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

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Abstract

Historically, agriculturalists were a hegemonic group protected by norms and institutions since colonial times. However, the emergence of the industrial sector imposed tight constraints on the way politics was run by the incumbent landowning class, forcing both political elites to make institutional agreements. I identify one such compromise, the implementation of the income tax. When the income tax was implemented under politically contested circumstances, this institution was crystallized within a series of reforms that replaced the old institutional order inherited since colonial times. I argue that this new institutional order fostered long-run economic development. Using the Chilean case to illustrate the causal mechanisms at work and time-series econometric techniques in a number of Latin American countries I find that before the income tax law the institutional order was designed to give unfair economic advantages to the agricultural sector. When political contestation was high, the implementation of the income tax put countries in a path of long-run economic development. However, when political contestation was low, the income tax did not reflect this early foundational sectoral cleavage. In these cases, the levels of sectoral conflict were low, and agricultural elites were never challenged. An untransformed elite structure permitted then unbalanced growth reinforcing the political and economic advantages of the landed elites.

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I. Sectoral Conflicts and Development

> *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 political and economic development is vast. Without trying to survey all of it, there seems to be an agreement in that strong institutions cause better economic performance. For example North [1990, 3] asserts that the idea that "institutions affect the performance of economies is hardly controversial." However, most explanations focus property rights protection.[1] I find that this is a limitation since regimes that do not respect property rights (for example, dictatorships) grow at levels that sometimes even surpass democratic countries. While I still think that institutions matter for economic growth, this paper seeks to contribute to this literature by introducing an additional channel, particularly, emphasizing the role of sectoral conflicts on political and economic development. I build on the *fiscal sociology* paradigm to argue that fiscal institutions, which are the engine of state-*making*, are product of a sectoral conflict. In turn, borrowing from the *dual sector* model I document how the secular structural transformation (i.e. the gradual emergence of the industrial sector) triggered a major political transformation reverting the backward institutional order implemented since colonial times (and sustained by the landowning class), producing long-term balanced economic growth. More generally, this paper explains how political development is associated with economic growth. I use sectoral outputs from 1900 to 2009 to proxy the emergence of the industrial sector in a number of Latin American countries,[2] vector autoregressive models (VAR), Granger-causality tests, impulse response functions (IRFs) and the Chilean case to illustrate the causal mechanisms. The results suggest that long-term economic development is channeled through sectoral contestation and institutional investments, particularly the expansion of the fiscal system.

The political development literature has traditionally focused on socio-economic cleavages and potential alliances between a *homogeneous* ruling elite and politically excluded segments of the society, traditionally peasants or other disenfranchised groups such as 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] In this paper I focus on political divisions

[1] Johnson and Koyama [2016].

[2] The actual data availability might vary by case.

[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 preferences over democracy of industrialists and agriculturalists. An alternative to the 'bargaining' model is the 'compelling' model proposed by Boucoyannis [2015].

among the elite. The elite-sector approach is hardly new. Just to mention some examples, 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" while Mares and Queralt [2015] examine how income taxation in Europe is associated with inter-elite conflicts, particularly between the landed elite and the industrial elite. While political economists have already recognized the relevance of sectoral conflicts and the structure of the economy, the focus has been on democratic development. Using the same sectoral approach as a starting point, the paper stresses how these structural conflicts are associated with institutional and economic development.

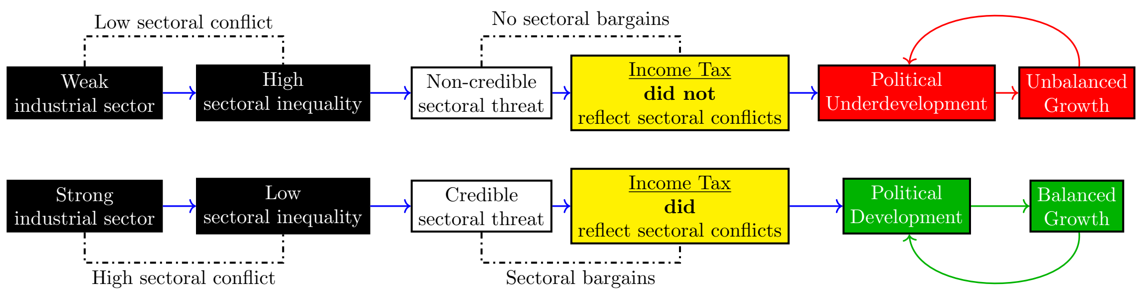

Figure 1: *Causal Mechanism*

An elite divided on an *economic* cleavage should at the same time be divided on their *political* preferences, particularly regarding their attitudes towards taxation.[4] Taxation affects landowners and industrialists in different ways.[5] Agriculturalists will systematically resist it as land fixity increases the risk premium of their main asset.[6] In contrast, industrialists' preferences toward taxation are more elastic as capital can be reinvested in nontaxable sectors.[7] However, class conflicts are more likely to resolve in favor of direct taxation when income inequality *among the elite* is low.[8] When inequality among the elite is high, there are no incentives to cooperate, and rather the leading elite rules in a monopolistic way. However, given that similar degrees of sectoral economic development can be converted into armies of similar capabilities,[9] elites will have incentives to make agreements rather than engaging in conflict when their economic/military capacities are similar. When levels of inter-elite inequality are low, war is more likely to exhaust all existent assets without producing positive outcomes for either sector,[10] putting then pressures to reach agreements instead of engaging in armed conflicts.

[4] See for example Llavador and Oxoby [2005].
[5] Acemoglu and Robinson [2009, 289].
[6] Robinson [2006, 512].
[7] Hirschman [1970] and Ronald Rogowski in Drake and McCubbins [1998, ch. 4]. However, see Bates and Lien [1985, 15].
[8] Tani [1966, 157] explains that the absence of "wealth groups" makes passing an income tax law easier.
[9] Boix [2015]. For example, elites could use a faction of the existing army or hire private militias.
[10] Richard Salvucci in Uribe-Uran [2001, 48].

I argue that 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, causing in turn long-term economic growth. I identify one such compromise, the implementation of the income tax. Elsewhere I have argued that the rise of the industrial sector accelerated the implementation of the income tax law,[11] causing a long-lasting positive impact on state institutions and political development.[12] In this paper I study how the implementation of the income tax in the presence of high sectoral conflicts set states in a path of political development causing long-term *modern* (i.e. 'balanced') economic growth (see Figure 1). While balanced growth (end of causal chain) implies the expansion of the industrial sector (beginning of causal chain), the expansion of the industrial sector does not imply balanced growth. Balanced growth implies a much deeper long-run relationship of sectoral inter-dependence. However, mere industrial expansion could be short-lived. Although Bahamonde [2017a] studies the *timing* of the implementation of the income tax as a function of the emergence of the industrial sector, here I present an argument centered on the *long-lasting consequences on economic growth* of the implementation an income tax (when it responded to sectoral conflicts/bargains). Since the economy alters the balance of political power, this theory is relevant for explaining political development too (circular arrows at the end of the causal chain)

The crux of the argument is that the economic structural transformation characterized by "a secular decline of agriculture and substantial expansion of manufacturing"[13] imposed tight constraints on the way politics was run by the incumbent landowning class. In that sense, this paper considers that given that each economic sector has a corresponding political arm, the *sectoral* conflict is also a *political* conflict.[14] Consequently, these gradual long-term changes not only altered the structure of the economy but also the balance of political power. Historically, agriculturalists had been a hegemonic group protected by norms and institutions that originated in colonial times. I find that before the income tax law, institutions were designed to give unfair economic advantages to the agricultural sector, locking countries in a backwards economic suboptimal equilibrium of *un*balanced growth. When the income tax law reflected the underlying economic cleavage, this institution improved the overall state institutional capabilities, reverting the institutional political order that permitted *un*balanced growth. Here I adopt the fiscal sociology paradigm to contend that tax institutions as conflictual devices *made* the state. Not only these institutions improved bureaucratic development and expanded the *dominion* of the state, but also secured long-lasting agreements between elites with diverse (or even opposing) interests which in turn translated into institutional development. I claim that the emergence of such new institutional order fostered long-term balanced

[11] Bahamonde [2017a].
[12] Bahamonde [2017b].
[13] Johnston and Mellor [1961, 567].
[14] See Ansell and Samuels [2014] and Bahamonde [2017a].

economic growth. Analytically, this theory speaks to a broader conceptualization of the role of inter-elite (in)equality on political and economic development. In particular, lower levels of inter-elite inequality (expressed in the emergence of an industrial sector) put both sectors in an equilibrium of economic interdependence, where no sector predominated. The political correlate is that if both sectors grew in a balanced fashion (which does not necessarily mean similar growth rates), there was no clear leading elite, *reinforcing* the need to sustain levels of political cooperation (backward arrows in Figure 1). Finally, when the elite structure and levels of sectoral conflict were weak, the income tax did not reflect the sectoral conflict (because there was no sectoral contestation). Landowners were never challenged and there were less pressures to centralize the state, making further institutional investments less likely. Hence, even though in these cases the income tax was implemented, it did not reflect the *early foundational sectoral cleavage*, compromising long-run economic development. Consequently, the income tax is a necessary but not sufficient cause of development as it requires the presence of high sectoral conflicts to cause economic development.[15]

Next section explains the dual sector model, explaining how balanced growth happens, why it does not mean 'equal' growth, why it does not imply the absolute decline of the agricultural sector, and why it is important for political development. Then I provide some historical context using the Chilean case to illustrate the theory. Using the fiscal sociology paradigm, I try to pay especial attention to how the series of inter-elite bargains that surrounded the implementation of the income tax fostered institutional development and state-*making*. Next, I present some econometric evidence, putting especial attention to the relationship between institutional development, particularly, fiscal expansion and long-term balanced growth. Finally, I provide some ending comments.

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 economic modern growth[16]

[15]Similarly, Johnson and Koyama [2017] find that the link between state capacities and economic growth is conditional on several factors (population size, culture, population homo(hetero)geneity, among others). However, in my account, the role of the income tax is conditioned on the degree of intersectoral conflicts, which I measure via the size of the industrial sector.

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

by emphasizing the importance of macro-structural gradual transformations. The model argues that the economic system is divided into two sectors loosely defined as 'advanced or modern sector' or 'manufacturing sector,' and as 'backward or traditional sector,' or 'agriculture.'[17] 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 goes from a low-productivity sector to high-productivity, eventually surpassing the agricultural sector. If the agricultural sector lacks economic efficiency, the industrial sector will hardly develop, leaving the country in an economic trap. This literature is vast. While in this section I explain the core of it, there are many current theoretical and methodological applications as well as extensions of the dual sector model. Just to name a few examples, 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. This paper links decreasing levels of inter-elite inequality with balance growth and inter-elite political contestation.

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."[18] And while dichotomizing the entire economy in just two sectors might sound as too much of an oversimplification,[19] I follow Dixit [1973, 325] in that the dual economy model provides a significantly better description of the economy because "it reflects several vital social *and* economic distinctions."[20] 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."[21] 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

[17] 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.

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

[19] This is a stylized theory. Of course, in reality, there are other economic activities such as logging, mining and others. Given its dependence on capital, mining has always been considered industrial. The Chilean case illustrates this.

[20] Emphasis is mine.

[21] Streeten [1959, 169]. Emphasis is mine.

necessarily develops *after* the industrial sector is developed.[22]

Economic development depends on the emergence of the industrial sector which in turn depends on the development of a productive agricultural sector.[23] As Kuznets [1961, 59] puts it, "economic growth is *impossible* unless there is a substantial rise in product per worker in the agricultural sector."[24] Following Jorgenson [1961, 311], Ranis and Fei [1964, 59], Jorgenson [1967, 291], Skott and Larudee [1998, 279-280] and Vollrath [2009, 290], the industrial sector is assumed to use capital and labor (having both increasing returns to scale). And while the agriculture sector also needs capital,[25] I follow conventional wisdom in development economics and assume that agriculture uses land (which is fixed) as the main input, and labor. This implies that the industrial sector is *structurally* advantaged: the fixity of land requires countries to industrialize in order to grow, and for that they need first an efficient agricultural sector. This insight is shared by many other development economists. Hayami and Yamada [1969, 105] for example argue that "[i]ndustrialization and modern economic growth are basically *conditioned* by the level of agricultural productivity."[26] 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." This structural transformation is the key of economic growth. If the expansion of the agricultural sector is compromised, it will necessarily compromise the expansion of the industrial sector as well.[27]

The political correlate is that a weak inter-sectoral economic cleavage engenders a weak *political* elite structure. Since agriculturalists were an economic hegemonic group protected by norms and institutions that originated in colonial times, slow industrial sectors left agricultural political elites uncontested,[28] compromising both political and economic development (as I explain here). In line with others, institutional investments are more likely to happen when levels of sectoral conflicts are high. This happens when there is sectoral equality or balanced growth. 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 lower levels of inter-sectoral economic inequality led both elites to implement the income tax, a state-*making* institution.

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

[22] Galenson [1963, 506-507, 513] and Baer and Herve [1966, 95-96].

[23] Johnston and Mellor [1961, 567] argue that this process "seems to be a necessary condition for cumulative and self-sustaining growth."

[24] Emphasis is mine.

[25] Federico [2008, 40].

[26] Emphasis is mine.

[27] 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."

[28] Bahamonde [2017b].

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."[29] Technologies such as "crop rotation, pest control, seed breeding [and] fertilizer use [represent] the major potential source of agricultural labor productivity,"[30] increasing also "non-agricultural value added per worker."[31] 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.[32]

Surplus of labor naturally leads to a reallocation of redundant workers into the industrial sector, which is the crux of economic development.[33] Nurkse [1953] in fact argues that development *means* to employ the surplus labor.[34] The literature coincides in that the 'natural role' of the agricultural sector is to provide labor to the industrial sector.[35] 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."[36] 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*.[37] In fact, Nurske [1961, 225] points out that the concept "is commonly used to denote all types of rural unemployment."[38]

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.[39] "It is *self-evident* that without increasing food output, the capitalist sector must remain in a stationary

[29] Kelley et al. [1972, 133].

[30] Ranis and Fei [1964, 62].

[31] McArthur and McCord [2017].

[32] 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.

[33] Ranis and Fei [1964, 7] and Leibenstein [1957b, 51].

[34] Similarly, Matsuyama [1991, 621-622] points out that "[i]ndustrialization [*consists of*] a shift of resources from agriculture to manufacturing."

[35] 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.

[36] Emphasis is mine.

[37] See Ranis and Fei [1964, 203] and Jorgenson [1967, 289].

[38] 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') is what prevents a rise in industrial wages.

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

state."[40] 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."

Finally, it is important to say that "the agricultural sector declines relative to the overall economy but continues to expand absolutely."[41] In other words, it is the "the proportional contribution of agriculture to the growth"[42] what decays, implying that in the long run the agricultural sector "must also grow,"[43] specially given the continuing dependence on a constant supply of food.[44] Under balanced growth, the political consequence is that both sectors need one another to grow, limiting the excessive power of one political elite over the second political elite. And while agricultural declines overtime, it continues to expand absolutely, preserving the political balance between the two elites.

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 their advantaged position.[45] As Collier and Collier [2002, 106] argue, the "national government was dominated by [...] owners of large agricultural holdings,"[46] 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." Similarly, 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.[47]

While on the one hand institutions, policies and other practices were biased against industrial elites, on the other, rapid industrial growth (see Figure 2, top left) incentivized industrial elites to form pressure groups to offset the bias against them. The little public infrastructure that existed benefited the agricultural sector only. 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." To address this situation, industrialists started to "form trade associations to engage in lobbying and

[40] Ohkawa [1961, 21]. Emphasis is mine.
[41] Nerlove [1994, 14].
[42] Kuznets [1961, 45].
[43] Ranis and Fei [1961, 534].
[44] Nicholls [1963, 2].
[45] This idea also applies for Mexico. "The principal source of its wealth was not its mines, Humboldt noted, but agriculture." Amaral and Doringo, in Uribe-Uran [2001, 13].
[46] 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."
[47] Bauer [2008, 45].

propaganda."[48] Eventually, these interests groups turned into political parties.[49] These new groups, backed by their economic leverage, put pressures to open the political system in a way that allowed industrial elites to gain egalitarian political conditions and equal access to state power. While initially both elites confronted each other in two civil wars,[50] conflict was not sustainable over time. Consequently, Chilean agricultural and industrial elites opted for a political compromise. The keystone of these inter-elite compromises was the implementation of the income tax in 1924, which marked the beginning of an institutionalization path. As others have observed, industrialists "accepted taxation, *while demanding state services and expecting to influence how tax revenues were spent*."[51] This is why the expansion of political rights *among the elite* and the rise of the industrial sector shared the same timing. As Collier [1977, 683] has pointed out, "the real story of Chilean industrialization belongs to the Parliamentary period" (1891-1925).

The implementation of the income tax in Chile, as part of the sectoral bargain, was then associated with the implementation of other state institutions and services, expanding in this way the bureaucratic *dominion* of the state. However, unlike other 'regular' state institutions, taxing incomes *makes* the state.[52] It is the very practice of this technology what gives the state the big push making it able to continue the reproduction of its power. Critically, from the elite's perspective, it was in their interest to see these extractive capacities grow. Taxation is more likely to survive as an institution when it counts with the elite's 'blessing.' Boix [1999] and Parente and Prescott [1994] explain how the development of certain institutions or the adoption of certain technologies are implemented when they go in the benefit of the elites. In turn, Kurtz [2013, 86] points out that state expansion "must be reasonably understood as nonthreatening to the fundamental material interests of nearly all politically relevant fragments of the upper class." In fact, for the Latin American case, Beramendi et al. [2016] argue that "capitalist elites [*preferred*] to shoulder a higher tax burden through progressive direct taxation, which they [viewed] as the least-worst economic option."[53] Fiscal sociologists argue that the capacity the state has of taxing its subjects *diffuses* to other state institutions via spillovers. For example Musgrave [1992, 99] argues that since taxation (specially of incomes) requires such a high degree of state penetration, *public finances offer the key for a theory of state-making*. Finally, Bahamonde [2017b] finds that the implementation of the income

[48] Weaver [1980, 107].

[49] Collier and Collier [2002, 109].

[50] Zeitlin [1984, 23] argues that the civil wars challenged a "large landed property [elite against a] productive capital [elite]."

[51] Carmenza Gallo, in Brautigam et al. [2008, 165]. Emphases are mine. She refers specifically to nitrate producers, one of the first industrial activities.

[52] Indirect taxes are easier to levy (Krasner [1985, 46], Bertola and Ocampo [2012, 132]), and hence this kind of revenue is generally considered "unearned income" (Moore [2004b, 304]) or "easy-to-collect source of revenues" (Coatsworth and Williamson [2002, 10]). Given the relatively lower costs states have to incur to collect them, indirect taxes have a very low impact on state-building (Moore [2004a, 14]). In fact, when early Latin American states depended heavily on trade taxes, the state apparatus tended to be less developed (Campbell [1993, 177]).

[53] They particularly argue that progressive taxation is better relative to "trade taxation, which can negatively impact the industrial sector" (p. 18). Similarly, Best [1976, 71] argues that the "taxes can be viewed as dependent upon the distribution of power rather than as an expression of the free choice of the majority of the people."

tax was associated with institutional development and state expansion. Here I contend that the implementation of such institutional order fostered economic growth, leveling the economic and political power of both elites in the long-run.

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 emergence of a new industrial sector rose a new politically disenfranchised elite who demanded political and economic reforms, ending years of political asymmetries. The keystone of these inter-elite compromises was the implementation of the income tax, setting countries in a path of both political and long-run economic development. The income tax, as an institution that contributed to develop further institutional development, should then be associated with long-term economic growth, and consequently with a secular relative decline of agriculture and substantial relative expansion of manufacturing. To test this hypothesis, the theory should pass a number of tests. As argued, *before* the inter-sectoral compromises (i.e., before the income tax law was implemented), political institutions and social norms inherited from the colonial period were designed to allocate economic inputs in a way that benefited the landowning class. Hence, I expect the transference of economic inputs to go *from* the industrial sector *to* the agriculture sector, a *backwards* equilibrium as stated by the dual sector model. However, *after* the income tax was implemented, we should see a *reversion* of the flow of inputs, generating growth *from* the agricultural sector *to* the industrial sector (balanced growth). In econometric terms, we should see that the income tax reverted the way in which one sector 'Granger-caused' the other.[54] Lutkepohl [2006, 42] explains that if some variable X forecasts variable Y (and not vise versa), X is said to

[54] This is not an experimental design, and hence the term 'causation' should be taken loosely. Beck [1992, 241] explains that cointegration is not causal, while Angrist and Pischke [2008, 237] Granger-causality is not really *causal*.

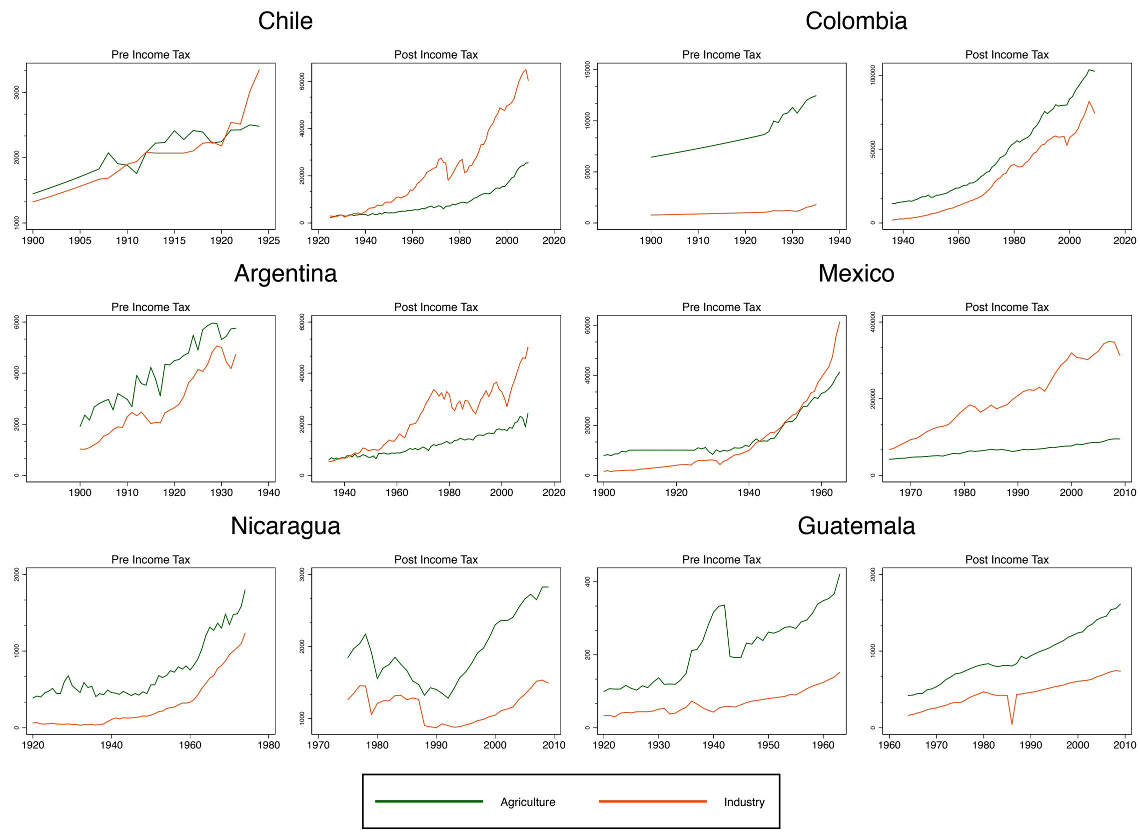

Figure 2: *Sectoral Outputs Before and After the Implementation of the Income Tax Law*

'Granger-cause' Y. According to Granger [1980, 349], this concept of 'causation' is based on the idea "that the future cannot cause the past."[55]

I utilize the MOxLAD data to test this, particularly the *agriculture value-added* and *manufacturing value-added* variables.[56] The dataset spans from as early as 1900 to as late as 2009.[57] Table A1 specifies the available time-spans. Using secondary information, the table also states *when* the income tax was implemented, what the law was and its corresponding source(s).[58] Following Mahoney [2010, 5] I consider two 'advanced' economy countries (Chile and Argentina), two 'intermediate' 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

[55] See Durr [1992, 197] for a similar definition.

[56] 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."

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

[58] 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.

implemented.

In Table 1 I test for Granger-causation, i.e. the directionality in which economic growth was produced both prior and after the implementation of the income tax law.[59] The results strongly suggest that the income tax caused a structural transformation in (almost) all 'developed' countries, namely Chile, Colombia and Mexico. In all these cases the income tax reverted the initial inter-sectoral growth equilibrium suggesting a contested elite structure, as the case of Chile conveys. Before the income tax law, industrial development Granger-caused agricultural development, and after the income tax law, the agricultural sector Granger-caused industrial development (all p-values are significant at the .05 level).[60] These results suggest that the implementation of the income tax was associated with the overthrowing of the political institutions and practices that permitted agricultural expansion at the expenses of the modern sector, and that the reversion of the original backwards macroeconomic structure set in motion a path of long-term economic development.[61] In Nicaragua and Guatemala the tests suggest the exact opposite (all p-values are significant at the .05 level).[62] The implementation of the income tax in these countries did *not* revert the initial backward macroeconomic equilibrium because when lately implemented, the tax did not reflect the inter-sectoral tensions, challenges and compromises proper of the contested political economies. The industrial sector never had enough economic leverage to politically confront the landowning elite (see Figure 2) 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 is associated with the imposition of the income tax law, it is necessary to establish the inter-sectoral long-run economic equilibrium. This relationship is an endogenous one.[63] 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. 'Unit root' or 'integrated' *I(1)* vectors[64] are time-series that "wander" up and down, yet they never revert to a given mean.[65] Moreover, two integrated vectors that are mutually endogenous, such as industrial and agricultural outputs, imply a 'cointegrated' CI(1) relationship, imposing additional statistical restrictions.[66] A "set of integrated time-series is said to

[59]Specifically, the tests were computed after estimating the reduced form VAR specified in Equation 1.
[60]Except for the Mexico after the implementation of the income tax (p-value = .06).
[61]See specially next section.
[62]Except for the pre income tax period test of Guatemala, which is significant at the .1 level.
[63]Tiffin and Dawson [2003, 33].
[64]The order of integration could be higher than 1. However, for simplicity sake, I restrict my analyses to I(1) processes, which is the most common strategy in applied econometric analyses of time series.
[65]Box-Steffensmeier et al. [2014, 129].
[66]See Granger [1981] and Engle and Granger [1987]).

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*

be cointegrated if some linear combination of the series in levels produces a stationary series," or *I(0)*.[67] The economic literature generally coincides in that economic growth is an I(1) process, and that sectoral development is a CI(1) process.

Integration and cointegration are assumptions that should be tested. The first step is to find strong evidence of integration in each of the series. In Table A2 I show several unit root tests.[68] The

[67] Durr [1992, 193].

[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.

table indicates that all variables, periods, sectors and countries have I(1) processes. 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. In turn, failure to find evidence of cointegration would imply coordination failures between the two sectors (economic backwardness), the delayed emergence of a political challenger, the lack of a sectoral political conflict, and consequently a politically unchallenged landed elite. Given that the maximum number of cointegrated vectors in bivariate cointegrated series is 1, I only test for the minimum number of cointegrated relationships.[70] I expect to find evidence of cointegration only in the 'developed' cases. 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]

Cointegration "implies a particular kind of model" to estimate the series.[72] If traditional methods are used, given the interdependent relationship of these kinds of time-series, the results will be spurious.[73] I use the vector-autoregressive approach (VAR) specified in Johansen [1988] which among several advantages, is estimated via MLE. Another advantage is that VAR models do not need to specify the number of cointegrated vectors as opposed to error correction models.[74] Formally, I will model the next reduced form VAR in differences, one per country, both before and after the income tax law was passed:

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

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 (t) per each country regression.[75] Most tests give satisfactory results.

Given that "it is often difficult to draw any conclusions from the large number of coefficient

[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] 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] Wooldridge [2002, 571]. Cointegrated vectors, ECM and VAR models are widely common in political science too. Just to mention some examples, refer to Ostrom and Smith [1992], Krause [1997], Fish and Choudhry [2007], Haber and Menaldo [2011], Sobel and Coyne [2011], Herzer and Vollmer [2012, 489] and Blaydes and Kayser [2011].

[73] Ostrom and Smith [1992, 142-143].

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

[75] 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.

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*

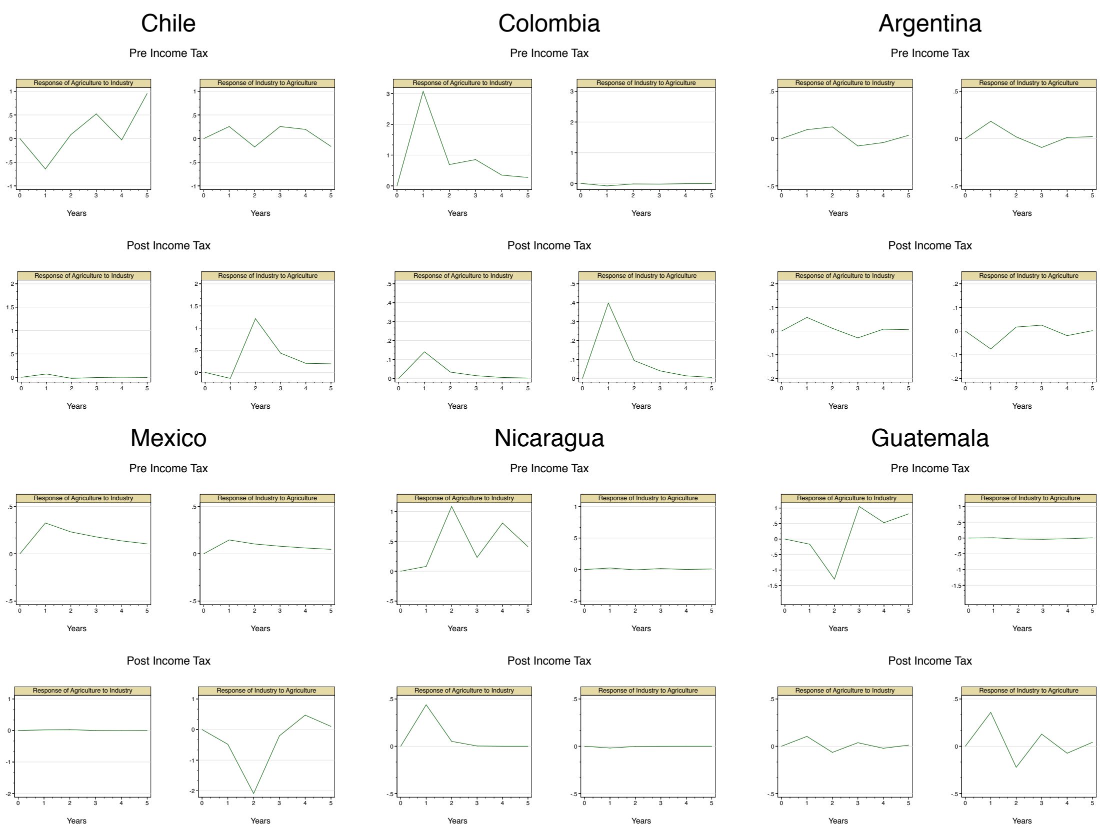

Figure 3: *VAR Impulse Response Functions: Sectoral Responses to Each Other's Growths*

estimates in a VAR system,"[76] econometricians usually turn to the analyses of *impulse response functions* (IRFs), which are derived from VAR analyses.[77] "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."[78] 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. Similar to the Granger-causality tests, I expect politically 'developed' countries to have gone through a process of structural transformation reverting the initial backwards development trap. However, this time I am able to observe the (predicted) long-run equilibrium. The X-axis is expressed in years. The Y-axis is *not* growth, but response to equilibrium. That is, the reaction of one sector once the other one is shocked.[79]

Figure 3 suggests that all 'developed' countries switched from a backwards equilibrium to a modern economic growth strategy after the income tax was implemented. 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 such that to give advantage to the agricultural sector and the landed elites. This situation was reverted after the income tax law causing long-term balanced economic growth. Colombia and Mexico show a similar pattern. 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. In each case, the economy was designed to develop the agricultural sector completely at the 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. The political correlate is the lack of a strong political challenger. Figure 2 suggests that the industrial sector was always weak, indicating that their corresponding political elites were unable to contest the landowning class. In both cases the implementation of the income tax did not revert the initial backward macroeconomic equilibrium because when implemented, it did not reflect the inter-sectoral tensions, challenges and compromises proper of the contested political economies.

V. Discussion

Historically, agriculturalists were a hegemonic group protected by norms and institutions since colonial times. 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

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

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

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

[79] 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]).

such compromise, the implementation of the income tax.

I theorized that when the income tax was implemented under politically contested circumstances, this institution expanded the overall state capacities, crystallizing a series of reforms that replaced the old institutional order inherited since colonial times, fostering long-term balanced/modern economic growth. In turn, balanced growth reinforced sectoral inter-dependence, precluding sectoral dominance of both political elite. Importantly, all these elite compromises took place during the formative years of the Chilean state and during a period of structural indetermination, where no elite had a clear economic/military/political advantage. Particularly, industrial elites were being excluded from politics, and they accepted to be income taxed in exchange of being allowed to participate in politics under fairer conditions. These series of inter-elite bargains helped the state to expand its dominion by offering different and new state services, improving the bureaucracy, and critically, bonding conflicting elites in an path of mutual institutional compliance.

In turn, my statistical analyses suggest that when the sectoral cleavage was high (i.e. when both sectors were strong), the implementation of the income tax fostered balanced growth. I explain that balance growth secured egalitarian political conditions between the two elites. The main findings are that the post income tax institutional order fostered long-run balanced economic development, keeping both elites politically accountable to one another. I find that in both *strong* and *weak* cases, the pre income tax institutional order was designed to give unfair economic advantages to the agricultural sector. However, when the industrial elites were able to challenge the landowning class, the new institutional order in which the income tax was situated reverted that. When sectoral contestation was high, political contestation was high, and the income tax (as a state-making institution) put countries in a path of long-run balanced economic growth. However, when sectoral contestation was low, the income tax did not reflect these economic cleavages. In these cases, the levels of sectoral conflict were low, the economic cleavage weak, thus agricultural elites were never challenged, leaving the old institutional order unchallenged. An untransformed elite structure permitted unbalanced growth, reinforcing the historic political and economic advantages of the landed elites.

.... **Word count**: 10,294 ....

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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