeier et al. [2014, 165].

[71] Since I am interested in the long-run equilibrium, I do not split the sample before and after the implementation of the income tax.

[72] Box-Steffensmeier et al. [2014, 164].

[73] For simplicity, the VAR equation is in reduced form.

| Country | Number of Cointegrated Vectors (rank) | Restrictions | Lags | Log-Likelihood | Trace |
|---|---|---|---|---|---|
| Chile | at least 1 | Restricted Constant | 5 | -1665.9736 | 0.3799 |
| Argentina | at least 1 | Restricted Constant | 3 | -1802.292 | 4.7657 |
| Colombia | at least 1 | Restricted Trend | 2 | -1805.6773 | 10.0076 |
| Mexico | at least 1 | Restricted Constant | 4 | -1978.1322 | 1.0274 |
| Nicaragua | 0 | Restricted Constant | 2 | -1020.221 | 11.5297 |
| Guatemala | 0 | Trend | 3 | -859.2802 | 16.5493 |

**Table 2:** *Johansen Tests for Cointegration: Complete Series*

$$\begin{aligned} \triangle M_{t_m} = &\quad \alpha_m + \beta_m \triangle M_{t-l} + \beta_m \triangle A_{t-l} + \epsilon_{t_m} \\ \triangle A_{t_a} = &\quad \alpha_a + \beta_a \triangle M_{t-l} + \beta_a \triangle A_{t-l} + \epsilon_{t_a} \end{aligned} \tag{1}$$

Notice that in both lines the different dependent variables are expressed as a function of the *same* set of lagged independent variables. Since the number of lags $l$ varies by country *and* time-span (i.e. before/after the income tax law), Equation 1 is in standard form. Table A3 describes the optimal lag structure per each country regression.[74]

Given that "it is often difficult to draw any conclusions from the large number of coefficient estimates in a VAR system,"[75] econometricians usually turn to the analyses of *impulse response functions* (IRFs), which are derived from VAR analyses.[76] "Impulse responses trace out the response of current and future values of each of the variables to a one-unit increase in the current value of one of the VAR errors."[77] Figure 3 shows four panels for each of the six countries, one for the response of agriculture to industrial growth (left column), one for the response of industrial growth to agricultural growth (right column), both before (top row) and after (bottom row) the implementation of the income tax. I expect the income tax to reverse the traditional institutional order and be associated with a path of long-run economic growth only in politically 'developed' countries. Lack of sustained balanced economic growth upon the implementation of the income tax indicates that this institution did not emerge out of the sectoral cleavage, leaving the colonial backwards economic order unaltered. The X-axis is expressed in years. The Y-axis is not growth,

[74] The next information criteria were used to determine the appropriate lag length: final prediction error, AIC, Schwarz's Bayesian information criterion, Hannan and Quinn criterion as well as the corresponding likelihood-ratio test statistics. The same criteria are used to compute the optimal lag length in Table 2. The table also shows a summary of different post-estimation tests when the optimum lag length specified in the table was used. A check mark indicates that the tests was passed successfully, a check-minus mark indicates that the test was passed somewhat successfully, and a cross mark denotes failure to reject specification problems. Detailed results are available upon request.

[75] Lütkepohl and Krätzig [2004, 159].

[76] The raw VAR regression tables are available upon requests.

[77] Stock and Watson [2001, 106]. See also Lütkepohl [2005, 51].

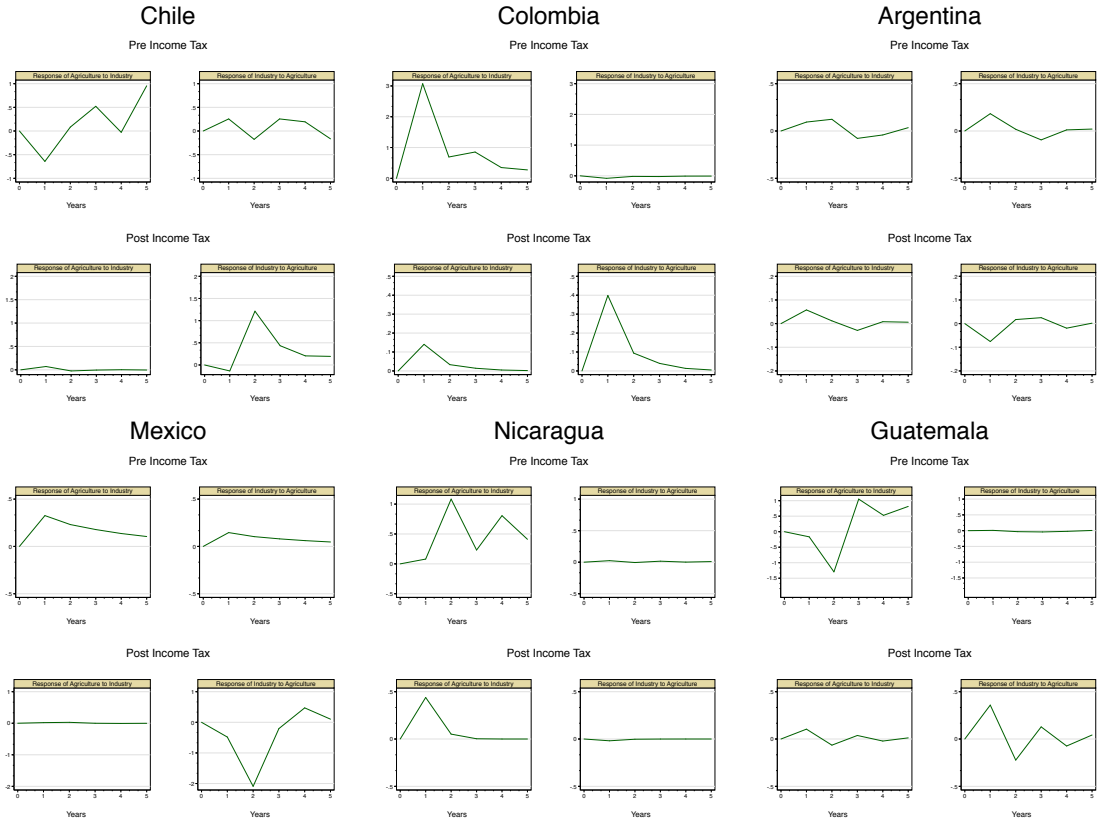


**Figure 3:** *VAR Impulse Response Functions: Sectoral Responses to Each Other's Growths*

but response to equilibrium. That is, the reaction of one sector once the other one is shocked.[78]

Figure 3 suggests that all 'developed' countries switched from an economic backwardness equilibrium to a modern economic growth strategy after the income tax was implemented, indicating a change in the institutional order. For example, a shock to industrial growth in Chile before the tax has a positive and increasing effect on agriculture. However, after the income tax is adopted, a shock on industry has a negligible effect on agricultural output. This suggests that the political institutions before the tax were oriented to channel all economic resources in a way that advantaged the agricultural sector and the landed elites. This equilibrium is reversed after the income tax law, one that of long-term balanced economic growth. Colombia and Mexico show similar patterns. While the analyses on the Argentinean case suggest that there is a long-term inter-sectoral relationship (Table 2), according to Figure 3 and Table 1 this relationship is weak, indicating weak inter-sectoral complementarity. Nicaragua and Guatemala are the prototypical backward cases. Their economies

[78] That is why the "shape of the [IRFs] indicate [...] the dynamic responses of the variables [and since the variables] are I(0) the impulse responses [...] should converge to zero" (Enders [2014, 364]).

were designed to develop the agricultural sector completely at expenses of the industrial sector. This goes in line with the null findings of cointegration in Table 2 and Granger-causality tests in Table 1. In these cases the effect of a shock to agricultural output on industrial output is zero both before and after the implementation of the income tax law, suggesting a situation of unbalanced economic growth, unbalancing also the development of agricultural political elites relative to the development of industrial elites. In both cases the implementation of the income tax did not reverse the initial economic backwardness equilibrium because when implemented, it did not reflect the inter-sectoral cleavage (because there was no cleavage). The lack of sectoral challenges and compromises left the traditional institutional order unaltered, preserving the political advantages the landowning elites enjoyed since colonial times.

## V. Discussion

Since colonial times agriculturalists had been a hegemonic group protected by the persistence of backwards institutions. This institutional unbalance promoted unbalanced economic growth. However, the emergence of the industrial sector imposed tight constraints on the way politics was run by the incumbent landowning class. The emergence of the industrial sector lowered the levels of inter-sectoral inequality making possible higher levels of inter-sectoral contestation, forcing industrial and agricultural political elites to make institutional agreements. I identify one such compromise, the implementation of the income tax. Leveraging the Chilean case I explain how and why the tax was relevant for industrial expansion. The crux of the argument explains how the context in which countries implemented the income tax law was a critical juncture, promoting or undermining long-term economic and political development. When the implementation of the income tax reflected the foundational sectoral economic cleavage, the tax expanded the overall state capacities, crystallizing a series of reforms that replaced the backwards institutional order, fostering long-term balanced/modern economic growth. In turn, balanced growth reinforced sectoral inter-dependence, precluding sectoral dominance of either political elite.

The Chilean case suggests that these compromises took place during the formative years of the state and during a period of structural indetermination, where neither elites had a clear economic, military, and political advantage. Industrial elites accepted to be income taxed in exchange of implementing public goods delivered at the local level. Public infrastructure was key for their continuous expansion. As others have argued, industrial elites preferred to impose the income tax on themselves rather than imposing trade taxes. In turn, and according to fiscal sociologists, the implementation of this institution was key for political development. Using time-series econometric

methods I find that when the sectoral cleavage was strong (cointegration), the income tax law promoted long-term economic growth (VAR models and IRF analyses). Balanced economic growth was important for political development. I explain how balanced growth secured egalitarian political conditions between the two elites.

..... ..... **Word count**: 10,534 ..... .....

# VI. Appendix

| Country | Available Data | Year Income Tax | Law | Source |
|---|---|---|---|---|
| Chile | 1900 - 2009 | 1924 | *Ley* 3996 | Mamalakis [1976, 20] and LeyChile.Cl (official) |
| Colombia | 1900 - 2009 | 1935 | *Ley* 78 | Figueroa [2008, 9] |
| Argentina | 1900 - 2010 | 1933 | *Ley* 11682 | Infoleg.Gob.Ar (official) |
| Mexico | 1900 - 2009 | 1965 | *Ley de Impuesto sobre la Renta* | Díaz González [2013, 130-133] and Diario Oficial (official) |
| Nicaragua | 1920 - 2009 | 1974 | *Ley* 662 | Legislacion.Asamblea.Gob.Ni (official) |
| Guatemala | 1920 - 2009 | 1963 | *Decreto* 1559 | Instituto Centroamericano de Estudios Fiscales [2007, 165] |

**Table A1:** *Sample, Data Available and Year the Income Tax was Implemented*

| Country | Time Frame | Sector | Augmented Dickey-Fuller | Phillips-Perron | KPSS | Conclusion |
|---|---|---|---|---|---|---|
| Chile | Pre | Agriculture | -1.185 (0.68) | -1.241 (0.66) | .107† | I(1) |
| | | Industry | 2.310 (0.99) | 2.556 (0.99) | .113† | I(1) |
| | Post | Agriculture | 4.557 (1.00) | 5.40 (1.00) | .289 | I(1) |
| | | Industry | 0.908 (0.99) | 1.458 (0.99) | .249 | I(1) |
| | All | Agriculture | 5.521 (1.00) | 6.722 (1.00) | .31 | I(1) |
| | | Industry | 1.582 (0.99) | 2.305 (0.99) | .314 | I(1) |
| Colombia | Pre | Agriculture | 2.709 (0.99) | 2.414 (0.99) | .204 | I(1) |
| | | Industry | 2.103 (0.99) | 3.257 (1.00) | .183 | I(1) |
| | Post | Agriculture | 2.392 (0.99) | 3.156 (1.00) | .282 | I(1) |
| | | Industry | 0.520 (0.98) | 1.044 (0.99) | .241 | I(1) |
| | All | Agriculture | 4.256 (1.00) | 5.893 (1.00) | .372 | I(1) |
| | | Industry | 1.674 (0.99) | 2.707 (0.99) | .374 | I(1) |
| Argentina | Pre | Agriculture | -0.849 (0.80) | -1.201 (0.67) | .0801† | I(1) |
| | | Industry | -0.495 (0.89) | -0.378 (0.91) | .115† | I(1) |
| | Post | Agriculture | 1.197 (0.99) | 1.093 (0.99) | .277 | I(1) |
| | | Industry | 0.228 (0.97) | 0.381 (0.98) | .0901† | I(1) |
| | All | Agriculture | 1.484 (0.99) | 1.401 (0.99) | .332 | I(1) |
| | | Industry | 1.007 (0.99) | 1.237 (0.99) | .183 | I(1) |
| Mexico | Pre | Agriculture | 4.601 (1.00) | 5.552 (1.00) | .288 | I(1) |
| | | Industry | 5.803 (1.00) | 10.776 (1.00) | .29 | I(1) |
| | Post | Agriculture | 0.599 (0.9876) | 0.497 (0.99) | .109† | I(1) |
| | | Industry | -1.255 (0.65) | -0.982 (0.76) | .113† | I(1) |
| | All | Agriculture | 3.431 (1.00) | 3.607 (1.00) | .341 | I(1) |
| | | Industry | 0.672 (0.99) | 2.020 (0.99) | .367 | I(1) |
| Nicaragua | Pre | Agriculture | 2.473 (0.99) | 2.355 (0.99) | .25 | I(1) |
| | | Industry | 4.958 (1.00) | 9.100 (1.00) | .244 | I(1) |
| | Post | Agriculture | -0.154 (0.94) | 0.154 (0.97) | .2 | I(1) |
| | | Industry | -1.237 (0.6577) | -1.176 (0.68) | .189 | I(1) |
| | All | Agriculture | 0.636 (0.99) | 0.759 (0.99) | .116† | I(1) |
| | | Industry | -0.164 (0.94) | -0.090 (0.95) | .123 | I(1) |
| Guatemala | Pre | Agriculture | -0.393 (0.91) | -0.343 (0.92) | .0639† | I(1) |
| | | Industry | 1.358 (0.99) | 1.704 (0.99) | .199 | I(1) |
| | Post | Agriculture | 1.786 (0.99) | 1.965 (0.99) | .162 | I(1) |
| | | Industry | -0.998 (0.75) | -1.352 (0.61) | .0915† | I(1) |
| | All | Agriculture | 3.349 (1.00) | 3.714 (1.00) | .321 | I(1) |
| | | Industry | 0.413 (0.98) | 0.017 (0.96) | .288 | I(1) |

**Table A2:** *Unit Root Tests for Agricultural and Industrial Growth*

| Country | Time Frame | Number of Lags | LM | Normally Tests | | | Stability Condition |
|---|---|---|---|---|---|---|---|
| | | | | *Jarque-Bera* | *Skewness* | *Kurtosis* | |
| Chile | Pre | 4 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Post | 2 | ✓ | ✓⁻ | ✓⁻ | ✓⁻ | ✓ |
| Colombia | Pre | 1 | ✓⁻ | ✗ | ✗ | ✗ | ✓ |
| | Post | 1 | ✓ | ✓⁻ | ✓⁻ | ✓⁻ | ✓ |
| Argentina | Pre | 2 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Post | 2 | ✓ | ✓⁻ | ✓ | ✓⁻ | ✓ |
| Mexico | Pre | 1 | ✓ | ✓⁻ | ✓⁻ | ✓⁻ | ✓ |
| | Post | 2 | ✓ | ✓ | ✓ | ✓ | ✓ |
| Nicaragua | Pre | 2 | ✓ | ✓⁻ | ✓⁻ | ✓⁻ | ✓ |
| | Post | 1 | ✓ | ✓⁻ | ✓⁻ | ✓⁻ | ✓ |
| Guatemala | Pre | 3 | ✓ | ✗ | ✓⁻ | ✓⁻ | ✓ |
| | Post | 1 | ✓⁻ | ✓⁻ | ✓⁻ | ✓⁻ | ✓ |

**Table A3:** *Lag Length and Post-Estimation Results*

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