

# Research Portfolio

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## Research Statement

Within comparative politics, my research explores the intersection between inequality and political development, from a political economy perspective. My **job market paper** (*in preparation*) is entitled “[Income Taxation and State Capacity in Chile: Measuring Institutional Development Using Historical Earthquake Data](#).” Income taxation fostered via spillover effects increases in state-consolidation over time in Chile. The paper contributes in two ways. First, it studies the relationship between taxation and state building outside Europe. Second, the paper tests the theory using a novel approach. Exploiting the exogeneity of earthquake shocks, I create a novel hand-collected longitudinal dataset on Chilean earthquake death tolls. Under reasonable assumptions, the capacity for enforcing and monitoring building codes throughout the territory is a reflection of a state’s overall capacities. The paper shows that death tolls decrease (state capacity increases) once the income tax law was implemented in 1924 using a Bayesian Poisson regression. To explore the causal mechanisms, I discuss the Chilean case since the 1920s.

The job market paper is embedded in a **larger research agenda and book manuscript** entitled “[Structural Transformations in Latin America: State Building and Elite Competition 1850-2010](#).” The **main argument of the book** is that the economic structural transformation in Latin America—the secular decline of agriculture and substantial expansion of manufacturing—imposed tight constraints on the way politics was run by the incumbent landowning class. This was a major change due to the advantage the landed elites enjoyed since colonial times. Where the expansion of the industrial sector was weak, post-colonial norms persisted due to institutional inertia, perpetuating the advantaged position of the agricultural class. Leveraging economic sectoral outputs dating back to 1900 until 2010, for a sample of Latin American countries, I use panel data **methods** (particularly, Cox-proportional hazard models), time series analyses (VAR models, impulse response functions, and Granger-causality tests), and fine-grained qualitative data to support my argument. **Another major contribution of the book** is in measurement. One of the biggest gaps in the literature is the lack of a measurement of state capacities able to capture variations of *stateness* over time. Using a novel dataset, the book proposes measuring state capacities using earthquake data. The rationale is very intuitive: the capacity to enforce quake-sensitive building codes throughout the territory is a *reflection* of the overall (*in*)capacity of states of solving both logistic and political limitations at the subnational level. *Why does a 7.0 magnitude earthquake flatten Haiti, leaving at least 100,000 deaths, while a 8.8 earthquake in Chile in the same year leaves just 525 deaths?* By exploiting variations on earthquake death-tolls and local population to weight the number of deaths since 1900, I measure state capacities over time. Keeping magnitudes constant, casualty differentials should be attributed to the *lack of state capacities*.

In one of the **sections of the book**, I explain that the structural transformation required both sectors to grow in a *balanced* fashion, *leveling both elites in their relative political, economic, and military capacities*. Leveraging the dual sector model of economic growth, I sketch a theory of political and economic development that stresses the structural economic dependence of both sectors. The agricultural sector supplied labor and

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cheap foodstuff—which the industrial sector demanded, promoting balanced economic development of both sectors. The political consequence of balanced economic growth was the mutual political dependence and the need of inter-elite compromises that fostered both economic and political development in the long-run. The paper version of the chapter (currently *in preparation*) can be downloaded [here](#). In another section of the book, I explain how the emergence of a strong industrial sector accelerated the implementation of fiscal institutions. From a fiscal sociology standpoint, I consider this to be an important critical juncture that set countries in a path of political development. The paper version of the chapter (currently *in preparation*) can be downloaded [here](#).

In addition to the book manuscript, I am currently expanding the findings of a **series of papers** related to vote-buying and vote-selling, using both **observational** and an original **experimental** designs.

**Vote-buying.** Going forward, I have a **published paper** (*Bahamonde, H. (2018). Aiming Right at You: Group versus Individual Clientelistic Targeting in Brazil. Journal of Politics in Latin America, 10(2), pp. 41-76.*) on vote-buying in Brazil. Do parties target individuals or groups? This is a question fundamental to understanding clientelism, yet the literature does not offer an answer. This paper argues that depending on certain conditions, brokers target individuals when they are identifiable and groups when brokers need to rely on the spillover effects of clientelism. Both identifiability and spillovers depend on individual poverty, group poverty, and political competition. Though the theory I outline focuses on targeting, the paper also argues that structural factors, such as the density of the poor, should be considered in the vote-buying literature. Structural factors are one of the few observables upon which brokers can base their decision regarding investment in clientelism. Using survey and census data from Brazil, the paper exploits variations in personal incomes within contexts of differing levels of poverty. I find that political parties engage in segmented or ad-hoc strategies, targeting individuals when identifiability is high, and groups when there are economies of scale. Importantly, non-poor individuals can also be offered clientelism.

**Vote-Selling.** With the support of a generous grant, I designed two experiments in the U.S. out of a series of experiments to be fielded in Latin America for further comparison. In the **paper** (*revise and resubmit, Acta Politica*), I looked at the tipping points at which a sample of U.S. citizens ( $N = 1,479$ ) prefer a monetary incentive rather than keeping their right to choose whom to vote for. In nineteenth-century United States politics, vote buying was commonplace. Nowadays, vote-buying seems to have declined. Yet, the literature emphasizes vote-buying, ignoring the micro-dynamics of vote-selling. We seem to know that vote-buyers can no longer afford this strategy, however, we do not know what American voters would do if offered the chance to sell their votes. Would they sell their votes (and at what price) or would they consistently opt-out of vote-selling? Exploiting a novel experimental dataset representative at the national level, 1,479 U.S. voters participated in an online list experiment in 2016 and the results are striking: Approximately 25% would sell their votes for \$730. Democrats and liberals are systematically more likely to sell while education levels and income do not seem to impact on vote-selling.

Within the same project, I am currently designing an **economic experiment** in the lab. The literature asserts that Chilean parties no longer buy votes. While those are good news, the bad news are that we are rather ignorant about a number of other interesting, and yet, unanswered questions. First and foremost, the approach used by most scholars focuses exclusively on vote-buying. That is, parties offering to buy votes, completely ignoring the ones who sell their votes (i.e. voters). This is a rather important distinction. What would voters do if offered the chance to sell their votes? Would they sell them? And if so, at what price? Would voters still sell their votes to their own party of preference, or would they sell it to the opposing party? Do voters set a higher selling price if selling to the opposing party, while lowering the price if selling to the party they would have supported anyways? Another important question is who political parties target: party supporters, opposers, or swing voters? By recreating market conditions that exist between vote-buyers and vote-sellers implemented in the lab, the paper sheds light on these issues.

**Summary and Future Research** In summation, my book manuscript, job market paper and working papers on vote-buying and experiments on vote-selling work toward exploring the effects of inequality on political development from a comparative perspective. I use a widely broad methodological perspective, historical comparisons, time series analyses, and experimental and quasi-experimental methodologies. My goal is to use this toolkit to keep asking “big” questions that are fundamental to our discipline. My future research will seek to study the connection between elite competition and democratic regimes, exploring the connection between state building and democratic institutions (and its relationship with vertical accountability), and the role of the middle class on bureaucratic development. Particularly, I am interested in whether dictatorships have different dynamics of state-building relative to democracies. Please check my [teaching portfolio](#) and see how my **research and teaching interests match**.

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More information, [syllabi](#), my [research](#), [teaching](#) and [diversity](#) statements, as well as other [papers](#) are available on my website: [www.HectorBahamonde.com](http://www.HectorBahamonde.com). Thank you for considering my application. I look forward to hearing from you.

# Income Taxation and State Capacity in Chile: Measuring Institutional Development Using Historical Earthquake Data

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## Abstract

Income taxation fostered via spillover effects increases state-consolidation over time in Chile. The paper contributes in two ways. First, it studies the relationship between taxation and state building outside Europe. Second, the paper tests the theory using a novel approach. Exploiting the exogeneity of earthquake shocks, I create a novel hand-collected longitudinal dataset on Chilean earthquake death tolls. Under reasonable assumptions, the capacity for enforcing and monitoring building codes throughout the territory is a reflection of a state's overall capacities. The paper shows that death tolls decrease (state capacity increases) once the income tax law was implemented in 1924 using a Bayesian Poisson regression. To explore the causal mechanisms, I discuss the Chilean case since the 1920s.

**Keywords**— state-building; fiscal sociology; development; Latin America; time-series and panel data econometrics.

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Levi (1989, 1) famously explained, “the history of state revenue production is the history of the evolution of the state.” However, even when we have gained considerable knowledge of fiscal expansion in European cases, the study of public finance within a context of state consolidation in the developing world is lacking, especially in the presence of “new leading [economic] sectors” (Schneider 2012, 2). In fact, while there are a number of theories about state capacity in Latin America, domestic explanations centered on the role of economic structural transformation and taxation have been overlooked.<sup>1</sup> Besides this theoretical gap, there is also an empirical deficit. As Soifer (2012, 586) points out, most “scholarship on state capacity [...] lack[s] a satisfying conceptualization and measurement scheme for this concept.” Moreover, while most state formation theories are situated during pre-colonial (Mahoney 2010) or early (Kurtz 2013; Soifer 2015), independent Latin America, we lack a measurement that corresponds *temporally* to the theories we have. In other words, most explanations of state-making are *historical* in nature, yet, in practice, available measurements capture *contemporary* levels of *stateness*.

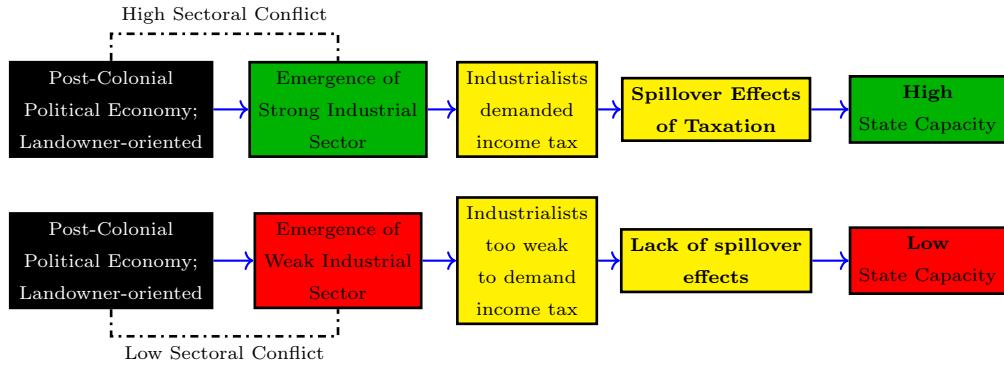
This paper contributes to the literature from a substantive perspective by explaining the positive relationship between adopting the income tax and sectoral conflicts. The historical evidence suggests that since the income tax law was an agreement among the elites, the institution had quasi-voluntary compliance. In turn, the argument outlines how income taxation had positive spillover effects over state institutions, increasing levels of state consolidation over time. The mechanisms evidence how the presence of tax assessors and collectors throughout the territory increased norms of enforcement of state regulations more generally, fostering overall state capacity over time.

The paper also contributes to the literature from an empirical perspective. Exploiting the exogeneity of earthquake shocks, I leverage a novel hand-collected dataset on Chilean earthquake death tolls between 1900 and 2010. Earthquakes are time-invariant, and importantly, orthogonal to economic development and regime type. Under reasonable assumptions, if the state’s capacity for enforcing and monitoring building codes throughout the territory is a reflection of overall state capacity, then death-toll differentials should be mainly associated with state capacity. Exploiting this variation via a Bayesian Poisson model with year fixed-effects, I find that death tolls associated with earthquakes systematically decreased (that is, *state capacities increased*) after the income tax

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1. A few exceptions are Gallo (1991, 7-8), Beramendi, Dincecco, and Rogers (2016), and Saylor (2014, 8) who consider elite conflicts to study state-making and fiscal development in the developing world. Dargent, Feldmann, and Luna (2017) focus on a “‘challenger-based’ causal mechanism” of state formation in Peru; however, they concentrate their efforts on the role of exogenous economic shocks.

law was implemented in 1924. Importantly, these changes are not correlated with economic growth or industrialization levels. The empirical section also provides an in-depth qualitative case study.



**Figure 1: Causal Mechanism.**

The paper argues, in more detail, that (a) the emergence of the industrial sector caused higher levels of sectoral conflicts, triggering the implementation of the income tax, which in turn, (b) fostered state development over time via spillover effects (Figure 1). The article empirically tests both hypotheses, while providing a short Chilean case study.

The paper not only builds on the fiscal sociology literature (Musgrave 1992), but on the sectoral politics approach, too (B. Moore 1966; Stephens, Rueschemeyer, and Stephens 1992; Ansell and Samuels 2014; Boix 2003; Acemoglu and Robinson 2009). In particular, it argues that elites whose assets are allocated in different sectors of the economy have different preferences over direct taxation, and consequently, state centralization (Acemoglu and Robinson (2009, 289), Best (1976, 50), Mamalakis (1971, 109)). The framework follows Mamalakis (1969, 1971), who introduced the sectoral conflict approach for the Latin American cases but also Hechter and Brustein (1980, 1085) who explain, “state formation will be most likely to the degree that powerful individual actors form two groups on the basis of divergent economic and political interests.”

As such, this article is an attempt to provide an alternative explanation of state development to the bellicist approach (Tilly 1992; Dincecco and Onorato 2016) and extended to the Latin American case by Thies (2005), Thies, Chyzh, and Nieman (2016), and Kurtz (2006)—but see Centeno (2002). And while Kurtz (2009, 2013) and Soifer (2015) situate the relevant state-building critical juncture at the end of the colonial period, before the class compromises that this paper identifies, the argument pursued in this paper explains that the implementation of the income tax was an important building

block in this process.

## I. SECTORAL CONFLICTS, AND INCOME TAXATION

The landed Latin American elites were an hegemonic economic group protected by norms and institutions that originated during colonial times (Keller 1931, 13). Not only that, the post-colonial institutional and economic orders were designed to give an unfair advantage to the agricultural sector. Mamalakis (1971, 99) is well known for describing how an agriculture-government coalition was formed in Chile, beginning with the colonial period. Several historians point out that “[i]n those areas where the government did interfere in the countryside, the effect was to strengthen the position of the landowning class” (Bauer 2008, 118). In fact, the little public infrastructure that existed benefited mostly the agricultural sector (Rippy 1971; Marichal 1989; Zeitlin 1984; Bauer 2008). By extension, the landowning class controlled most of the politics, too (Wright (1975, 45-46), Zeitlin (1984, 13), Bauer (2008, 45), Baland and Robinson (2008, 1748), Best (1976, 56), Rippy (1971) and Marichal (1989)). For example, Collier and Collier (2002, 106) explain that the Chilean “national government was dominated by the central part of the country, with owners of large agricultural holdings playing a predominant role.”<sup>2</sup>

However, when the “structural transformation” happened—a process by which there is a “secular decline of agriculture and substantial expansion of manufacturing” (Johnston and Mellor 1961, 567)—it imposed tight constraints on the way politics was run by the incumbent landowning class. Given the foundational advantage of the landed elites, the secular emergence of the industrial sector generated political, economic, and military threats to the landed elites.<sup>3</sup> For instance, before the Civil War, *salitreras* (nitrate towns) in northern Chile were so prominent that they were considered “a state within the state” (Barros 1970, 500). Industrial bosses had to approve decisions on whether public employees could be fired, whether public works could be developed, and on whether politicians

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2. Similarly, McBride (1936, 15) explains 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.” My emphases.

3. As Boix (2015) explains, lower levels of inter-elite economic inequality are tied to similar degrees of military capabilities. Under these circumstances, war is most likely to exhaust all existent assets without producing positive outcomes for either sector (Richard Salvucci, in Uribe-Uran 2001, 48), leading to heavier pressures to reach agreements instead of engaging in armed conflicts. In Chile, while initially both “antagonistic elites” (Keller 1931, 37-38) confronted each other in two bloody civil wars between a “large landed property [elite against a] productive capital[ist] [elite]” (Zeitlin 1984, 23), due to low levels of inequality, war was not sustainable over time. For instance, while *Balmacedistas* managed to secure the support of the army, *congresistas* (the anti-Balmaceda group) gathered support from the navy. Similarly, in the subsequent years of the civil war, there were a number of *aborted* coups, 1907, 1912, 1915, and 1919 (in Collier and Collier 2002, 109), suggesting an equilibrium where no elite was the leading elite.

could give public speeches. *Salitrera* industries also coined their own currency and had their own particular local laws. All in all, these sets of practices posited credible threats to the agricultural political and economic orders.

The preferences over fiscal policy of the expanding industrial sector clashed with the ones of the agricultural class. On the one hand, land fixity increased the risk premium of the landed elite's main asset (Robinson 2006, 512), so they systematically resisted taxation. However, as capital could be reinvested in nontaxable sectors (Hirschman (1970); R. Rogowski in Drake and McCubbins (1998, ch. 4); however, see Bates and Lien (1985, 15)), industrialists' preferences toward taxation were more elastic.

The emergence of a strong industrial class led to heavier pressures for the implementation of the income tax law.<sup>4</sup> As industrialists depended more on infrastructure implemented at the local level—such as roads, railroads, and bridges—the industrial classes in Latin America “[preferred] to shoulder a higher tax burden through progressive direct taxation” (Beramendi, Dincecco, and Rogers 2016, 18).

In fact, in 1924 Chilean industrial elites accepted income taxes by agriculturalist incumbents *in exchange* for 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” (Carmenza Gallo, in Brautigam, Fjeldstad, and Moore (2008, 165)).<sup>5</sup> Since both elites agreed on implementing the income tax, compliance was high.

Institutionalist economists find that optimal institutional choices result from political settings where all involved actors “had a voice in the choice of institutions” (Aghion, Alesina, and Trebbi 2004, 566), essentially contributing to an equilibrium of quasi-voluntary compliance (Levi 1989).

## II. POSITIVE EXTERNALITIES OF INCOME TAXATION ON STATE CENTRALIZATION

Indirect taxes were easier to levy and hence this kind of revenue is generally considered “unearned income” (M. Moore 2004a, 304) or “easy-to-collect source of revenues” (Coatsworth and Williamson 2002, 10). Since customs administrations have always been concentrated in a few critical locations—

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4. Separate panel-data analyses, available upon request, also confirm this hypothesis.

5. My emphases.

especially ports—tariffs and customs duties oftentimes did not require an elaborate fiscal structure (Bertola and Ocampo 2012, 132). Given the relatively lower costs states have to incur to collect them, indirect taxes had a very low impact on state building (M. Moore 2004b, 14). In fact, when early Latin American states depended heavily on trade taxes, the state apparatus tended to be less developed (Campbell 1993, 177).

Fiscal sociologists, however, explain that direct taxation fostered state consolidation. Musgrave (1992, 98-99) and M. Moore (2004a, 298) explain that transforming private incomes into public property fostered state expansion. Particularly, since taxation (especially on incomes) requires such a high degree of state penetration, the study of public finances also offers a theory of state building.

The mechanism through which the positive spillover effects of taxation on state-building occur is based on the endogenous accumulation—and transmission—of knowledge. Particularly, the mechanism considers situations where the stock of know-how accumulated in the revenue service spread to other state institutions such as institutions related to the counting of individuals, policing, and the enforcement of public security, contracts, building codes, zoning laws, among others. The state-building literature has also considered these types of mechanisms before. For instance, Soifer (2013, 2012) and Bahamonde and Trasberg (2018) proxy state capacity by considering a cumulative count of censuses taken in a particular country. The understanding is the same: as early states learn to count their inhabitants (or tax them, in my account), they also learn—at marginally lower costs—to perform other state tasks.

This paper explains that direct taxation via a learning-by-doing process produced technical complementarities<sup>6</sup> between the state’s existing stock of know-how and fiscal capacities. In short, implementing the tax lowered the marginal costs of adding an additional layer of stateness onto the territory. 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.” This paper argues that it is this bureaucratic effort (contingent on elite-led fiscal pacts) that was what fostered state consolidation over time. 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—and at lower marginal costs—increasing the density of state presence in the territory.

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6. These are situations in which “an increase in the output of [a] commodity [...] lowers the marginal costs of producing [other] commodity” (Hirschman 1958, 67).

And while there exists a tension between the intention to tax and the capacity to actually do it, it is important to remember that both elites wanted to implement a system of income taxation, fostering an equilibrium of quasi-voluntary compliance. The literature, in fact, finds that introducing the income tax has been associated with improvements in efficiency and expansion of the scope of a number of other state tasks. For instance, Kaldor explains that the revenue service is the “point of entry.” Once this institution is secured, securing the rest is marginally easier (in Brautigam, Fjeldstad, and Moore (2008, 15)). In turn, Besley, Ilzetzki, and Persson (2013, 208) 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, while Dincecco and Troiano (2015, 3) find “a positive and significant relationship between the introduction of the income tax” and per capita (1) total expenditures, (2) education expenditures, and (3) health expenditures. Others have found that literacy levels in Chile rose from 40% in 1907 to 66% in 1925 (Engerman, Sokoloff and Mariscal, in Engerman and Sokoloff (2011, Ch. 5)), and the share of national revenue accounted for by income taxes after implementing the income tax in 1924 rose from 6% in 1920 to 23.7% in 1940 (Engerman, Sokoloff and Zolt, in Engerman and Sokoloff (2011, 178)). In turn, Humud (1969, p. 154) documents that the income tax was widely enforced, generating considerable resources for the Chilean treasury (in Bowman and Wallerstein (1982, 451-452)), and that the dependence on custom taxes decreased from 70.2% to 41.1% during those same years (Engerman, Sokoloff and Zolt, in Engerman and Sokoloff (2011, Ch. 6)).

### III. FROM EARTHQUAKE DEATH-TOLLS TO STATE CAPACITY

*Did the implementation of the income tax in Chile foster state development over time?* While this section motivates the measurement approach pursued in this paper, it leaves for future research—presumably, in a “measurement paper”—further performance and sensitivity analyses regarding this measurement.

More than being blessed, the literature is in fact cursed due to an over-abundance of poor indicators of state consolidation (Soifer 2012, 589). In fact, its abundance “points to the poor state of empirical measures of the quality of states” (Fukuyama 2013, 347) mostly because most indices are conflated with analytical and conceptual problems (Ferreira 2017, 1292).

One notable example is “protection of the rule of law,” which is commonly used as a proxy for

state capacity (Besley and Persson 2009, 1237). As Kurtz and Schrank (2007, 543) explain, this strategy is severely confounded “with policy preferences over the structure of private property rights.” On the one hand, this is problematic since the sources of these data are usually elite interviews (Fukuyama 2013, 349). To “the extent that public bureaucracies *are* effective in imposing taxes or regulatory demands [...] they are likely to be judged ‘burdensome’ and ‘growth-inhibiting’ by many businesspersons” (Kurtz and Schrank 2007, 542) thereby introducing systematic measurement error (Kurtz and Schrank 2012, 618). On the other hand, the problem is conceptual. As Soifer (2008, 247) puts it, there is a widely spread “problem of misalignment between dimension and indicator.” Kurtz and Schrank (2012, 619) recommend “explicitly avoid[ing] an emphasis on outputs that are at the center of political or policy debates, such as property rights.” For example, the U.S.S.R. had a strong state; however, it did not protect property rights.

Another iconic example of this misalignment problem is the use of fiscal extraction as a proxy of state capacity. Johnson and Koyama (2017, 3) explain that “[t]ax revenue per capita is a commonly used metric of fiscal capacity,” which in turn “speaks” to levels of state capacity. In fact, Thies (2015, 172) conceptualizes “fiscal capacity [...] in terms of tax revenue extracted from society.” This error is very common in the literature, and other examples are Besley, Ilzetzki, and Persson (2013, 224) and Besley and Persson (2014). Not only do tax shares reflect policy preferences (Soifer 2013, 9) but also, as Fukuyama (2013, 353) explains it, there “is a difference between extractive potential and actual extraction rates.” For instance, since American institutions were deliberately designed to limit the exercise of state power, the U.S. taxes very little (Fukuyama 2004, 6). However, it is not reasonable to say that the U.S. is a “weak state.” Moreover, in late imperial China, “high taxes on peasants [...] were the result of rulers’ *lack* of power. Chinese rulers consistently attempted to limit officials’ excessive extractions from the masses, but were unable to do so” (Kiser and Tong 1992, 301).<sup>7</sup>

Finally, others have proxied state capacity with economic growth, which is also problematic (Fearon and Laitin 2003; Besley and Persson 2011). Interestingly, Mahoney (2010, 4, 6-7) pursues the same strategy. As Dargent, Feldmann, and Luna (2017) explain, state capacity and economic growth are causally distinct mechanisms. For instance, boom-led economic growth has left net state capacity low in Peru.

This paper identifies an additional limitation. Beyond conceptual and analytical problems, most available measurements are unable to capture temporal variations of state capacity. Since most

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7. My emphasis.

explanations of state-making have a strong historical component, the lack of an indicator able to *travel in time* represents a huge deficit in the literature. Just to name a few examples, Soifer (2012, 585) “builds a new measure of state capacity for [...] contemporary Latin America [combining] multiple dimensions (extraction, security, and the administration of basic services).” Kurtz and Schrank (2012, 618-619) designed some list-experiments to study bureaucrats’ opinions, Dargent, Feldmann, and Luna (2017) “analyses the evolution of state capacity in Peru during the recent commodity boom,” while Luna and Toro (2014) and Luna and Soifer (2017) employ a survey-based design to measure contemporary subnational state capacities. While these measurements do overcome the conceptual and analytical problems mentioned above, they do not help us in studying state capacities in a historical setup.

Still, economic historians offer other alternatives to proxy levels of state capacity over time. Some examples are levels of investments in public goods such as infrastructure (Enriquez, Sybllis, and Centeno 2017), roads (Mann 1984, 2008; Acemoglu 2005; Saylor 2012; Thies 2009; Besley and Persson 2010), electrification (measured as light intensity per pixel, Huntington and Wibbels (2014)), and railroads (Saylor (2012, 302), Coatsworth (1974)).

Unfortunately, many of these measurements are debatable. For instance, Soifer (2012, 593) explains that “railroads were often constructed by private actors.” The same problem applies to other types of infrastructure.

There are other more appropriate strategies such as the opening of postal offices (Acemoglu, Moscona, and Robinson 2016), the administration of national censuses (Lee and Zhang 2017; Soifer 2013; Centeno 2002; Hanson and Sigman 2013; Hanson 2015). Another variation of this technique is “age heaping” or vaccination (Soifer 2012).

While these measurements do capture historical variations of state capacity, some other problems arise. Censuses, for example, provide a non-continuous temporal measurement of state capacities. For instance, censuses are applied in Chile every ten years, so having just a few snapshots of state-capacity should compromise any statistical analysis. In turn, vaccines are usually targeted at primary and high school students. In practice, vaccines are administered by the schools themselves, both public and private. Private schools might be more efficient in doing so, inflating the average level of state capacity.

To solve some of these limitations, the paper proposes earthquake death tolls as an alternative to measure state capacity over time. In particular, the proposed measure is explained leveraging

the Chilean case. Unlike censuses—*unfortunately*—earthquakes happen in Chile often. While “[e]arthquakes alone claim thousands of lives a year” (Anbarci, Escaleras, and Register 2005, 1908), they are not well studied in political science (Brancati 2007, 719). Building on Mann (1984, 113), the proposed measurement intends to capture the state’s *infrastructural* power, that is, “the capacity of the state [to] actually [...] penetrate civil society, and to implement logically political decisions throughout the realm.”

Natural hazards involve two kinds of processes, one natural and another human (Raschky 2008, 627). In the case of earthquakes, the natural component happens at random, and as a consequence, they are exogenous to the affected locality. For instance, Brancati (2007, 728) explains that “earthquakes constitute a natural experiment,” while Gignoux and Menéndez (2016, 27) also point out “that the occurrence of earthquakes can be viewed as random [allowing the analyses of] these events as a set of repeated social experiments.” In fact, earthquakes are orthogonal to levels of state capacity and economic development (Kahn (2005, 271) and Brancati (2007)).

Since the natural process associated with the realization of earthquakes is random, the only unexplained part that is left is the systematic human component, which is what the measurement captures. Consequently, keeping earthquake magnitudes constant at their means, (population-weighted) death counts should be attributed to the (*in*)capacity of the states to invest in preparedness and earthquake-mitigation institutions.

I focus on earthquakes and not on other natural disasters, such as “extreme temperature events, floods, landslides, and windstorms” (Kahn 2005, 280), because earthquakes cannot be foreseen and, as such, they put to the test the states’ capacity for having their preventive institutions *already* in place and in good shape. In fact, Brancati (2007, 716) explains that “[e]arthquakes may provoke conflict more than any other type of natural disaster because they have rapid onsets [and] are not predictable.”<sup>8</sup> State capacity consists of sustained proactive efforts of enforcing institutions in the territory and hence, short-term reactive actions should not be considered state-*making*.

Under reasonable assumptions, the capacity of deploying inspectors to enforce quake-sensitive zoning and building codes should be a reflection of the overall levels of state capacity. In fact, Ambraseys and Bilham (2011, 153) explain that “[e]arthquake-resistant construction depends on responsible governance,” while Raschky (2008, 628) argues that the effects of natural hazards depend on the region’s “institutional vulnerability.” Thus, state capacity acts as a scope condition

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8. My emphasis.

undermining (facilitating) the implementation of construction norms. For example, Bilham (2013, 169) explains that “although engineering codes may exist[,] mechanisms to implement these codes are largely unavailable” in low-capacity states. For example, Anbarci, Escaleras, and Register (2005, 1910) explain that “while Iran has building codes [...] comparable to those existing in the United States, they tend to be enforced only in the country’s larger cities,” not in the countryside.

Only high-capacity states implement and enforce quake-sensitive regulations. The Chilean government started its efforts to ameliorate the impact of earthquakes after the great quake of 1928 in Talca. A first effort happened in 1929 when *Ley* number 4563 was implemented. The law was among the first attempts to prohibit “construction, reconstruction or any other repairing or transformations [...] without a permit from the authorities.” Importantly, the law required that all blueprints had to be signed off by an expert before the construction started. By 1930, *Decreto* number 4882 was adopted, but this time the rule made a number of technical prescriptions,<sup>9</sup> determining what kinds of construction materials ought to be used, among other requirements. Critically, while the central government had retained the control of the supervision of the code since the promulgation of the *ley*, the *decreto* explicitly created the role of the *inspector* to supervise, enforce, and monitor these measures at the local level. Furthermore, *artículo* 414 of the Chilean *Decreto* 4882 granted inspectors “free access to the building” at any time during the construction process. The proposed measurement captures whether these good intentions achieved lower death tolls.

The proposed measurement has a number of advantages. Unlike non-experimental survey-based or purely policy-based measures, earthquake death tolls are an objective measurement of earthquake preparedness, an activity that any state must perform. For instance, Carlin, Love, and Zechmeister (2014, 422) explain that “a basket of ‘minimal’ state functions [typically includes] primary education, public health, [the] rule of law, public finance management, and disaster relief.”

However, the measurement has a number of drawbacks. Obviously, the country needs to have earthquakes, possibly limiting the number of potential cases. Yet, good indicators of state capacity also suffer from the same problem (i.e. context-specificity). For instance, Soifer (2012, 593) and Slater (2008, 252) propose a measurement based on whether states are able to enforce voter registration “where voting is mandatory,” or conduct “state registration of marginal populations,” respectively, limiting the study of state-capacity to democratic countries only. This is not only a

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9. See, especially, article 151.

democracy-specific limitation but also a temporal one.

One advantage that actually mitigates some of these drawbacks is that most earthquakes occur at the various borders of the Pacific, Latin American, African, Arabic, Indian and Eurasian plates, allowing a number of potential cross-country comparisons (Keefer, Neumayer, and Plümper 2011, 1534). In fact, from a population size perspective, this measurement is also a convenient one. A “quarter of the world’s population inhabits [...] the northern edge of the Arabian and Indian Plates that are colliding with the southern margin of the Eurasian Plate” (Bilham and Gaur 2013, 618).

Additionally, there are countries like India or the United States where earthquakes happen only in certain regions. Presumably, mitigation policies in these places would need to be targeted to specific areas, possibly undermining the assumption that these kinds of policies should penetrate the entire territory. For instance, Dunbar, Bilham, and Laituri (2003, 164) explain that the Indian state implements targeted policies (that might not necessarily correspond to the administrative areas) based on isoseismal maps that define different zones of seismic hazard.

Another potential concern is that the ability to count the death toll might be a function of state capacity itself.<sup>10</sup> However, in most cases, civic organizations, the Catholic Church, and, particularly, the press (national and local) have been the main entities who (willingly or not) have carried out the task of enumerating the deaths. Another potential issue is the measurement of the magnitudes. Before the instrumental period, magnitudes were obtained in an estimative way and, while there are methods to approximate historically-felt magnitudes to instrumental-like intensities (Szeliga et al. 2010), this strategy, unfortunately, adds more than one layer of complexity. All in all, this measurement offers a rough approximation of levels of state capacities over time.

#### IV. EMPIRICAL SECTION

The theory should pass two tests. First, the implementation of the income tax should be associated with the rising of the industrial sector. Given that all Latin American economies began by developing an agricultural sector first, the emergence of an industrial sector can be conceptualized as a sectoral conflict. In other words, the timing of the rising of the industrial sector should coincide with the implementation of the income tax. Second, we should observe that once the income tax is implemented, we should observe higher levels of state development.

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10. I thank [ ] for this comment.

## I. Income Tax Adoption: Latin America

This section seeks to establish an empirical connection between sectoral conflict and the implementation of the income tax. All countries began as agricultural economies. Thus, sectoral conflict was proxied by measuring industrial development relative to agricultural sectoral growth rates, as presented in the MOxLAD data.<sup>11</sup> The dataset spans from 1900 to potentially 2010.<sup>12</sup> Since the idea is to capture the contribution of each individual sector, sectoral growths rates were not combined.

Using secondary information, [Table OA1](#) states when the income tax was implemented. [Figure 2](#) shows both sectoral outputs (independent variables), and the year when the income tax law was passed (dependent variable). Since population has been associated with the probability elites expand the franchise—and consequently the tax base, Engerman and Sokoloff (2005, 892-893)—the total country-year population as a control variable was included.

complete  
table

[Table 1](#) shows 3 models.<sup>13</sup> Following Aidt and Jensen (2009), Model 1 computes the lagged conditional hazard ratio of a country which has not yet adopted the income tax, adopts it in a given year, as a function of industrial and agricultural outputs.<sup>14</sup> Countries drop out of the sample when they adopt the income tax. Lagging the independent variables should account for non-contemporaneous factors that might conflate the contribution of sectoral growths, such as prior state capacities, among others. Model 2 shows the estimated coefficients of a generalized estimating equation (GEE).<sup>15</sup>

Generalized estimating equations were introduced by Liang and Zeger (1986) to fit clustered, correlated, and panel data (Zorn 2006, 322). This method is especially well suited to analyze binary

11. Particularly, the *agriculture value-added* and *manufacturing value-added* variables. Both are expressed in local currency at 1970 constant prices.

12. Since countries are “censored” once they implement the income tax law, they leave the sample (potentially) before 2010. According to Astorga, Berges, and Fitzgerald (2005, 790), these data provide extended comparable sectoral value-added series in constant purchasing power parity prices. These data, and similar strategies, have been employed before (see Thies 2005)

13. All tables were produced using the `texreg` package (Leifeld 2013). All Cox models were computed using the `survival` R package (Therneau 2015). The GEE logistic regression was computed using the `geepack` package (Højsgaard, Halekoh, and Yan 2016). The simulations were performed using the `simPH` R package (Gandrud 2015).

14. Following Box-Steffensmeier and Jones (2004, 49), the next equation was fitted:

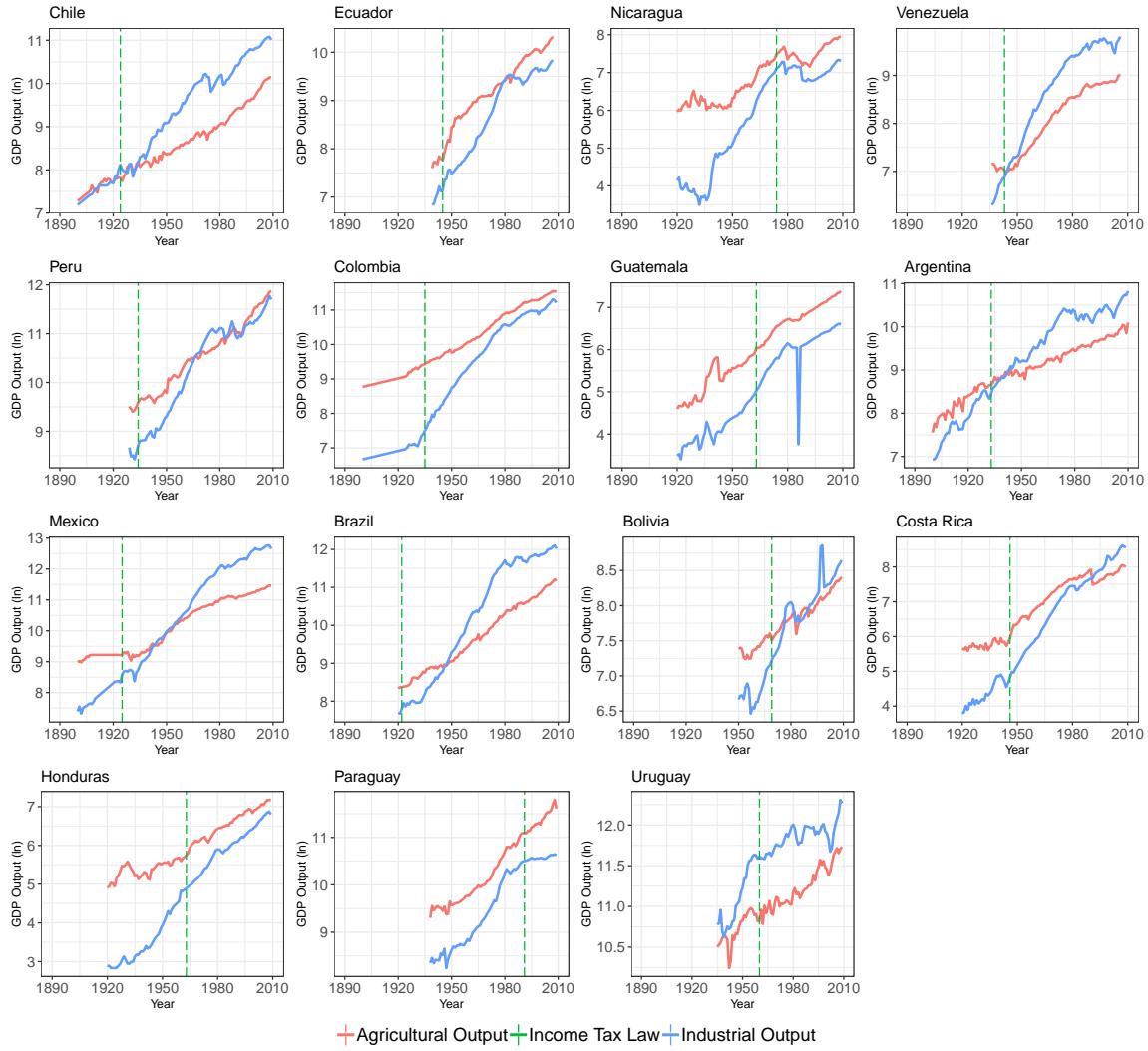
$$h_i(t) = \exp(\beta_1 \text{Industrial Growth}_{i,t-1} + \beta_2 \text{Agricultural Growth}_{i,t-1} + \beta_3 \text{Total Population}_{i,t-1}) h_0(t) \quad (1)$$

for all countries  $i$  and years  $t$ .

15. Following Zorn (2006, 331), the next equation was fitted:

$$\pi_{i,t} = \Phi(\beta_1 \log(\text{Industrial Growth}_{i,t}) + \beta_2 \log(\text{Agricultural Growth}_{i,t}) + \beta_3 \log(\text{Total Population}_{i,t})) \quad (2)$$

where  $\pi$  is the logit link function, and  $\Phi$  is as scale parameter (i.e. the cumulative distribution function), for all  $i$  countries, and  $t$  years.



**Figure 2: Industrial and Agricultural Outputs, and The Passage of the Income Tax Law in Latin America.**

**Note:** Figure shows historical sectoral outputs, and year of the passage of the income tax law. Following convention, the figure shows logged values. Figure shows all countries for which there were complete data.

**Source:** *MoxLAD*, and other sources compiled by the author (see *Table OA1*).

data (Hanley et al. 2003).<sup>16</sup>

16. GEE methods require analysts to parameterize the working correlation matrix. Though GEE are robust to misspecified correlation structures (Hedeker and Gibbons (2006, 139), Westgate and Burchett (2017), Gardiner, Luo, and Roman (2009, 227), Carlin et al. (2001, 402)). Zorn (2006, 338) explains that whereas the choice of estimator makes little or no difference, the unit on which the data are grouped makes a big difference. Hence, following Hardin

	(1) Cox (1 lag)	(2) Logit GEE	(3) Conditional Logit (FE)
Manufacture Output <sub>t-1</sub>	2.033*** (0.682)		
Agricultural Output <sub>t-1</sub>	-2.438*** (0.857)		
Total Population	0.000* (0.000)		
Manufacture Output (ln)		1.384*** (0.357)	0.227** (0.095)
Agricultural Output (ln)		-1.827*** (0.421)	-0.330* (0.173)
Total Population (ln)		1.424*** (0.408)	0.983*** (0.225)
AIC	33.311		9043.609
R <sup>2</sup>	0.049		0.223
Max. R <sup>2</sup>	0.110		0.997
Num. events	15		1258
Num. obs.	415	1658	1658
Missings	0		0
PH test	0.017		
Num. clust.		20	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Robust standard errors, models 1 and 2. Country fixed effects in 3. Intercept omitted.

**Table 1:** Sectoral Origins of Income Taxation: Income Tax Law and Industrial Development

Substantively, GEE models provide an estimated marginal mean, or the *weighted average* of all cluster-specific effects (or conditional means). Model 3 is a conditional logit model (“fixed effects”).<sup>17</sup> One important advantage of this strategy is the ability to account for country-specific effects. For example, fiscal expansion could be a function of country-specific prior state-building capacities.<sup>18</sup> A number of scholars rightly argue that post-colonial state-capacities are in part a function of pre-colonial state-capacities (Wimmer 2016, 1416, Mahoney 2010, Lange, Mahoney, and Hau 2006, 1426). Fixed-effects should be able to account for these and other unobserved or hard-to-measure covariates, which if left unaccounted for, would introduce omitted variable biases (Angrist and Pischke 2008).

All models suggest that the rise of a strong industrial sector largely accelerates the implementation of the income tax law. Moreover, a strong agricultural sector not only has zero impact on fiscal development, but a negative one. Using the estimations from Model 1, I follow Gandrud (2015) and King, Tomz, and Wittenberg (2000), and in [Figure 3](#), simulate 1,000 times the hazard rate of implementing the income tax law, conditional on industrial and agricultural growth rates.<sup>19</sup> Since the hazard rate “is the probability that a case will fail at time  $t$ ” (Licht 2011, 231), I take advantage of this quantity of interest which allows some dependency on both time *and* the covariates (Box-Steffensmeier and Jones 2004, 15). [Figure 3](#) strongly suggests that the faster the agricultural sector develops, the less likely the implementation of the income tax. This relationship does not change at later stages of development, suggesting that polities with a strong agricultural elite are not associated with fiscal development. However, rapid industrial development is associated with an earlier implementation of the income tax law.

## II. Positive Spillover Effects of Income Taxation: Chile

Fiscal sociologists, mostly focusing on the continental cases, have for a long time claimed that the capacity of taxing individuals’ incomes fosters overall state capacity. Unfortunately, there are no

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and Hilbe (2013, 166) the “independence” working covariance structure was used, which also corrects for small-sized panel designs.

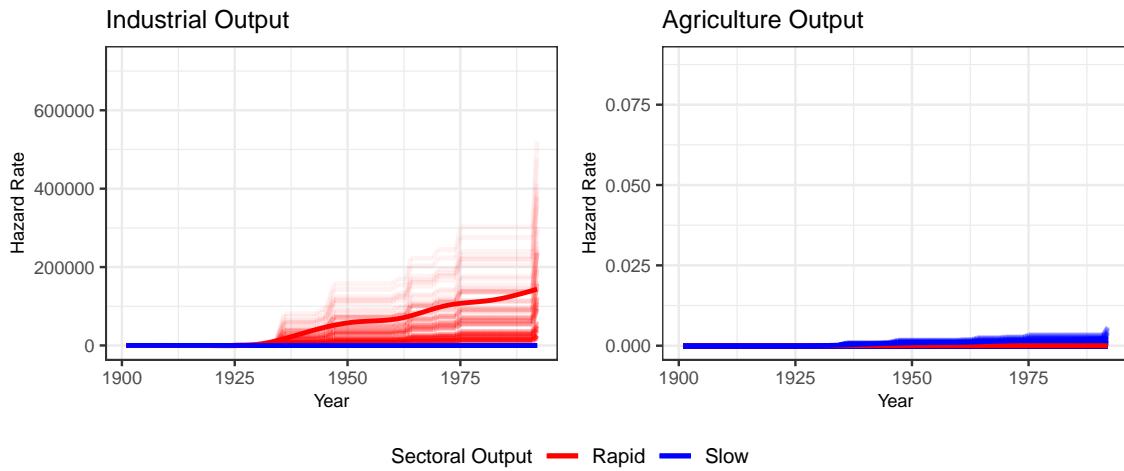
17. More formally,

$$\pi_{i,t} = \Phi(\beta_0 + \beta_1 \log(\text{Industrial Growth}_{i,t}) + \beta_2 \log(\text{Agricultural Growth}_{i,t}) + \beta_3 \log(\text{Total Population}_{i,t}) + \alpha_i) \quad (3)$$

where  $\alpha$  are the country fixed effects for all countries  $i$ .

18. I thank Matthias vom Hau for this suggestion.

19. Box-Steffensmeier and Jones (2004, 15) explain that the hazard rate is the most common quantity of interest analysts focus on. [Figure 3](#) shows 95% confidence intervals.



**Figure 3: Hazard Rate of Implementing the Income Tax Law in Latin America.**

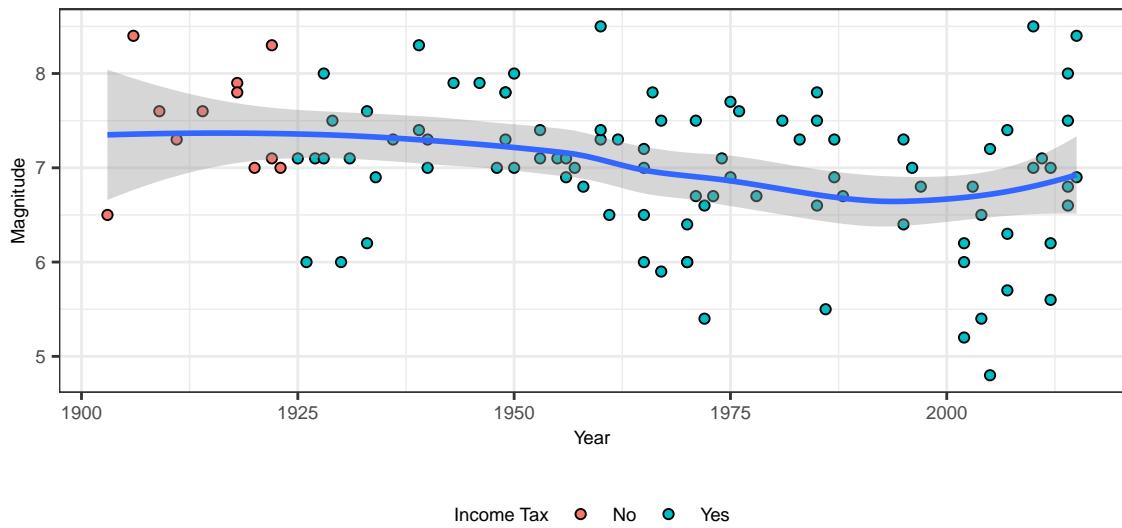
*Note:* Using estimations of Model 1 in Table 1, figure shows 1,000 simulations with different sectoral growth speeds. ‘Slow’ is the minimum value, while ‘rapid’ is the maximum value for each sectoral output. The figure also shows the 95% confidence intervals.

attempts to study this relationship for the Latin American cases. The results presented in this paper find support for this claim.

Previous section suggests a strong relationship between levels of sectoral conflict and the implementation of the income tax law in most Latin American countries. The stronger the industrial sector, the sooner the tax is implemented. This section seeks to establish an empirical link between the implementation of the tax, and higher levels of state development. Due to data availability, this section focuses on Chile only.

I constructed a novel hand-collected longitudinal dataset using the *Significant Earthquake Database* compiled by the National Centers for Environmental Information (NOAA) as a starting point (NGDC/WDS, National Geophysical Data Center / World Data Service 2015). The dataset “contains information on destructive earthquakes from 2150 B.C. to the present,” such as magnitude, date, latitude, longitude, number of deaths, among other variables. Tsunami casualties were excluded. Additionally, since “most of the damage in major earthquakes occurs within 30 km of the epicenter” (Dunbar, Bilham, and Laituri 2003, 172), earthquakes that did not happen on land were not dropped. While the epicenter might have been a few miles away from the shore, the consequences certainly reached the land.

Using archival census data from 1907 to 2012,<sup>20</sup> the NOAA dataset was complemented with local population measures at the municipal level where the quake hit. The local population was used to weight the death toll.<sup>21</sup> Adding archival census data, I coded the main economic activity of the affected municipality<sup>22</sup> and whether the municipality was urban or rural.<sup>23</sup> The death-tolls and magnitudes proportionated by the NOAA dataset were contrasted case by case with historical press archival information.<sup>24</sup> Magnitudes, in particular, were also compared with the International Seismological Centre.



**Figure 4: Earthquakes in Chile: 1903-2015.**

**Note:** Figure shows earthquakes over time ( $N=103$ ). Additionally, the figure shows earthquakes before and after the implementation of the income tax in 1924. A smoothing function was added to show that there are not statistically significant decreases/increases in magnitudes over time.

20. Particularly, censuses of 1907, 1920, 1930, 1940, 1952, 1960, 1970, 1982, 1992, 2002 and 2012. Some of them were kept at the *Biblioteca Nacional* and others at the *National Statistic Institute* historical library.

21. Around 90% of the time it was possible to recover the actual local population. For the rest, the population of the most concentrated area nearby was recovered. Consequently, population is used as a control, not to weight the dependent variable directly.

22. This variable was constructed by coding press and official sources (mainly censuses) of the main economic sector at the local level: *Agriculture* (n=31), *Industry* (n=56), *Mixed* (n=16).

23. Urban=85, rural=18. If more than 50% of the population lived in an urban setting, I assigned a 1 to that municipality, 0 otherwise. Urban concentrations are most likely to have vertical constructions rather than one-story buildings, increasing the potential number of casualties. Consequently, it is important to control for this source of variation. I thank Daniel Kelemen for this suggestion.

24. *El Mercurio* and *La Nación* newspapers, both kept at the *Archivo Nacional* of the *Biblioteca Nacional de Chile*.

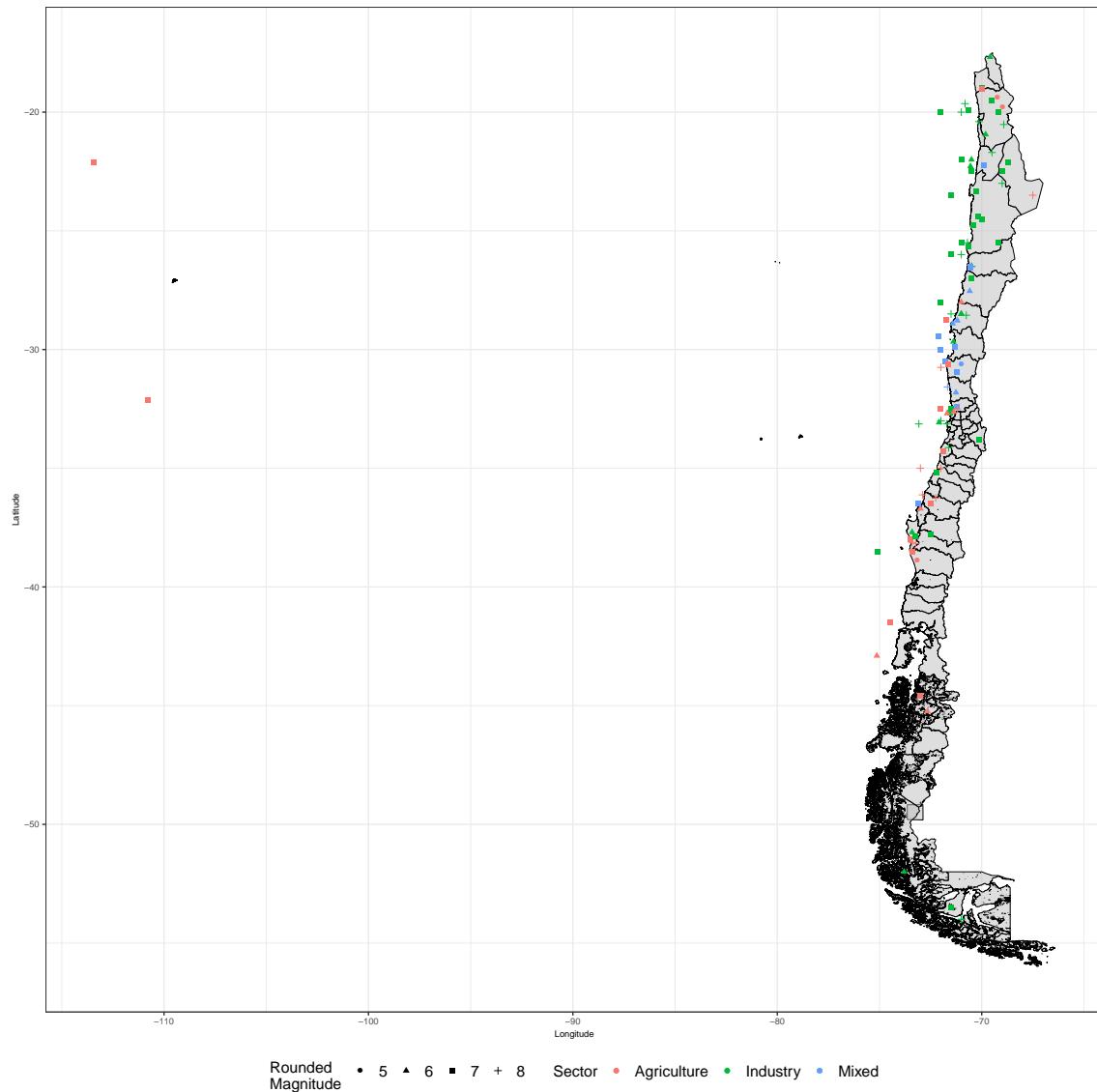
[Figure 4](#) plots the over time variation, while [Figure 5](#) plots the geographical variation, and the dominant productive sector at the municipal level. Both figures suggest that Chile is a good case to study infrastructural state capacity using the earthquake framework: Chile has considerable variance regarding quake magnitudes, locations, and sectoral variation. The northern part of Chile has historically been an industrial region, while the southern part of Chile has traditionally been agricultural. Both have been affected by earthquakes in a similar fashion. Relatedly, both regions vary according to their climate (which correlates with agriculture). Furthermore, the distance from Santiago, which is located near latitude  $33^{\circ}$ , might impose some degree of difficulty for the central government to reach the farthest northern/southern parts of the territory ([Foa and Nemirovskaya 2016](#), 418). However, the central part also has considerable earthquake activity. There is also variance considering longitude. Closeness to the Andean mountains (around longitude  $70^{\circ}$ ) determines the ruggedness of the terrain, presumably making it harder for the state to penetrate these areas. In fact, [Brancati \(2007, 729\)](#) explains that “[e]arthquakes often occur in mountainous areas.” All things considered, earthquakes have affected the territory from coast to mountain, both north and south, close and far away from Santiago, and in both agricultural and industrial areas, solving potential concerns about geographical sectoral self-selection. For instance, it would have been a problem that a specific sector, say the industrialists, were located *only* in the northern part, which is the most earthquake-prone area.

Following conventional wisdom, the unit of analysis is the earthquake ([Kahn 2005](#), 273). As an event, each earthquake is associated with a death toll, a location, a magnitude, a local population, and an urban/rural setting. Following statistical convention, a count model was used to test the effect of implementing the income tax law on earthquake death tolls over time ([Anbarci, Escaleras, and Register \(2005, 1907\)](#), [Kahn \(2005, 276\)](#), [Brancati \(2007, 729\)](#), [Escaleras, Anbarci, and Register \(2007\)](#)), specifically a Bayesian Poisson regression was employed.

The main quantity of interest is an interaction term— $\beta_3$  in [Equation 4](#)—between earthquake magnitude and a binary variable that denotes whether the income tax had been implemented at the time of the event. The idea is to inspect whether the baseline propensity of the earthquake’s magnitude of increasing the death toll is modified when combined with the introduction of the income tax. The null hypothesis is that the income tax does not alter this baseline propensity. The alternative, however, is that introducing the income tax decreases (increases) the propensity.<sup>25</sup>

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25. While the main model does not include year fixed effects (due to multicollinearity issues), another model (not



**Figure 5: Data Used in the Analyses: Geographical Distribution of Earthquakes in Chile, 1903-2015.**

*Note: The figure shows a total of 103 earthquakes using a combination of archival information and external sources. Each quake was colorized according to the predominant economic sector at the municipal level. In total, there were 31 earthquakes that took place in agricultural localities, 56 in industrial, and 16 in mixed municipalities.*

In addition, the local population was used to proxy for local economic development (Sokoloff and Engerman 2000). Since the idea is to account for the state's ability to enforce building codes

and zoning laws, it is important to control for the capacity wealthier localities might have had to enforce those norms on their own—i.e. without the need of the state.

Latitude was included to control for the proximity to the Andean mountains, aiming to control for a built-in tectonic earthquake predisposition. Longitude seeks to control for climate and other unmeasured conditions that make agricultural development more difficult. In turn, both measurements serve as good proxies of terrain ruggedness and the difficulties the state faces in reaching these areas.

Undoubtedly, there are many more factors that might increase death tolls. Ambraseys and Bilham (2011, 154), for example, explain that the “number of fatalities depends on whether an earthquake happens at night or during the day, in the winter or in the summer, in a mountainous region or in a valley, after strong and protracted fore-shocks and with or without warning.” While the model has some of these factors accounted for, complete hourly data is lacking. However, Lomnitz (1970, 1309) explains that “some of the larger Chilean earthquakes which have caused deaths” between the 1900’s and the 1960’s have been afternoon quakes. Other factors such as “the speed of tectonic movements [and] the degree to which the lower plate bends the upper plate” and the focal depth (Keefer, Neumayer, and Plümper 2011, 1534) could not be included due to the lack of complete data over time.

All in all, the next equation was fitted:<sup>26</sup>

$$\begin{aligned}
 \text{Deaths} &\sim \text{Poisson}(\lambda_i) \\
 \log(\lambda_i) = &\mu + \beta_1 \text{Magnitude}_i + \beta_2 \text{Income Tax}_i + \\
 &\beta_3 \text{Magnitude}_i \times \text{Income Tax}_i + \\
 &\beta_4 \text{Population}_i + \beta_5 \text{Longitude}_i + \beta_6 \text{Latitude}_i + \\
 &\beta_{7,k} \text{Sector}_i
 \end{aligned} \tag{4}$$

where

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shown) including year fixed effects was fitted. The results are the same. The advantages of the fixed effects model is that it accounts for country-specific prior state capacity levels and other unmeasured yearly factors. I thank Hillel Soifer for this suggestion.

26. All parameters  $\beta \sim \mathcal{N}(0, 0.0001)$ , all precisions  $\tau \sim \mathcal{G}(1, 1)$ , while  $\mu \sim \mathcal{N}(0, 0.0001)$ . Traceplots—not shown but available upon request—indicate that the model has good mixing.

$i_{1,\dots,I}$  and  $I = 103$  events;

$k_{1,\dots,K}$  and  $K = 3$  sectors.

	Mean	SD	Lower	Upper	Pr.
Income Tax	108.26	4.13	101.29	115.01	1.00
Magnitude	17.88	0.52	17.05	18.69	1.00
Income Tax * Magnitude	-13.34	0.49	-14.14	-12.51	1.00
Latitude	-0.87	0.03	-0.90	-0.85	1.00
Longitude	4.40	0.13	4.34	4.46	1.00
Population	0.04	0.00	0.04	0.04	1.00
Sector[Agriculture]	33.79	51.57	-66.52	136.86	0.74
Sector[Industry]	30.83	51.57	-69.54	134.03	0.72
Sector[Mixed]	34.56	51.57	-65.80	137.72	0.75

**Note:** 300,000 iterations with a burn-in period of  $n = 30,000$  iterations discarded.

95% credible intervals (upper/lower bounds). All R-Hat statistics are below critical levels.

Standard convergence diagnostics suggest good mixing and convergence.

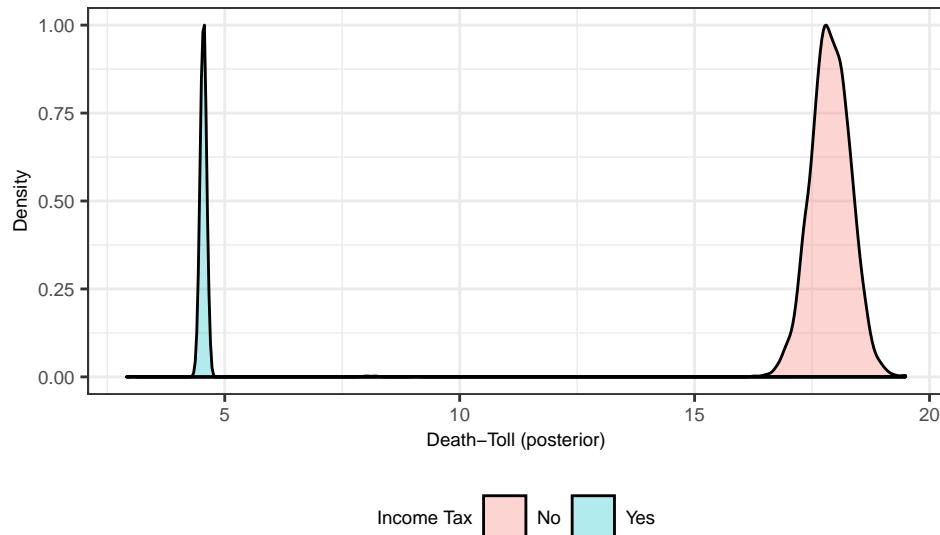
A total of five chains were run.

**Table 2: The Spillover Effects of Income Taxation in Chile: Simulated Posterior Predictions (Poisson Regression, Equation 4).**

While Table 2 shows the estimated results, the coefficient of the interaction term (i.e.  $\beta_3$ ) remains uninterpretable from a substantive standpoint (Brambor, Clark, and Golder 2006, 74). The problem becomes more complex when it comes to generalized models (such as Poisson models), as a number of challenges arise. In an important paper, Ai and Norton (2003) explain that the interaction effect could be nonzero, even when the coefficient says it is zero; the statistical significance of the interaction effect cannot be tested with a simple t-test on the coefficient of the interaction term; the interaction effect is conditional on the independent variables; and that the interaction effect may have different signs for different values of covariates. In addition to all these challenges, and given that cross-partial derivatives are also not advisable, simulation methods are required (Zelner 2009; King, Tomz, and Wittenberg 2000). This procedure samples via simulation from the point estimates, generating a new and larger distribution. That is, taking the single estimated parameters (i.e. the regression coefficients), a new distribution of estimated values for each coefficient is constructed. Relying on the central limit theorem, the new simulated distribution is a transformation that approximates with a great degree of precision the (uninterpretable) coefficients with enough sampling draws.

Subsequently, means and uncertainty measures can be constructed for each of these distributions.

Fortunately, Bayesian methods have embedded a systematic and intuitive framework to solve these challenges. In particular, for every coefficient, I estimated five chains with 300,000 iterations per chain. Considering the Monte Carlo Markov Chain properties, the first 30,000 iterations of every chain were discarded. Following Brambor, Clark, and Golder (2006), Figure 6 shows the conditional effect of earthquake magnitudes on implementing the income tax.<sup>27</sup>



**Figure 6: Conditional Effects of Earthquake Magnitudes on Implementing the Income Tax Over Time in Chile.**

*Note: Using the estimations from Table 2 (Equation 4), and following the advice of Brambor, Clark, and Golder (2006), the figure shows the conditional effect of earthquake magnitudes on implementing the income tax in Chile in 1924 ( $\beta_1 + \beta_3 \times \text{Income Tax}_i$ ). Particularly, by implementing the income tax, the baseline propensity of the earthquake's magnitude of increasing the death toll decreases from an estimated overtime average of eighteen to an estimated overtime average of five. Hence, the figure suggests that implementing the income tax law had positive effects on state capacity over time. Both distributions were computed via a MCMC routine, particularly the iteration of five chains with 300,000 iterations per chain. Considering the Monte Carlo Markov Chain properties, the first 30,000 observations of every chain were discarded.*

Substantively, Figure 6 shows that the death toll systematically *decreases* over time—i.e. levels of state capacity systematically increase over time—*once the income tax law is implemented*. Particularly, by implementing the income tax, the baseline propensity of an earthquake increasing

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27. Based on Equation 4, the simulated matrix was constructed following the routine described above, iterating over the next generalized equation:  $\beta_1 + \beta_3 \times \text{Income Tax}_i$ .

the death toll decreases from an estimated over time average of *eighteen* to an estimated over time average of *five*.

As argued before, a potential issue might be that sectors self-select into more/less earthquake-prone geographical locations. For instance, it might be argued that agricultural areas, being mostly rural, might have lower constructions and less populated areas, potentially having lower earthquake death tolls. Industrialists, in turn, being a more urban-oriented sector, might have highly populated municipalities and higher constructions (edifices), potentially showing higher death tolls.

To rule out this possibility,  $\beta_{7,k}$  in [Equation 4](#) has a hierarchical structure which allows having three different intercepts, one per every  $k$  sector. In other words, this parameter shows whether earthquake death tolls are systematically higher in agricultural, industrial, or mixed municipalities. [Table 2](#) strongly suggests that industrial areas do not have higher earthquake death tolls when compared to agricultural areas. The posterior predicted means for the former are 31 deaths and for the latter, 34 deaths. Similarly, mixed municipalities have a predicted death toll of 35.

Finally, it could be argued that the idea of sectoral conflict is overstated and that they were not conflicting sectors. Some historians claim that there was just one economic and political elite, invested in both sectors. Since landowners also invested in industry ([Kirsch \(1977, 57, 95\)](#), [Bauer \(2008\)](#), [Coatsworth and Williamson \(2002, 23\)](#)), it could be argued that there was a blurry class division between the industrial and agricultural sectors ([Bauer 2008, 30, 44, 94, 108](#)). Perhaps the most cited reference regarding this issue is [Veliz \(1963, 231-247\)](#).

However, there are a number of stylized facts that strongly suggest that there was indeed a structural cleavage between the two sectors. For example, it was common that industrialists invested in real estate, yet, 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.”<sup>28</sup> In fact, this practice shows how the credit system was oriented to give an unfair advantage to the landed elites. [Unda \(2017, 9\)](#), for instance, explains that in Mexico, industrial elites complied with the income tax in exchange for having a credit system more adequate for them. Similarly, [Zeitlin \(1984, 174\)](#) finds “the combined ownership of capital and landed property was a distinctive quality of *certain* [elites] actors,”<sup>29</sup> not *all* their members. There were also other instances where miners invested in

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28. My emphases.

29. My emphasis.

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. And finally, 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.”

There are also structural reasons to believe that cross-sectoral investments were not efficient. The “dual sector” model argues that the economy is divided into agriculture and industry (Jorgenson 1961, 311). One finding of this paradigm is that the “natural” structural role of the agricultural sector is to provide labor and cheap foodstuff to the industrial sector (Ranis and Fei (1964, 114), Reyes (2015, 129)). For instance, 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.”<sup>30</sup> The rationale is that more efficient agricultural techniques make agricultural production less labor intensive, allowing landowners to free workers that the industrial sector can rely on (Johnston 1951, 498). A surplus of labor naturally leads to a reallocation of redundant workers into the industrial sector, which is the crux of economic development (Ranis and Fei (1964, 7), Leibenstein (1957, 51)). Nurkse (1953), in fact, argues that development means to employ the surplus labor. Similarly, Matsuyama (1991, 621-622) points out that “[i]ndustrialization [*consists of*] a shift of resources from agriculture to manufacturing.”

## V. DISCUSSION

The paper sketched an argument about how higher levels of sectoral contestation increased state capacity over time. Particularly, it explained how the emergence of industrial elites posited credible threats to incumbent landowners, pushing agricultural and industrial elites to reach agreements that materialized in investments in state-making institutions (the income tax), which in turn fostered higher levels of state consolidation over time.

The empirical analyses showed that earthquake death tolls decrease (i.e. state capacity increases) after the income tax law is implemented and that the emergence of the industrial sector accelerated the implementation of the income tax.

Enforcing quake-sensitive building codes embodies the most basic form of social contract that exists between the state and its subjects. Earthquake damage poses a major threat to commercial,

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30. My emphases.

official, and residential buildings, potentially triggering higher levels of looting and social unrest. Any kind of political leader should be interested in preventing looting and social unrest. Leaders not only care about their own survival but also about the legitimacy of the state. In the event of heavy social unrest, not only is the essential social Hobbesian-like contract broken, but the expectations of social peace are also questioned (Carlin, Love, and Zechmeister 2014, 419). The physical presence of the state literally crumbles when institutions of social coercion and discipline, such as state schools, prisons, and police stations, collapse. For example, when the magnitude 7.0 earthquake hit Haiti in 2010, the *Prison Civile de Port-au-Prince* had a population of 4,500 inmates. During the quake, five inmates died. As a prison guard describes it, “everyone escaped. Everyone. Except the dead.” This natural disaster exacerbated the already existent chaos, freeing “gang bosses, kidnappers, gunmen,” among others (Reed 2011; Laursen 2010), reducing the legitimacy of the state to zero.

Finally, income taxation did even more than just trigger other state capacities. Via a process of assimilation, it also helped in constructing the figure of the citizen, centered on the concept of the taxpayer. Regardless of an individual’s race, religion, culture, or any other kind of status, the state classifies its subjects according to their incomes and obliges them to pay, punishing whoever refuses to do so. From a sociological standpoint, this “generality makes taxation a crucial element in the development of the “imagined community” (Anderson 2006), of the modern nation-state [...] Taxation enmeshes us in the web of generalized reciprocity that constitutes modern society” (Martin et al., in Martin, Mehrotra, and Prasad 2009, 3).

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.....Word count: 8,260 .....

## VI. ONLINE APPENDIX

Country	Available Data	Year Income Tax	Law	Source
Chile	1900 - 2009	1924	<i>Ley</i> 3996	Mamalakis (1976, 20) and <a href="#">LeyChile.Cl</a> (official)
Peru	1929 - 2009	1934	<i>Ley</i> 7904	Gobierno del Perú (1934) (official)
Venezuela	1936 - 2006	1943	<i>Ley</i> 20851	<i>Gaceta Oficial</i> (official) and Ventura and Armas (2013, 27)
Colombia	1900 - 2009	1935	<i>Ley</i> 78	Figueroa (2008, 9)
Argentina	1900 - 2010	1933	<i>Ley</i> 11682	<a href="#">Infoleg.Gob.Ar</a> (official)
Mexico	1900 - 2009	1925	<i>Ley de Impuesto sobre la Renta</i>	Unda (2017, 8)
Ecuador	1939 - 2007	1945	-	Aguilera and Vera (2013, 135)
Nicaragua	1920 - 2009	1974	<i>Ley</i> 662	<a href="#">Legislacion.Asamblea.Gob.Ni</a> (official)
Guatemala	1920 - 2009	1963	<i>Decreto</i> 1559	Instituto Centroamericano de Estudios Fiscales (2007, 165)

**Table OA1:** Sample, Data Available, and Year the Income Tax was Implemented



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# Aiming Right at You: Group versus Individual Clientelistic Targeting in Brazil

Héctor Bahamonde

**Abstract:** Do parties target individuals or groups? Although this question is fundamental to understanding clientelism, the literature does not offer an answer. This paper argues that, depending on certain conditions, brokers target individuals when they are identifiable, and groups when brokers need to rely on the spillover effects of clientelism. Both identifiability and spillovers depend on individual poverty, group poverty, and political competition. Though the theory I outline focuses on targeting, I also argue that structural factors, such as the density of the poor, should be considered in the vote-buying literature. Structural factors are one of the few observables upon which brokers can base their decision regarding investing in clientelism. Using survey and census data from Brazil, the paper exploits variations in personal incomes within contexts of differing levels of municipal poverty. I find that political parties engage in segmented or ad-hoc strategies, targeting individuals when identifiability is high, and groups when there are economies of scale. Importantly, non-poor individuals can also be offered clientelism.

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There is no agreement on when, how, and why parties choose to aim clientelist practices at individuals or groups.<sup>1</sup> The distributive politics and vote-buying literatures have traditionally pursued one of two approaches. The former has mostly focused on group targeting, usually districts or provinces (Dixit and Londregan 1996; Khemani 2015; and Calvo and Murillo 2004), showing that incumbent parties deliver public-sector jobs or construction projects contingent on the support of groups of people. The latter has typically focused on individuals and their characteristics, such as their socio-economic or electoral profiles. Substantively, however, it is not clear when or why clientelist brokers use either strategy.

In fact, the decision to investigate group-based and/or individual-based targeting seems to be attributable to distinct research designs and agendas, rather than theory. For example, ethnographers generally focus on individuals, while others have traditionally focused on groups (Scott 1972; Auyero 2000; Szwarcberg 2013; Weitz-Shapiro 2012; and González-Ocantos et al. 2012).<sup>2</sup>

What is most concerning, however, is that it is relatively assumed or implied that individual and group clientelist targeting strategies are interchangeable, when they are clearly not. Individuals pertaining to groups and individuals by themselves have different incentives to defect to the incumbent. For instance, individuals belonging to larger groups have greater incentives to defect (Stokes 2005), while individuals who are personally targeted have fewer incentives to defect (Auyero 2000). Anticipating this, brokers adjust their strategies accordingly. In the first instance, brokers deal with low-informational environments that increase principal-agent problems. In the second instance, brokers – who know their clients better – are able to leverage this knowledge, reducing the probability of defection. However, these differences have not been sys-

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2 I wish to thank Ezequiel González-Ocantos for this suggestion.

tematized in the literature. In the present paper, I propose a framework that explains when it is more efficient to target groups or individuals.

Particularly, by focusing on brokers, the paper advances an argument about the decision process regarding whom to target. The crux of the argument is that this decision is a function of three factors: individuals' discount factors explained by income levels, the incentives of clientelist brokers to rely on spillover effects caused by the nesting structure of individuals (that is, whether individuals are nested in poor or non-poor contexts), and brokers' incentives to engage in clientelism explained by higher electoral pressures and political competition.

Overall, I share Carlin and Moseley's (2015: 14) opinion that "[e]xisting research looks almost exclusively at individuals' socio-economic and, specially, electoral profiles [and] [y]et our knowledge of who parties target remains incomplete." The present paper seeks to contribute to this issue by incorporating both structural and individual factors that foster clientelism in the same theory. Analytically, the structure of the argument (and the empirics) allows for disentangling the effects of "being poor" and "living in a poor area." Another important implication of the argument is that I am able to suggest why parties that adopt clientelism as a strategy, target their resources to both poor and non-poor individuals, an empirical regularity that, to the best of my knowledge, has been unexplored so far.

Perhaps the area in which there is the most agreement among scholars is on the relationship between poverty and vote-buying (Calvo and Murillo 2004; Weitz-Shapiro 2012; Kitschelt 2000; and Kitschelt and Altamirano 2015). For example, Brusco, Nazareno, and Stokes (2004), Stokes et al. (2013), and Nazareno, Brusco, and Stokes (2008) explained that since the poor derive more utility from immediate transfers than the uncertain returns associated with future policy packages, clientelist political parties only target the poor. In fact, Weitz-Shapiro explained that "[a]lmost universally, scholars of clientelism treat and analyze [this] practice as an exchange between politicians and their poor clients" (Weitz-Shapiro 2014: 12; my emphasis).

However, this canonical predictor has recently been contested (Hicken 2007: 55). Szwarcberg (2013: 32) "challenges the assumption [that brokers] with access to material benefits will always distribute goods to low-income voters in exchange for electoral support," while González-Ocantos et al. (2012) and Holland and Palmer-Rubin (2015) found that income (measured at the individual level) had little or no effect on vote-buying. In fact, Figure 1 shows that non-poor individuals in Brazil did receive clientelist offerings. *Why would brokers target non-poor individuals?*

And relatedly, *why does contemporary scholarly work report null findings for poverty, traditionally the most important predictor of vote-buying?* I present an argument where individual income alone is not relevant (similarly, see Weitz-Shapiro 2012: 568). What matters is how noticeable individuals are. Wealthier individuals living in poor contexts and poor individuals living in non-poor contexts are more identifiable, increasing their respective probabilities of being targeted. I also contend in this article that, in low-information environments, brokers use these kinds of observables to reduce the probability of defection of their clientele.

Another often-considered contextual factor in the literature is the size of the community in which clientelism takes place. Large-sized communities impose severe principal-agent problems. Stokes (2005: 323) explained that the “community structure” mediates the incentives to defect. Large communities make voters more anonymous, increasing their probability of defection. In fact, Rueda (2017: 164) found that in Colombia vote buying is more effective in contexts of small polling places.

Figure 1. Individual Wealth and Vote-Buying in Brazil



Note: Following the advice of Córdova (2008) and Córdova and Seligson (2009, 2010), different socio-economic variables in The Latin American Public Opinion Project (2010) dataset were used to construct a relative wealth index (RWI). With this information, in addition to the frequency of clientelism question (*clien1*), the figure shows that clientelist brokers target individuals at all levels of income.

Several scholars have then argued that brokers prefer smaller groups because individuals nested in small communities should defect less (Brusco, Nazareno, and Stokes 2004; Kitschelt and Wilkinson 2006: 10; and Magaloni 2008: 67. See also Bratton 2008, for Nigeria, and Gingerich and Medina 2013: 456, for Brazil). Yet, even when brokers might prefer to target small communities (with fewer voters relative to large communities), it is not clear how political parties gain enough electoral returns, especially considering that clientelism is expensive.

Vote-buying is an expensive strategy (Zarazaga 2014: 35), and more so when clients are individually targeted.<sup>3</sup> Stokes (2005: 317) argued that brokers develop skills that allow them to infer whether individual clients in small-sized communities voted for their party by looking at them in the eyes. Gay (1993, 1998) documented similar findings for the Brazilian case. This strategy requires brokers to sustain close relationships over time with their clients in a personal and individualized way. Knowing the clients' needs, delivering them benefits, monitoring their political behavior (and punishing them in case of defection), all in an individualized fashion, makes this strategy an extremely expensive choice – and it becomes even more expensive as more individuals are added to the broker's portfolio.

The cost of individual targeting increases linearly with the size of the targeted population (Hicken 2007: 56). This intuition is important because the brokers' production-possibility frontier cannot be shifted upwards either. Since the number of brokers is a depletable resource, at some point party machines run out of brokers, implying that monitoring capacities are bounded. In fact, Auyero (2000: 74) explained that the capacity brokers have to deliver benefits is "finite," and "only for a restricted number of people." However, and despite this constraint, brokers still have incentives to secure a large number of votes. Yet, the literature explains that clientelism should decrease in large communities. However, it is hard to conceive that brokers will stop being clientelist just because the size of the population is large. *A priori*, it seems a missed opportunity for brokers to let go of a large number of votes. In fact, survey data for the Brazilian case indicate that inhabitants of large, medium, and small municipalities are targeted in virtually the same proportion (Speck and Abramo 2001: 2). This article explains that when

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3 Dixit and Londregan (1996: 1147) explained that brokers track "constituents' likes and dislikes, *compulsively* participating in a spectrum of events [such as] baptisms and bar mitzvahs, weddings and funerals [and even, holding] *daily* meetings with constituencies [even] *after* nine o'clock [hearing] what anyone wished to tell [them]" (My emphasis).

brokers need to secure large amounts of electoral support, especially when political competition is high, they turn to group-targeting strategies, relying on the spillover effects of clientelism. In these contexts, clientelism mobilizes electoral support from “actual” and “potential” beneficiaries, minimizing the costs of clientelist targeting while maximizing electoral benefits, a mechanism that I explain later on in the paper.

Civic associations might help solve some of the challenges large-sized groups present to brokers. As low-information environments prevent brokers from really observing individual electoral behavior (Zarazaga 2014: 35), they usually resort to alternative methods that allow them to make safer inferences. For example, Schaffer and Baker (2015: 1094) argued that clientelism is “socially multiplied” as party machines target individuals “who are opinion-leading epicenters” in informal situations, or “partisan networks” (Calvo and Murillo 2013), in what has been called “organization buying” (Stokes et al. 2013: 250–251).<sup>4</sup> If parties buy “turnout” (Nichter 2008), then they will most probably target associations too, as “citizens immersed in clientelist networks [...] have a higher probability of voting than the rest” (Carreras and Castaneda-Angarita 2014: 7). I acknowledge the positive relationship between group membership and clientelism. However, what has not been explored yet is whether clientelism is explained by association membership itself, or by the fact that poor individuals usually address their problems as a *group*, since otherwise it would be too costly to solve them individually. If this is the case, group membership should be spuriously related to clientelism. While I find that group membership does have a positive effect on clientelism, I find that structural contexts that foster group-targeting have even more explanatory power.<sup>5</sup>

Moving forward, Weitz-Shapiro’s (2012) important paper found that in several Argentine municipalities, higher levels of political competition and low socioeconomic levels fostered higher levels of clientelism. In her paper, losses are conceptualized in terms of “moral costs.” Evidence for these types of costs has been presented in the literature very recently. For example, Carlin and Moseley (2015) argued that citizens

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4 Holland and Palmer-Rubin (2015: 16) explained that when “parties lack their own brokerage networks [they seek] to capitalize on organizational networks instead.” Similarly, Rueda (2015: 13) argued that parties tend to target very specific civic associations of “seniors and associations of single mothers, organizing trips to recreational centers outside the city where all their expenses are covered.” Paradoxically, the stronger the civic society (that is, the more organized it is), the more clientelism there is.

5 These results are presented in Figure A4.

endowed with more democratic values feel more “moral repugnance” to clientelism. Vicente (2014) showed that vote-buying practices have an “immoral/illegal connotation,” while González-Ocantos et al. (2012) found that individuals wanting to avoid social stigma usually do not give truthful answers when asked directly about clientelism. Building on this literature, I contend that when political competition is high, clientelism will be higher in contexts where poor individuals live in poor economic contexts.

## When Do Parties Target Individuals and When Groups?

Table 1 presents four ideal types in four quadrants; cases where individuals are highly identifiable; that is, non-poor individuals living in poor areas (Q1), and poor individuals living in non-poor areas (Q4). Identifiability in these cases reduces the cost of defection, permitting clientelist brokers to closely target individuals. While individual targeting is more expensive, it is also safer (compared to group targeting). The table also shows cases where individuals are hard to identify; that is, poor individuals living in poor areas (Q2), and non-poor individuals living in non-poor areas (Q3). In these cases, voters are more anonymous, making direct individual-based targeting and monitoring more costly. Since brokers still have incentives to seek electoral support, they engage in group targeting by relying on the spillover effects of clientelism. In these cases, the effects of vote-buying disseminates by mobilizing targeted voters and latent untargeted (but potential) clients. This form of targeting is cheaper but more uncertain.

**Table 1. Strategy Set: Group versus Individual Targeting**

	<b>Non-Poor Individuals</b>	<b>Poor Individuals</b>
High Competition	Poor Areas, identifiable, individual targeting.	Poor Areas, spillover effects, group targeting, cheap vote-buying.
Low Competition	Non-Poor Areas, group targeting, expensive vote-buying, lack of checks and balances, embezzlement.	Non-Poor Areas, identifiable, individual targeting.

Source: Author's compilation.

## Individual Targeting

This is the safest bet a broker can make, but also the most expensive one, as it requires brokers to have sustained closed relationships with their clients. For instance, Zarazaga (2014: 26) stated that “brokers have detailed information about their neighborhood and clients’ needs.” Keeping track of every single client (and their respective needs) is an expensive strategy. After all, as Auyero (2000: 73) put it, brokers are “problem solvers.” Importantly, the kind of care given ranges from material needs to symbolic and immaterial necessities, making clientelism a relationship based on “trust, solidarity, reciprocity, caring, and hope.” Such broker-client symbiosis is both material and personal-intensive, making it very costly. As an investment, however, it pays off electorally. The same detailed information brokers have about their clients’ needs is then used to infer coercively (or know directly) the electoral behavior of their respective clientele, administering punishments or rewards accordingly (Stokes 2005: 317).

The transaction costs of clientelism are reduced by targeting identifiable clients. In 2009, Luna et al. (2011) made extensive participant observations in several campaigns, accompanying a number of candidates for several months in their campaigns for the legislative election in Santiago de Chile. With one incumbent, we spent considerable time on the ground, traveling in her district. On several times, as we drove throughout the district in her personal car, the candidate was able to recall who the head of household was (including his/her name), what her district office had contributed to solve their needs, and whether the household members were on good terms with her.<sup>6</sup> Importantly, the economic diversity of the district provided a number of useful observables. In non-poor areas, poor houses with an unpainted wall, a rusty front yard fence, a two-story house with a bodega market on the first, a household with a broken window, or a junk diesel truck aground in the front yard, among others, provided distinctive points of reference. Identifiability, as an observable, made these receivers less anonymous, raising their cost of defection and making them more prone to cooperate. Table 1 portraits individuals living in these heterogenous contexts in Q4.

Households in Q4, being more noticeable, stand out in their respective contexts, making it easier for brokers to notice whether they need construction materials, whether there are wakes to which they could contribute flowers or birthday parties to which they could bring cakes. In

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6 The actual gender of the candidate might have been changed for confidentiality purposes.

addition, it makes their possible defection more obvious and memorable for the brokers. In summary, higher levels of visibility supply brokers with good-quality information about their clients.<sup>7</sup> In addition, when political contestation is low, the demand for votes is less astringent, shaping brokers' incentives to target in a more accurate, less massive fashion, identifiable and particularized individuals, not groups.

The capacity brokers have to identify potential clients not only comes from third-party sources, as the "organization buying" proponents explain (Holland and Palmer-Rubin 2015; Rueda 2015 and Stokes et al. 2013). In a similar account, others have pointed out that brokers are also "reliable neighbors" (Zarazaga 2014: 38); that is, members of the same community of targeted individuals. Acknowledging this approach, the argument presented in this article contends that brokers have incentives to expand their immediate local networks by colonizing visible targets outside of their own proximate neighborhood. By conceptualizing brokers as active political entrepreneurs who seek new supporters outside of their immediate context, the proposed framework complements other accounts, as presented in Szwarcberg (2013: 32) or Zarazaga (2016: 681), where brokers are neighborhood party agents. Clientelist entrepreneurship can be performed directly or indirectly. For instance, Auyero (2000: 65–66) described the situation of Cholo, a member of the inner circle of one of the brokers in Buenos Aires, Argentina, who visited "other poor neighborhoods of the area adjacent to" the place where the broker (and himself) lived, to spread news about some government plan, the governor, and the Peronist party, but importantly, also reporting to the broker any unattended material needs he had noticed. This illustrates how, via different channels, brokers expand their client portfolio outside of their immediate community.

An important implication is that individual poverty does not play a role by itself. Non-poor individuals living in poor areas (Q1) are also noticeable, and consequently, possible targets as well. Political competition shifts the demand for votes upwards. As elections become more contested, brokers need to secure even higher levels of electoral support. Since newly elected representatives are more likely to bring new people to their machines, brokers are also interested in seeing their candidates elected. Consequently, brokers will have even more incentives to engage in clientelism when political competition is high. In these cases, political competition is high enough to even mobilize non-poor individuals in a

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7 Importantly, poor households do not need to be close to each other, but visible enough.

clientelist way. Since these votes are more expensive to purchase (given decreasing marginal utility from income, see Stokes 2005: 321), this strategy is less preferred. However, costly clientelism is worth the investment given the risk of losing the election.

## Group Targeting

This is the least accurate targeting strategy, but also the cheapest one available to brokers. It leverages the spillover effects provided by larger concentrations of individuals who share the same socio-economic backgrounds. This strategy is less accurate because it mobilizes electoral support from “actual” clients (individuals who have actually been targeted), and “potential” clients (individuals who have not received benefits yet). It is preferred when poor individuals are nested in poor areas (Q2), or vice-versa (Q3). In these cases, individuals are masked by their environments, which means that identifiability is hard to achieve. As explained before, identifiability facilitates individual targeting, an important factor in reducing the probability of defection of targeted clients. When individuals are hard to identify, however, individual targeting becomes prohibitively expensive. Yet, brokers who still need to secure electoral support do not opt out of clientelism and instead turn to group targeting.

Auyero (2000: 65) described the case of Alfonsina in Argentina. Alfonsina was part of the broker’s inner circle and got a job as a cleaning lady in a public school. As the broker explained to her, before getting the job, Alfonsina had to be *patient* because as a member of “the circle,” she was in the pool of potential beneficiaries; it was only a “matter of time” until she could get the job. The idea of expectations and hope are important. Auyero explained that the

*hope* of a job serves as important glue within the inner circle. Although not everyone is employed at the municipality, the fact that someone gets [a] job has an important *demonstration* effect. (Auyero 2000: 65; my emphasis)

Building on this intuition, two ideal types are suggested: actual and potential beneficiaries. The former receive particularistic benefits “today” and vote for the broker’s candidate “tomorrow,” while the latter do not receive benefits “today” (in the expectation of receiving them in the future) but still vote for the broker’s candidate “tomorrow.”

Group targeting is cost-effective because it mobilizes two types of voters at the cost of investing in just one (i.e. the “actual”). Actual beneficiaries want to remain actual beneficiaries since they want to keep re-

ceiving benefits; thus, they keep supporting the broker's candidate. In turn, potential beneficiaries want to become actual beneficiaries, but are uncertain when that might happen; as a result, they also support the broker's candidate. In this sense, from the broker's perspective, this strategy reduces the sunk costs by half, multiplying the gross benefits by two. In other words, the broker's reputation of a "problem solver" disseminates twice as fast relative to individual targeting. It is in this sense that this is a massive (but less precise) form of clientelist targeting.

Given that potential clients support the broker's candidate in the absence of current inducements, brokers need to effectively calibrate the timing when potential beneficiaries become actual beneficiaries. In other words, brokers need to infer the discount factors of their potential clients, making it expensive for them to defect. Reputation, as a form of capital, is fundamental for brokers since "voters prefer to support [brokers] with a reputation for delivering because they are a more reliable source of future rewards" (Zarazaga 2014: 24). However, potential clients are also interested in investing in their reputation. From their perspective, they know that the flow of resources is dependent on the brokers' electoral success. Also, they do not know whether new brokers might have access to fewer resources or distribute them to other people. For them, the cost of switching brokers (or defecting) is very high since it also involves building relationships of confidence with another broker from scratch, which is costly. Hence, the incentives are for the broker to deliver benefits before it is too late, while the incentives for the potential client are to support the broker's candidate.

Since it does not matter what type an individual is, both actual and potential beneficiaries keep voting for the broker's candidate. While cost-effective, group targeting is less accurate since brokers hope to mobilize potential beneficiaries only indirectly; that is, by targeting actual beneficiaries. This makes this strategy a fragile one. However, besides the reputation costs described above, low-income voters have additional incentives to support the broker's candidate. This is described in Q2. Given that the poor are risk-averse, potential beneficiaries are better-off waiting (and voting for the broker's candidate) than defecting. In the same vein, but on a slightly different subject, Magaloni (2008: 20) posited that the Mexican PRI lasted as long as it did not because of electoral fraud but because voters supported the "known devil." Economic underdevelopment played a fundamental role in this equilibrium as well. Finally, higher levels of electoral contestation force brokers to engage in this less accurate, but massive form of clientelist targeting, leveraging (1) the incentive structure of potential clients to support the candidate even in the ab-

sence of current inducements, and (2) the higher levels of risk aversion poor individuals have.

Importantly, vote-buying is also targeted to non-poor individuals nested in non-poor groups (Q3). Vote-buying has decreasing returns to scale in non-poor individuals. That is, wealthier individuals derive fewer advantages from a bag of rice relative to poorer individuals (Kitschelt 2000). Anticipating this, brokers will not offer the same benefits to wealthy individuals, but will customize the type of offerings. This distinction is important, since most of the literature assumes that clientelist practices decrease when individual incomes rise. However, that approach does not explain the counterintuitive empirical regularity depicted in Figure 1; that is, non-poor individuals get targeted too. *Why are non-poor individuals targeted?* This article seeks to contribute to the literature by explaining that brokers make their offers more attractive to non-poor individuals by offering goods that are relatively more expensive. This is more likely when districts are wealthier.

While buying votes from non-poor individuals costs more, brokers in non-poor areas have more resources to spend. Along the same lines, Hicken (2007: 55) questioned the implicit assumption that the broker's vote buying funds remain fixed; stating that "a candidate's capacity to buy votes increases commensurate with increases in average incomes." In other words, higher levels of economic development not only raise personal incomes, but also shifts the broker's vote-buying capacities upwards. Similar evidence has been found in the Philippines (Schaffer 2004). The link between higher incomes and vote buying is particularly relevant for Brazil, since its electoral laws allows political parties to get *unlimited* funds (Abramo and Speck 2001: 14), enabling brokers greater capacities to buy more expensive votes.

Besides having more resources to spend, brokers in politically uncontested districts have fewer political constraints, facilitating the spending of expensive clientelism. In Q3 it is suggested that lower levels of political contestation allow brokers to spend on more expensive means of clientelism. Uncompetitive districts lack proper *de facto* mechanisms of checks and balances, giving local incumbents more "room to move," allowing them to divert local resources into more expensive means of targeting. I call this "embezzlement clientelism." Given these relatively more expensive costs, however, I expect this form of clientelism to be less frequent. In a dynamic similar to Q2, potential clients also support the broker's candidate, hoping to become actual beneficiaries. However – and unlike poor clients in Q2 – non-poor clients in Q3 (both actual and potential) have smaller discount factors. That is, non-poor individ-

als – given their relatively higher incomes – have more “patience.” This is especially important for brokers. In practice, potential clients’ timing constraints are more elastic, putting less pressure on brokers to deliver benefits in the short run.

## Case Selection, Research Design, and Data Analyses

### I. Data

This section empirically tests the theoretical proposition stated in Table 1 – that is, the combined effects of individual income, of being nested in poor/non-poor communities, and being exposed to different levels of political competition – on receiving clientelist benefits. Brazil is a good case because its poverty structure is such that it is possible to find low-income individuals nested in non-poor areas (and vice versa). This case is also interesting from an institutional perspective. The Brazilian electoral system incentivizes clientelism. Several factors such as multimember districts with open lists, and the institution of the *candidato nato*,<sup>8</sup> “clearly [makes] Brazil one of the most personalistic systems of democratic governance” (Kitschelt and Altamirano 2015: 257), which might foster higher levels of clientelism. In fact, Gingerich (2014: 290) found that vote-buying drastically changed electoral results, concluding that “[v]ote brokerage can still pay electoral dividends in contemporary Brazil.”

To test this hypothesis, I use survey data from 2010 from The Latin American Public Opinion Project (LAPOP) (2010).<sup>9</sup> Though the LAPOP survey provides a question for income, people who are somewhat better off than their neighbors but live in poor areas may not “feel” poor. If this is the case, it could confound the results. Additionally, when answering the questioner, individuals might not want to reveal their true incomes (either because they are too low or too high). Following the advice of Córdova (2008) and Córdova and Seligson (2009, 2010), a

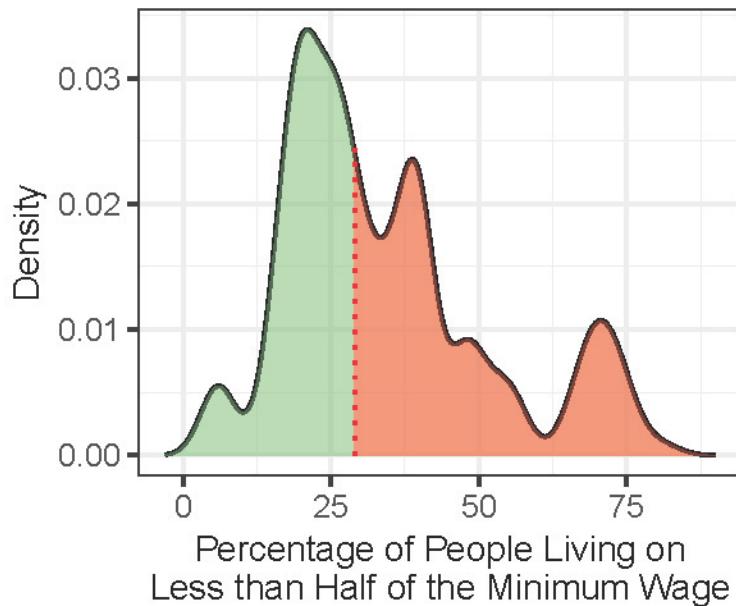
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8 “[R]ule that removed parties’ control over the nominations process and let an electoral legislator decide to run on any party ticket.” See Kitschelt and Altamirano (2015: 257).

9 “I thank the Latin American Public Opinion Project (LAPOP) and its major supporters (the United States Agency for International Development, the United Nations Development Program, the Inter-American Development Bank, and Vanderbilt University) for making the data available.” The sample consists of five strata representing the five main geographical regions of Brazil. Each stratum was further sub-stratified by urban and rural areas.

relative wealth index (RWI) was constructed (see also Santos and Villatoro 2018). Using principal component analyses, the index measures wealth based on actual assets weighted by how common these assets are. Different indices were constructed for urban and rural contexts. Figure 1 plots the distribution of the index.

Figure 2. Distribution of the Density of the Poor



Note: Employing Brazilian census data from the IBGE (2010), the figure shows the percentage of individuals who live on less than half of the minimum wage in a given municipality. While individual income is measured using the relative wealth index (in Figure 1), the variable plotted here is used to measure economic development at the group level. Due to statistical reasons explained in this paper, the variable had to be dichotomized at its median (29 percent). However, in separate statistical analyses shown in Table A3 (weighted model), the variable is used without dichotomizing it, showing the same results.

## II. Main Variables of Interest

To measure economic development at the group level, I constructed a variable that I call “the density of the poor” following a strategy similar to that of Weitz-Shapiro (2012). The variable, which is plotted in Figure 2, measures the degree of poverty at the municipal level. Using information from the 2010 Brazilian census,<sup>10</sup> a semi-continuous variable was constructed to measure the percentage of individuals who live on less than half of the minimum wage in a given municipality. Given that the

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<sup>10</sup> Official data comes from the Bureau of Statistics of Brazil IBGE.

municipality of residence for each individual in the LAPOP survey is recorded, I was able to merge the census percentage with the LAPOP dataset. It is important to stress that the unit of analysis is the individual, and that this variable captures the economic context in which each individual lives. Just like other scholars in the past have tested the effect of being nested in rural areas,<sup>11</sup> this paper focuses on another class of contextual variable. Although the density of the poor group was originally a semi-continuous variable (that is, a percentage), it had to be dichotomized at the median (29 percent) to be able to construct a matched sample, which I justify and explain below. Figure 2 shows the continuous distribution dichotomized at the median (dotted line).

Finally, to measure political competition, I again follow Weitz-Shapiro (2012). Using official electoral data from the 2008 municipal elections,<sup>12</sup> I constructed a variable that measures the percentage of seats that are not controlled by the mayor's party in a given municipal council.

### III. Matched Design

There is a built-in lack of relationship between “being poor” and “living in a poor municipality,” confirming that Brazil is in fact a good case to test this theory. Figure A1 in the Appendix shows that the unmatched/raw dataset already has embedded low levels of correlation between these two variables ( $r = -0.44$ ).<sup>13</sup>

I was able to break this relationship down further using matching methods. Matching is a two-stage process. In the first stage, the analyst “preprocesses” the data, seeking to break any systematic relationship between, in this case, the density of the poor and the relative wealth index RWI (Ho et al. 2011). Matching does so by deleting observations for which similar observations cannot be found.<sup>14</sup> The idea is to obtain a good covariate balance, as in Figure A3 (in the Appendix), to then estimate any appropriated statistical model.<sup>15</sup> From a statistical standpoint,

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11 See, for example, Brusco, Nazareno, and Stokes (2004) and Stokes (2005). Both studies used the log of population, which is a proxy for urban/rural.

12 Data from the Tribunal Superior Eleitoral.

13 The figure shows that, for both the matched and raw datasets, “being poor” and “living in a poor municipality” are not confounded, as it is possible to find poor individuals living in non-poor areas, and vice versa.

14 The final procedure matched 761 individuals living in the low-density poverty condition with 676 individuals living in the high-density poverty condition.

15 The idea is that the propensity of being exposed to the “high” density of the poor condition (or “propensity score”) has a similar distribution in both “treat-

preprocessed datasets are less model-dependent (Ho et al. 2007),<sup>16</sup> and prevent analysts from making extreme counterfactuals.<sup>17</sup> The preprocessed data used in the matching approach has 54 municipalities, while the raw data used in the generalized propensity score (GPS) approach (which I explain below) also has 54. Figure 3 lists the municipalities and shows which ones are considered “high” or “low” in terms of the density of the poor after the dichotomization process. The figure also shows that there is considerable variance in income/RWI in both high- and low-poverty density conditions (bubbles).<sup>18</sup>

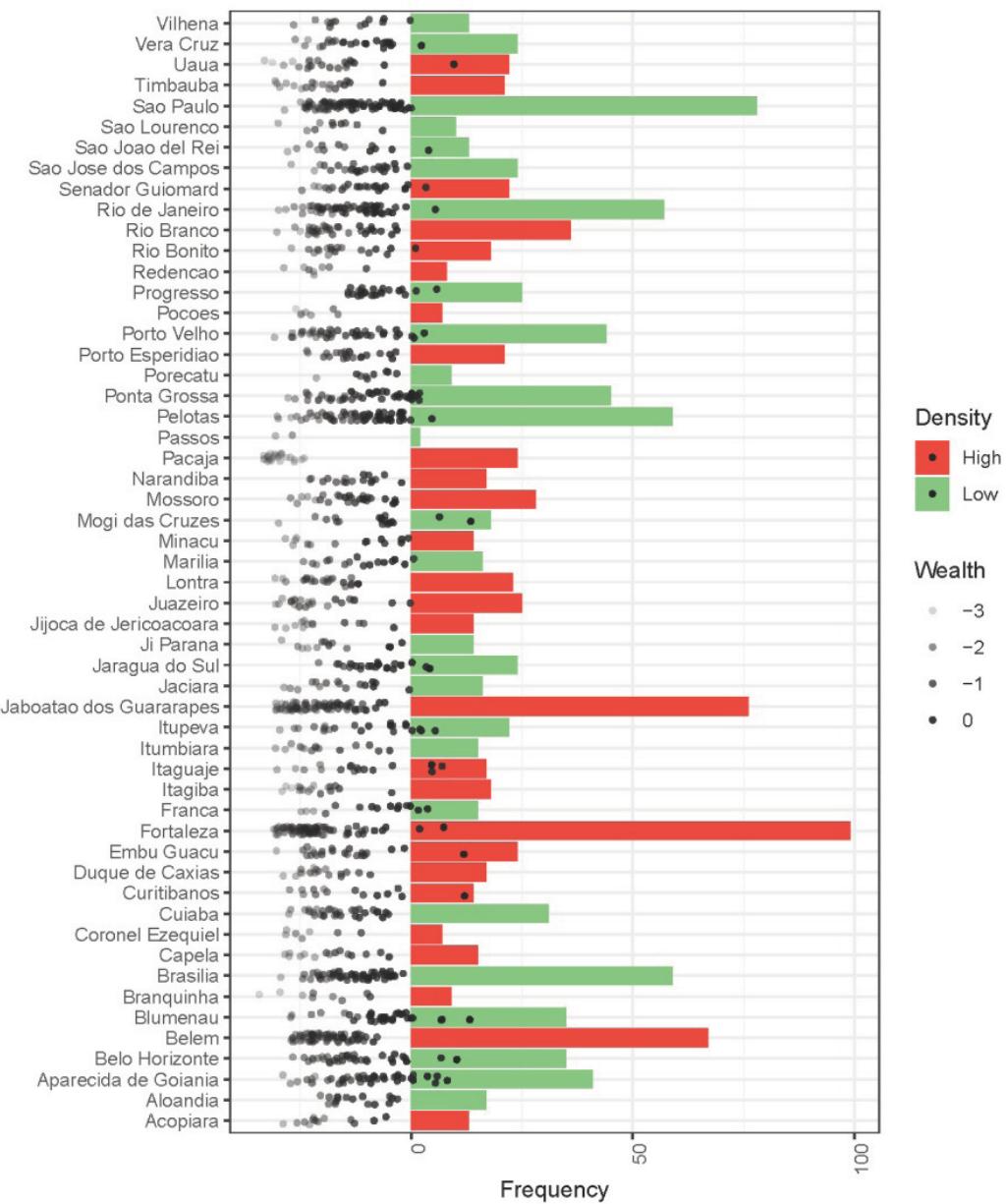
One could argue that dichotomizing the density of the poor variable at the median is an arbitrary decision. While there have been theoretical advances regarding general treatment effects regimes for continuous or semi-continuous response doses (Imai and Dyk 2004; and Hirano and Imbens 2004), algorithms with the ability to match on continuous treatment variables are not common. In order to obtain covariate balance in a non-parametric way (as matching does) but without dichotomizing the density of the poor, I also use the original (that is, continuous) density of the poor variable to construct a generalized propensity score GPS (Imbens 2004; Guardabascio and Ventura 2014; and Imai and Ratkovic 2014).<sup>19</sup> The score is used to weight each observation in the model.<sup>20</sup>

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ed” and “control” groups. It is important to note that, despite the language, I do not claim any causal relationship in this paper.

- 16 Table A2 and Table A1 in the Appendix provide summary statistics for both the matched and raw datasets. Tables were generated using the *stargazer* R package. See Hlavac (2015).
- 17 King and Zeng (2005). The matching routine used was the *full* matching routine (Hansen 2004; Rosenbaum 2010), via the *MatchIt* R package (Ho et al. 2011).
- 18 Figure A2 in the Appendix shows the frequency of individuals by municipality in both raw and matched datasets.
- 19 To generate the weighting vector, I used the *CBPS* R package (Fong et al. 2018).
- 20 Besides matching on and weighting by the RWI index, I also included the following variables to match on/weighting by: municipal opposition, municipal population and individual involvement in civic associations.

**Figure 3. Distribution of Observations by Municipality, Wealth Index and Density of the Poor**



**Note:** The figure shows the municipalities in the analyses (matched set). For every municipality, the figure shows (1) the number of inhabitants (Y-axis), and (2) whether the municipality is considered having a high or low density of the poor. High-density municipalities have more than half of their inhabitants living on less than half of the minimum wage. The figure also shows (3) individual wealth indexes (bubbles).

## IV. Model Specification

The dependent variable is clientelism. To measure it, I use the question that asks if a candidate or someone from a political party offered the respondent something, like a favor, food, or any other benefit or thing in return for her/his vote or support. Subjects could answer that this had happened often, sometimes, or never. Carreras and Irepoğlu (2013) and Holland and Palmer-Rubin (2015) used the same dataset and outcome variable. As they explained, the question did not ask whether respondents took the offer, hence it should not be an important source of social desirability bias (González-Ocantos et al. 2012). For statistical and substantive reasons, I dichotomized this variable, combining the alternatives often ( $n = 91$ ) and sometimes ( $n = 150$ ), leaving never ( $n = 1,196$ ) unchanged.<sup>21</sup>

The following control variables were considered in the statistical analyses. Perception of corruption was included to hold constant the effect of respondents who declared clientelist activity when in reality they were referring to corruption scandals.<sup>22</sup> Brokers usually target civic associations. Following Holland and Palmer-Rubin (2015: 28), an additive index to measure civic participation (Political Involvement) was created.<sup>23</sup> Some studies have also found group size to be important (Stokes et al. 2013). A variable to measure population size at the municipal level was constructed using Brazilian census data.

Following the convention in statistical studies of clientelism, an urban/rural dummy was also included. Some have argued that parties target their own supporters (Dixit and Londregan 1996, and Cox and McCubbins 1986), moderate opposers (Stokes 2005), or unmobilized supporters (Nichter 2008). To keep these effects constant, a variable to capture party identification (Political Id.) was included. Higher levels of democratic support should be negatively associated with clientelism. To control for that, a variable measuring democratic support was included. González-Ocantos, Kiewiet de Jonge, and Nickerson (2014) found that schooling plays a negative role on clientelism; hence, I control for education too.

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21 These numbers come from the matched dataset.

22 I thank Cesar Zucco for this suggestion.

23 This variable was constructed by adding the frequency of attendance at religious meetings, community improvement meetings, and political party meetings (variables  $\phi 6$ ,  $\phi 8$  and  $\phi 13$ , respectively).

## V. Functional Form

Observations are clustered on a number of important factors such as levels of municipal political competition, municipal poverty, and municipal population size. In order to account for these clustering effects, I use a “generalized estimating equations” approach. GEE were introduced by Liang and Zeger (1986) to fit clustered, repeated (that is, correlated), and panel data. This method is especially efficient when the data are binary (Hanley et al. 2003). GEE models are similar to random effects models (Gardiner, Luo, and Roman, 2009), in that they allow observations to be nested in hierarchical structures. This method requires analysts to parameterize the working correlation matrix. While Hedeker and Gibbons (2006: 139) stated that “the GEE is robust to misspecification of the correlation structure,”<sup>24</sup> Hardin and Hilbe (2013: 166) pointed out that “[i]f the observations are clustered (not collected over time), then [...] the exchangeable correlation structure” is the most appropriate working correlation matrix. Given that the data do not follow a panel but rather a clustered structure, the “exchangeable” correlation matrix was specified in all models.

While this method is very flexible, GEE estimates remain uninterpretable in practice (Carlin et al. 2001), making regression tables useless from a substantive standpoint. In this case, the problem is even more severe due to the interactive nature of the hypothesis being tested in this paper, which is a parameter for the multiplicative term between the variables wealth index, political competition, and density of the poor.<sup>25</sup> Methodologists agree about “not interpret[ing] the coefficients on the constitutive terms,” as they lack substantive meaning (Brambor, Clark, and Golder 2006: 77). These problems become more complex when it comes to generalized models, as a number of challenges arise.<sup>26</sup> Given that cross-partial derivatives are not advisable either, simulation methods

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24 Carlin et al. (2001: 402) argued that “[r]elatively minor differences in estimates may arise depending on how the estimating equations are weighted, in particular within the generalized estimating equation (GEE) framework.” Westgate and Burchett (2017) and Gardiner, Luo, and Roman (2009, 227) made the same point.

25 Brambor, Clark, and Golder (2006: 74) offer the same advice.

26 As Ai and Norton (2003) explained, “(1) the interaction effect could be non-zero, even when the estimation says it is zero, (2) the statistical significance of the interaction effect cannot be tested with a simple t-test on the coefficient of the interaction term, (3) the interaction effect is conditional on the independent variables, [...] and (4) the interaction effect may have different signs for different values of covariates.”

are required (Zelner 2009). In particular, I follow the simulation approach introduced in King, Tomz, and Wittenberg (2000). This procedure samples via simulation from the point estimates, generating a new and larger distribution. In more detail, taking the single estimated parameters (that is, the regression coefficients), I constructed a distribution of estimated values for each coefficient. Relying on the central limit theorem, with enough sampling draws, the new simulated distribution is a transformation that approximates with a great degree of precision the (uninterpretable) coefficients. Subsequently, means and uncertainty measures can be constructed for each of these distributions. From a substantive standpoint, simulation methods also allow for the sampling of new distributions at different values of the independent variables. This will be important in simulating the expected value of clientelism for different “profiles,” such as non-poor individuals nested in high-poor dense municipalities in contexts of high political competition, among other profiles.

Since it is “impossible to evaluate conditional hypotheses using only the information provided in traditional results tables” (Brambor, Clark, and Golder 2006: 76), I have focused instead on the substantive results from the simulation methods. However, I still present the raw results in Table A3 in the Appendix.<sup>27</sup> Analogous to Table 1, in Figure 4 I simulate the predicted probabilities of being targeted using both the matched and weighted/GPS models. The horizontal panel depicts simulations for the “upper” (“non-poor,” 75 percent) and “lower” (“poor,” 25 percent) quartiles of the wealth index. In turn, the vertical panel shows the simulated values for the maximum (100 percent) and minimum (43 percent) values of the municipal opposition index. Each quadrant shows simulations for individuals nested in poor municipalities (high density of the poor), and non-poor municipalities (low density of the poor). Each profile shows two simulated probability distributions (with 95 percent confidence intervals): one for the matched sample, and one for the weighted/GPS model.<sup>28</sup> The idea is to show that the decision of dichotomizing the density of the poor variable at its median gives substantively

27 Table generated via the *texreg* R package. The first column shows the estimates for the matched dataset, while the second column shows the results for the GPS-weighted model. Virtually all coefficients have the same size and sign.

28 In the case of the weighted/GPS model, which does not use the dichotomized variable, I use the continuous version of the size of the poor variable, where “low density” represents the lower quartile while “high density” represents the upper quartile.

exact results than using the continuous version of that variable via the GPS analysis.

## VI. Results

All quadrants in Figure 4, regardless of the approach used,<sup>29</sup> suggest that brokers engage in individual targeting when individuals are identifiable, and in group targeting when brokers need to rely on the spillover effects of clientelism.

In Q1, clientelism is more likely (with a 26 percent probability) in situations where non-poor individuals are nested in poor groups (i.e. where the density of the poor is “high”)<sup>30</sup> and living in electorally contested municipalities. As I have argued, these types of individuals are still targeted because they are more identifiable. For instance, a similar individual (same quadrant) who is nested in a non-poor group (“low” density of the poor), and consequently harder to identify, has a much lower probability of being targeted (7 percent). Similarly, individuals in Q4, such as poor individuals nested in non-poor areas (“low” density of the poor), and living in lowly contested municipalities, are more likely to be targeted (13 percent) relative to harder-to-identify individuals who live in poor areas (11 percent). In Q1, higher levels of electoral competition put heavier pressure on brokers to mobilize more expensive ways of clientelism. These pressures decay when incumbents face lower levels of electoral contestation (Q4).

Figure 4 shows in Q2 that clientelism is more likely (25 percent) in situations where poor individuals are nested in poor groups (“high” density of the poor). As I have argued here, brokers will have incentives to engage in group targeting, taking advantage of the spillover effects of clientelism, leveraging the electoral support of potential clients by mobilizing actual clients. This is especially the case when the incumbent is seriously contested. Individuals that are similar (same quadrant), but nested in a non-poor group (“low” density of the poor), have a much lower probability of being targeted (12 percent). Individuals in Q3, who are non-poor individuals nested in non-poor areas (“low” density of the poor), and those living in lowly contested municipalities, are more likely to be targeted (24 percent) than similar individuals nested in non-poor areas (5 percent). Areas with higher levels of economic development also allow brokers to have more resources to distribute in what it was called

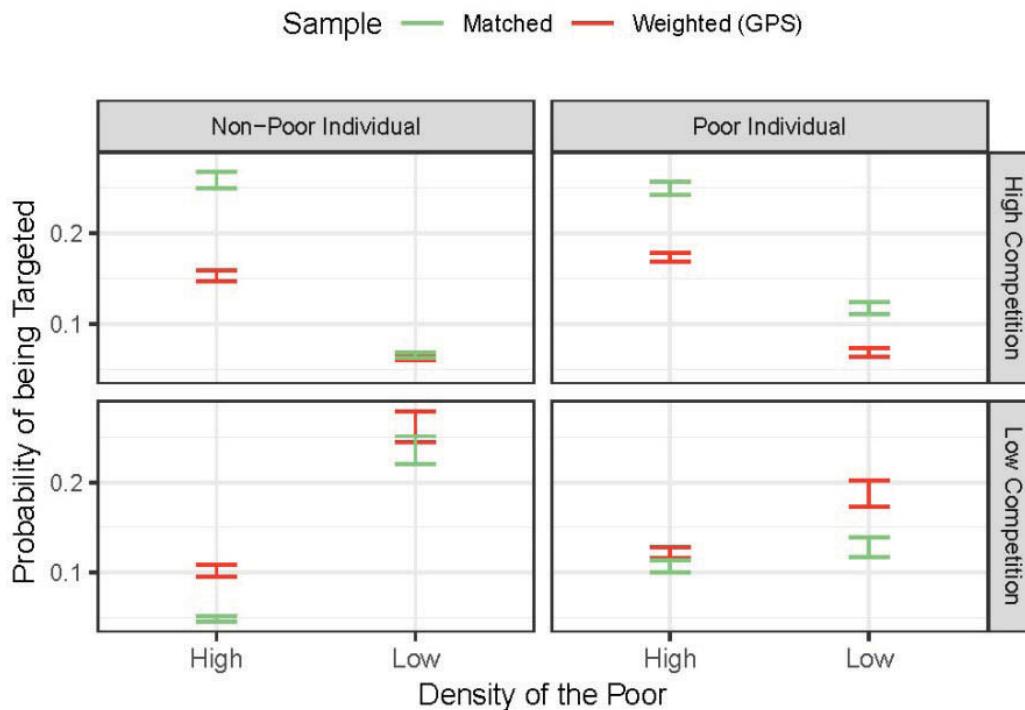
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29 Although there are statistical differences, the differences across datasets are proportional.

30 Matched sample.

“embezzlement clientelism.” Lowly contested municipalities give brokers and political incumbents more room to allocate and distribute more expensive goods. However, and as theoretically expected, given that the net costs of this form of clientelism are higher, this is the least likely form of clientelism (reflected in the lower probabilities).

Figure 4. Simulated Expected Values of Clientelism



Note: After fitting the models shown in Table A3, this figure shows the predicted probabilities of being targeted under different scenarios, with 95 percent confidence intervals. Substantively, the figure emulates the theoretical predictions shown in Table 1. Clientelism is higher when non-poor individuals are nested in poor groups (“high” density of the poor) in highly contested municipalities (Q1), when non-poor individuals are nested in non-poor groups (“low” density of the poor) in scarcely contested municipalities (Q3), when poor individuals are nested in poor areas in highly contested municipalities (Q2), and when poor individuals are nested in non-poor areas in scarcely contested municipalities (Q4). For every quadrant, estimates from both the matched and weighted datasets are shown. The idea is to show that the decision to dichotomize the density of the poor variable at its median (as shown in Figure 2) gives substantively exact results than using the continuous version of that variable via the GPS analysis.

## Discussion

This paper has argued that when poor individuals live in poor areas, brokers engage in group targeting relying on the spillover effects of clientelism. This strategy mobilizes targeted and untargeted clients by disseminating the broker's reputation of delivering benefits among potential beneficiaries. In a similar way, non-poor individuals clustered in non-poor areas are also targeted. In these cases, higher levels of economic development not only raise personal incomes, but also shift the broker's vote-buying capacities upwards. Lower levels of political contestation allow these more expensive forms of clientelism. However, in heterogeneous areas, brokers adapt their strategies and execute clientelism in a different way, relying on how identifiable individuals are. Identifiability raises the cost of defection by making their households more memorable, making receivers more likely to cooperate.

Incentives to offer or take clientelist offerings are not guided solely by structural or individual factors. This paper has suggested that both are necessary to understand clientelism better. Clearly, pressures to partake in clientelism, an expensive and uncertain strategy, rise as political competition raises (from 18 percent to 25 percent).<sup>31</sup> However, the outcomes of this strategy differ largely depending on whether brokers face homogeneous or heterogeneous groups of individuals. Each one provides a different cost/benefit structure for both clients and brokers. Finally, I hope that the literature considers that groups and individuals provide different incentives to both brokers and clients, and hence, this distinction should be incorporated to better understand clientelism.

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31 Grand mean considering the most likely scenarios only.

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# Appendix

Table A1. Summary Statistics: Raw Sample

	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Clientelism	1,483	0.171	0.376	0	0	0	1
Wealth Index	1,483	-1.543	0.846	-3.05	-2.261	-0.843	0.899
Municipal Opposition	1,483	81.761	11.821	43	75	89	100
Density of the Poor	1,483	2.435	1.12	1	1	3	4
Municipal Population	1,483	5.393	2.841	1	3	8	10
Urban	1,483	0.86	0.347	0	1	1	1
Political Involvement Index	1,483	1.792	1.619	0	0	3	9
Support for Democracy	1,483	5.426	1.682	1	4	7	7
Party Id.	1,483	5.939	1.15	1	6	6	12
Perception of Corruption	1,483	2.027	1.003	0	1	3	3
Years of Education	1,483	9.398	3.857	1	6	12	18

Table A2. Summary Statistics: Matched Sample

	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Clientelism	1,437	0.168	0.374	0	0	0	1
Wealth Index	1,437	-1.557	0.811	-3.05	-2.261	-0.866	0.899
Municipal Opposition	1,437	81.912	11.749	43	75	89	100
High Density of the Poor	1,437	0.47	0.499	0	0	1	1
Municipal Population	1,437	5.384	2.792	1	3	8	10
Urban	1,437	0.86	0.347	0	1	1	1
Political Involvement Index	1,437	1.784	1.613	0	0	3	9
Support for Democracy	1,437	5.417	1.684	1	4	7	7
Party Id.	1,437	5.934	1.16	1	6	6	12
Perception of Corruption	1,437	2.029	1	0	1	3	3
Years of Education	1,437	9.359	3.843	1	6	12	18

Table A3. Generalized Estimating Logistic Equations: Clientelism

	<b>Matched</b>	<b>Weighted</b>
(Intercept)	1.404 (1.968)	2.958 (2.691)
Wealth Index	1.374 (0.990)	1.320 (1.209)
Municipal Opposition	-0.040 (0.025)	-0.061 (0.032)
High Poor Density	-6.550** (2.399)	
Municipal Population	-0.115* (0.048)	-0.101 (0.053)
Urban	-0.091 (0.401)	-0.077 (0.416)
Political Involvement	0.046 (0.055)	0.047 (0.055)
Support for Democracy	-0.056 (0.046)	-0.051 (0.048)
Party Id.	-0.082 (0.053)	-0.087 (0.052)
Perception of Corruption	0.240** (0.088)	0.267** (0.089)
Years of Education	0.051* (0.021)	0.054** (0.020)
Wealth Index * Municipal Opposition	-0.018 (0.013)	-0.013 (0.015)
Wealth Index * High Poor Density	-2.509 (1.319)	
Municipal Opposition * High Poor Density	0.085** (0.030)	
Wealth Index * Municipal Opposition * High Poor Density	0.029 (0.016)	
Density of the Poor		-1.992* (0.921)
Wealth Index * Density of the Poor		-0.555 (0.372)
Municipal Opposition * Density of the Poor		0.024* (0.011)
Wealth Index * Municipal Opposition * Density of the Poor		0.005 (0.004)
Num. obs.	1,437	1,483
Num. clust.	54	54

Note: \*\*\* p < 0.001, \*\* p < 0.01, \* p < 0.05. Clustered standard errors at the municipality level. First column shows the estimates using the matched dataset. Second column shows the estimates of the weighted model (the generalized propensity score was omitted in the table). Both models are logit GEE.

Figure A1. Distribution of Pre- and Post-Matching Observations by Wealth Index and Density of the Poor

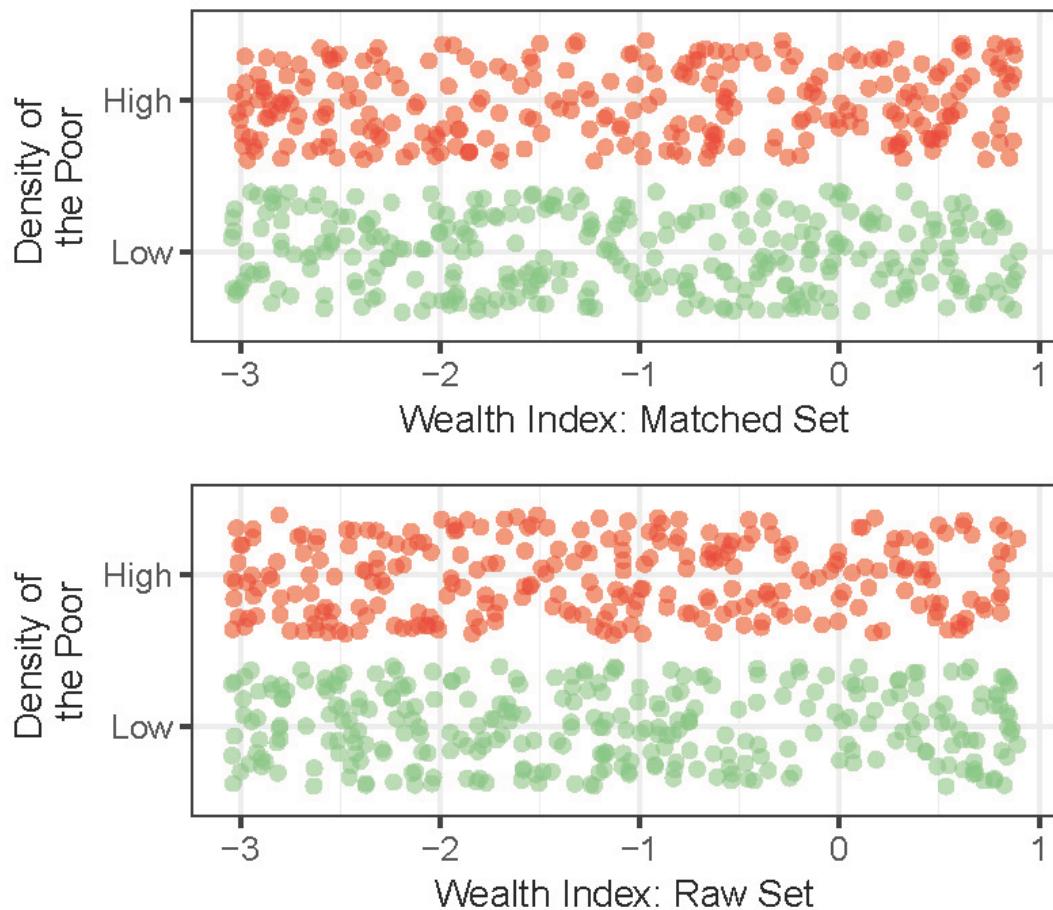


Figure A2. Frequency of Individuals by Municipality, Pre- and Post-Matching Deletion

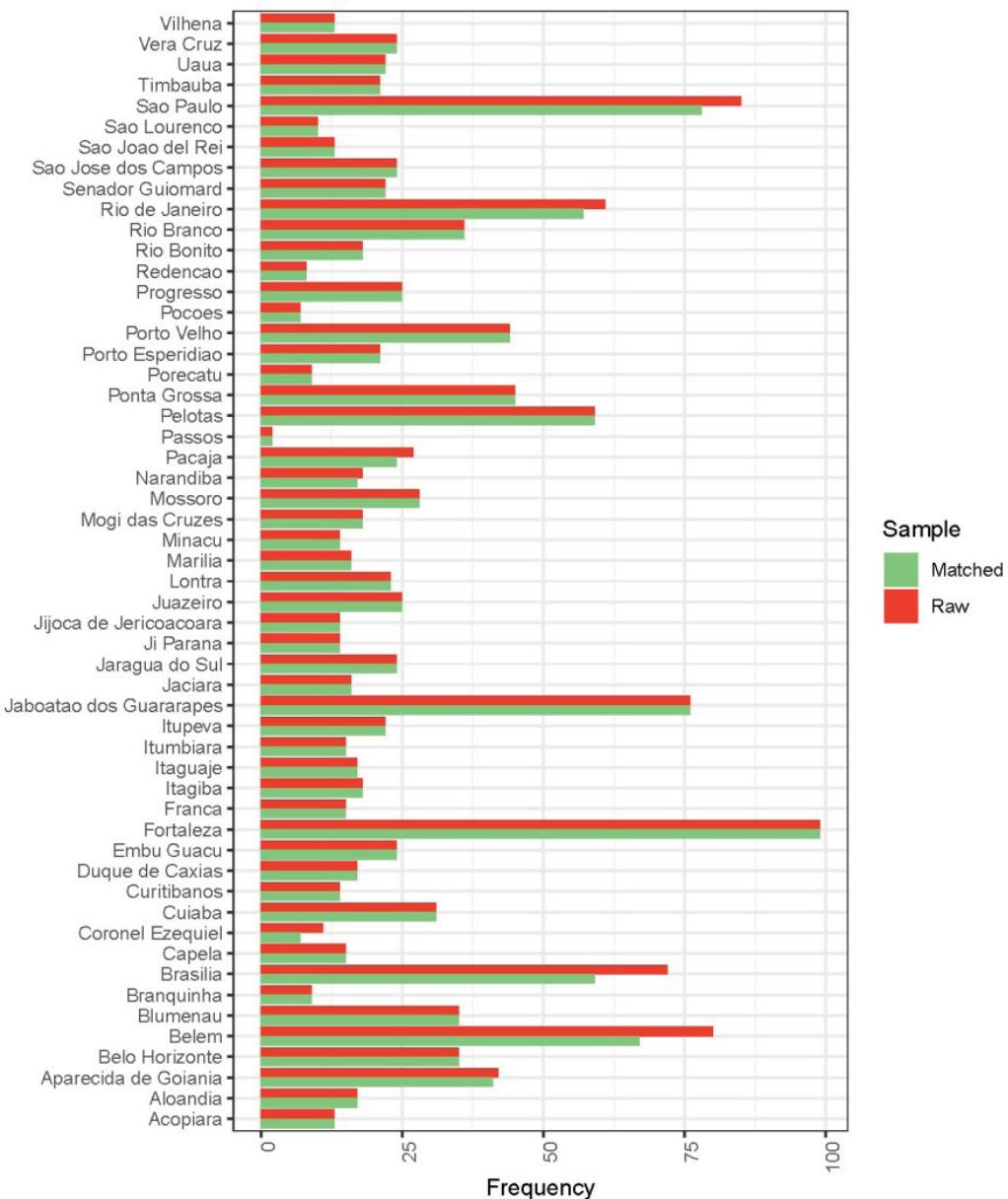
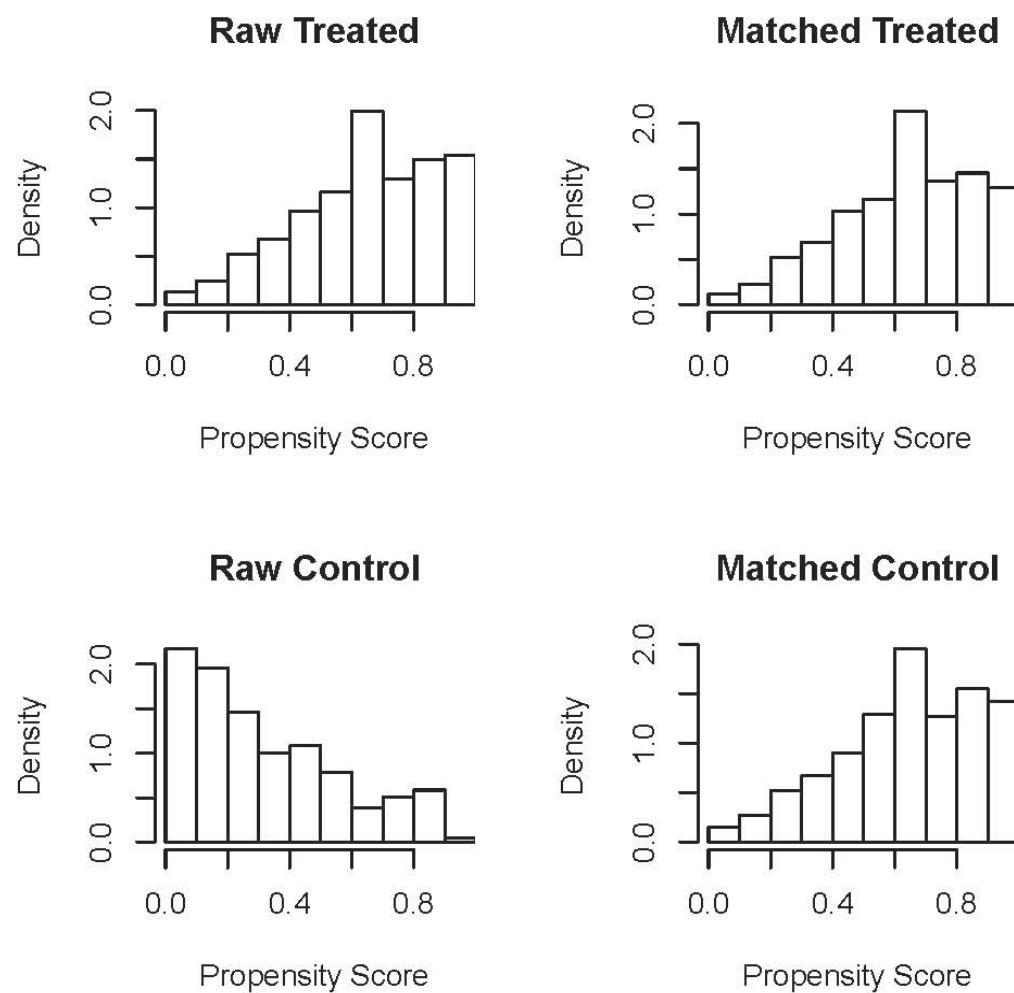
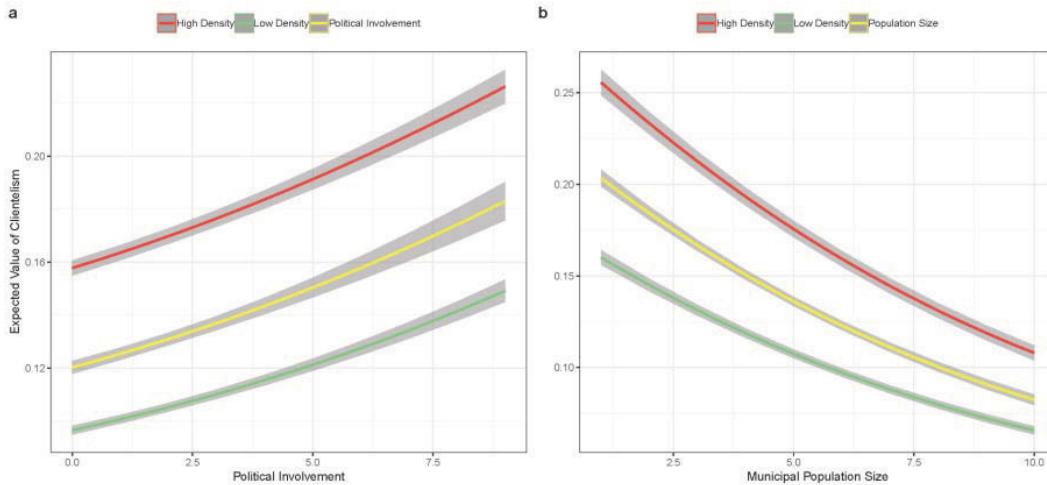


Figure A3. Pre- and Post-Matching Balance: Distribution of Propensity Scores



**Figure A4. Simulated Expected Probability of Being Targeted: Political Involvement and Population Size**



**Note:** Using the estimations in Table A3, the figure shows the probability of being targeted at different values of political involvement (**a**) and population size at the municipal level (**b**). The figure suggests that being nested in high-poor density areas contributes substantially more to explaining clientelism.

Figure A4 shows a plot divided in two panels. Panel **a** shows the simulated expected probabilities (with 95 percent confidence intervals) of being targeted at different levels of political involvement. As the blue lines suggests, individuals who participate in civic associations have higher probabilities of being targeted. This is in line with findings in previous research (Schaffer and Baker 2015; Carreras and Castaneda-Angarita 2014: 7; Calvo and Murillo 2013; Holland and Palmer-Rubin 2015: 16; and Rueda 2015). However, once I decompose these effects, being nested in high-poor density areas contributes substantially more to the model. These differences are statistically significant. Panel **b** shows the probability (with 95 percent confidence intervals) of being targeted at different increments of the size of the population. In line with the literature, I also see that this relationship is negative (Stokes 2005: 323; Kitschelt and Wilkinson 2006: 10; Magaloni 2008: 67; Rueda 2017; Bratton 2008; and Gingerich and Medina 2013: 456). However, the effect of being nested in high-poor density municipalities outperforms the effect of population size, suggesting spillover effects.

## **Apuntando Justo a Ti/Ustedes: Blancos Clientelares Grupales e Individuales en Brasil**

**Resumen:** ¿Los partidos apuntan a grupos o individuos? Aunque esta pregunta es fundamental para entender el clientelismo, la literatura no ofrece una respuesta clara. Este trabajo argumenta que, dependiendo de ciertas condiciones, los compradores de votos apuntan a individuos cuando pueden identificar a sus blancos, y a grupos cuando necesitan utilizar los efectos indirectos que provee la lógica del clientelismo. Tanto la identificación individual como los efectos indirectos del clientelismo grupal, dependen de los niveles de pobreza individual, pobreza grupal, y los niveles de competencia partidista. Aunque la teoría de este trabajo se concentra en los blancos clientelares (grupales e individuales), también argumenta que factores estructurales, como la densidad de pobreza, deberían ser considerados en la literatura acerca de la venta de votos. Estos factores estructurales son de los pocos observables sobre los cuales los compradores de votos basan su decisión acerca de si invertir en clientelismo o no. Usando datos de opinión pública y censos de Brasil, el trabajo examina las variaciones en rentas individuales dentro de diferentes contextos de pobreza a nivel municipal. Los resultados sugieren que los partidos políticos emplean estrategias segmentadas o ad-hoc, apuntando a individuos cuando son altamente identificables, y a grupos cuando se presentan situaciones de economías de escala. Además, individuos que no están en situación de pobreza también pueden recibir ofertas clientelares.

**Palabras clave:** Brasil, clientelismo, venta de votos

# Still for Sale: The Micro-Dynamics of Vote-Selling in the United States, Evidence From a List Experiment

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## Abstract

In nineteenth-century United States politics, vote buying was commonplace. Nowadays, vote-buying seems to have declined. Yet, the literature emphasizes vote-buying, ignoring the micro-dynamics of vote-selling. We seem to know that vote-buyers can no longer afford this strategy, however, we do not know what American voters would do if offered the chance to sell their votes. Would they sell their votes (and at what price) or would they consistently opt-out of vote-selling? Exploiting a novel experimental dataset representative at the national level, 1,479 U.S. voters participated in an online list experiment in 2016 and the results are striking: Approximately 25% would sell their votes for \$730. Democrats and liberals are systematically more likely to sell while education levels and income do not seem to impact on vote-selling.

**Keywords**— vote-buying; vote-selling; clientelism; list experiments; United States

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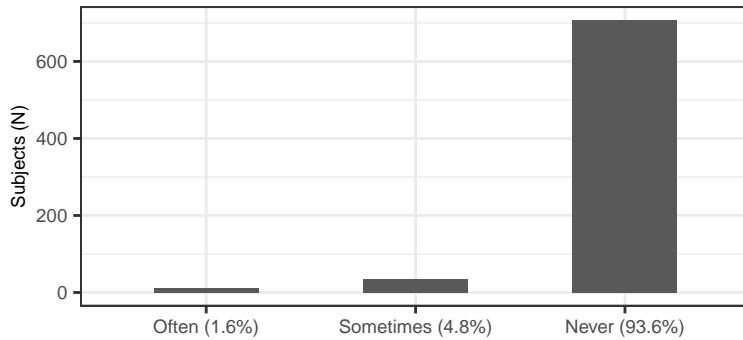
## I. ABSTRACT

In nineteenth-century United States politics, vote buying was commonplace. Nowadays, vote-buying seems to have declined. Yet, the literature emphasizes vote-buying, ignoring the micro-dynamics of vote-selling. We seem to know that vote-buyers can no longer afford this strategy, however, we do not know what American voters would do if offered the chance to sell their votes. Would they sell their votes (and at what price) or would they consistently opt-out of vote-selling? Exploiting a novel experimental dataset representative at the national level, 1,479 U.S. voters participated in an online list experiment in 2016 and the results are striking: Approximately 25% would sell their votes for \$730. Democrats and liberals are systematically more likely to sell while education levels and income do not seem to impact on vote-selling.

## II. VOTE-SELLERS AND VOTE-BUYERS

Prior research usually focuses on whether parties have attempted to buy votes (Vicente 2014; Vicente and Wantchekon 2009; Rueda 2017, 2015; Reynolds 1980; Nichter 2014; Kiewiet de Jonge 2015; Finan and Schechter 2012; González-Ocantos, Kiewiet de Jonge, and Nickerson 2014; Diaz-Cayeros, Estévez, and Magaloni 2012; Brusco, Nazareno, and Stokes 2004). While this is an important question, unfortunately, it overlooks the issue of whether citizens would sell their votes. This reconceptualization is necessary since several questions remain unanswered—and worryingly, most pertain to vote-sellers. For instance, *What would voters do, if offered the chance to sell their votes? Would they sell their votes (and at what price), or would they consistently opt-out of vote-selling?*

Except for a number of important studies (Hicken et al. 2015, 2018; Corstange 2012; Nichter and Peress 2017), the emphasis remains on studying vote-buying. In fact, Nichter and Peress (2017) explain that studies continue to view clientelism typically as a top-down process, generally overlooking citizens' demands. To illustrate the issue at hand, Figure 1 shows responses of U.S. citizens to whether a candidate or a member of a political party has offered something in exchange for people's votes, completely ignoring voters' preferences. The figure begs the question if survey respondents answering “never” would still be willing to sell their votes.



**Figure 1: Frequency of Clientelism in the United States (2010).**

**Note:** Figure shows the frequency of survey respondents,  $N = 755$ .

**Source:** *LAPOP*, 2010 wave for the United States. Question is *clien1*: “In recent years and thinking about election campaigns, has a candidate or someone from a political party offered you something, like a favor, food, or any other benefit or object in return for your vote or support? Has this happened often, sometimes, or never?”

This note proposes that the clientelism literature should “bring the voters back in.” There

is a solid vote-buying literature, but we lack a proper vote-selling body of research. A unified framework that stresses the preferences and incentives of both sellers and buyers is missing. Thus, this paper’s analytical contribution is to tackle this problem as a story of demand and supply, by explicitly considering the preferences of those who have the votes (voters), and that which demands them (parties). The current demand-side bias in the literature gives an incomplete picture because overlooking the supply-side gives the falsely optimistic impression that U.S. voters systematically oppose vote-buying and “thus” almost never engage in clientelism (as [Figure 1](#) strongly suggests).

Most contributions to vote-selling are generally formal/theoretical rather than empirical (Vicente and Wantchekon [2009](#)). Additionally, most empirical studies have been conducted in developing countries. For instance, González-Ocantos, Kiewiet de Jonge, and Nickerson ([2014](#)) designed a list experiment to study hypothetical vote-buying in Latin America. Thus, previous empirical studies do not offer satisfactory answers to questions about vote-selling.

A methodological contribution of this paper is to shed some light on these issues by leveraging a list experiment in a consolidated democracy.<sup>1</sup> Given that the paper focuses on eliciting truthful preferences (regardless of whether the behavior is hypothetical), list experiments seem the ideal strategy to pursue.

In 2016, a novel dataset representative at the national level was collected. A total of 1,479 U.S. voters participated in a list experiment between March 2<sup>nd</sup> and March 6<sup>th</sup>. Thanks to this experiment, it was possible to identify the demographic factors that would make U.S. voters more likely to sell their votes, at what price, and whether they would systematically lie about selling their votes.

The results are striking. The data suggest that a sizable portion of U.S. voters are willing to sell their vote (approximately 25%), would sell it at an optimal price of \$730, and would systematically lie about it (approximately 8%). Given that these data are representative at the national level—and that this is not a convenient sample—these findings are surprising. Democrats and liberals are systematically more likely to sell than Republicans. Education and income levels do not seem to have a systematic impact on vote-selling.

While this paper essentially describes the phenomena, it leaves for future research further considerations about the causes of hypothetical vote-selling in the United States. Ultimately, this paper is an attempt to bridge the gap between the supply side and the demand side, i.e. vote-sellers

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1. But see Levitsky and Ziblatt ([2018](#)).

and vote-buyers, by reporting unprecedented high levels of hypothetical vote-selling.

### III. THE UNITED STATES AS A CASE

Many advanced democracies were the first clientelistic political systems. For instance, Stokes et al. (2013, 200) explain that in the nineteenth-century United States, “vote buying was commonplace,” and that it was “the major urban political institution in the late nineteenth century” (Erie 1990, 2). In Chicago, New York City, Newark, and other large American cities, votes were exchanged for “cash, food, alcohol, health care, poverty relief, and myriad other benefits” (Stokes et al. 2013, 200). The street price of the right to vote freely was low. Bensel explains that “[voters] handed in a party ticket in return for a shot of whiskey, a pair of boots, or a small amount of money” (in Stokes et al. (2013, 227)). In general, students of American political development have analyzed vote-buying in detail, confirming both its early development and its generalized practice (Bensel 2004; Campbell 2005).<sup>2</sup>

Nowadays vote-buying seems to have declined considerably for two competing explanations. First, Stokes et al. (2013, 201) have shown that industrialization drove up the electorate’s median income making vote-buying more expensive for party machines. However, Kitschelt and Wilkinson (2006, 320) disregard the industrialization hypothesis, focusing on the lower levels of “[s]tate involvement in the public sector.” Regardless, clientelist linkages are now rare. In fact, Figure 1 suggests that 93.6% of U.S. respondents have never received a clientelistic offer from a political party.

While only a very small percentage (4.8%) report to have received some kind of clientelistic offer from a political party, we do not know whether survey respondents would sell their votes. This paper shows systematic evidence that they would. Describing a social phenomenon—such as the existence of high levels of willingness to sell—is still a valuable exercise *per se*. However, it is more so if done in a “crucial case” design framework, specifically, a “least-likely” design. As Levy (2008, 12) explains, “[i]nferential leverage from a least likely case is enhanced if our theoretical priors for the leading alternative explanation make it a most likely case for that theory.” The vote-buying literature (which mostly considers developing countries) describes vote-sellers as poor (Weitz-Shapiro 2014, 12), uneducated (González-Ocantos, Kiewiet de Jonge, and Nickerson 2014), and undemocratic (Carlin and Moseley 2015). Previous literature, then, informs us that the willingness to sell votes in the United States should be low, making it a hard case for vote-selling. Thus, the counterintuitive

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2. For the British case during the Victorian era, see Kam (2017).

results presented in this paper make our efforts worth pursuing.

In fact, in a highly controversial pair of articles, Foa and Mounk (2016, 7) document a deep “crisis of democratic legitimacy [which] extends across a [...] wider set of indicators” in the United States. They find that 26% of millennials declare that it is “unimportant” in a democracy for people to “choose their leaders in free elections” (Foa and Mounk (2016, 10), and Foa and Mounk (2017)). These findings raise a number of (unanswered) questions regarding the actual value citizens give to American electoral institutions, possibly undermining the legitimacy of the integrity of voting. Is voting unimportant enough to make U.S. citizens sell their votes, if offered the possibility?

The next section gives an historical account of vote-buying and vote-selling in the United States. The section is also an effort to situate both within a historical context. It particularly shows how vote-buying and vote-selling transitioned from important institutions in American elections, to scarcely practiced electoral methods. The following section explains the measurement, experimental strategies, and empirical findings. The last section offers some working hypotheses and possible lines for future research.

#### IV. VOTE-SELLING AND PATRONAGE IN THE UNITED STATES: A BRIEF HISTORICAL ACCOUNT

While all of the U.S. states made bribery of voters illegal early in U.S. history, these laws were purposely ignored. Well before the Gilded Age (1877-1896), a number of norms aimed to prohibit bribery, clientelism, and patronage. For instance, as early as 1725, the New Jersey legislature had already outlawed a number of electoral malpractices (Bensel 2004, 59). However, these restrictions were systematically bypassed. To circumvent property qualifications, for instance, it was common for office-seekers (and their supporters) to buy “freeholds for landless men in return for their vote” (Campbell 2005, 6), a practice known as “fagot voting.” Since it was a coercive bribe, after “the election, the land was simply returned to the original owner” (6).

Weak institutions, poor bureaucracies, and bad-quality record-keeping<sup>3</sup> helped to foster a number of electoral malpractices. First and foremost, most states did not have actual registration laws, making voter eligibility difficult to determine (Argersinger 1985, 672). Historians frequently report

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3. The U.S. Bureau of the Census did not exist. Consequently, it was relatively easy to invent names, “repeat,” or use any other subterfuge to “stuff the ballot box.” In fact, “a St. Louis politician admitted registry fraud but argued that there was no proof that the names he copied into the registry were of real people and, therefore, no crime had been committed” (Argersinger 1985, 680).

that judges at polling places had a hard time determining not only the age of the potential voter,<sup>4</sup> but also whether the prospective voter was a U.S. citizen, especially in cases that involved newly naturalized immigrants with strong foreign accents (Bensel 2004, 20). Consequently, often times it was at the judge's discretion whether to let prospective voters cast a ballot. Since judges were party appointees (Argersinger 1985, 672), their discretionary powers were systematically used to shape electoral outcomes.

Low literacy levels helped to sustain vote-selling in the United States as well. In places like Kentucky and Missouri, voters were required by law to verbally announce their choices at the polling places, instead of using party tickets (Bensel 2004, 54). The *viva voce* method, of course, was convenient for party workers who usually swarmed around the polling places. Eventually, however, this method was supplanted with the ticket system.

The “party strip” or “unofficial” ballot system permitted all sorts of fraudulent election practices, too. Party tickets were produced by the parties themselves. Since tickets varied by size and color, it made “the voter’s choice of party a public act and rendered voters susceptible to various forms of intimidation and influence while facilitating vote buying” (Argersinger 1985, 672). Similarly, Rusk (1970, 1221) explains that distinctive ticket colors and shapes, “assured instant recognition of the ballot by the voters [and] party workers.” Reynolds and McCormick (1986, 836) present similar evidence. And, since party workers were hired to monitor the voting window (Argersinger 1985, 672), this gave ample opportunity to punish (or reward) voters accordingly.

The ticket system required very strong party machines, which in turn, required considerable economic resources to make it work. Political machines were not only oiled with money, however. On the one hand, many “ticket peddlers” (672) were volunteers (Bensel 2004, 17), saving some of the costs needed to maintain the machine. Most of these volunteers, “enjoyed the patronage of elected party officials by holding government jobs, drawing public pensions, servicing government contracts, or enjoying special licensing privileges” (17). On the other, political appointees, “from janitor to secretary of state,” and some corporations too, donated part of their salaries on a yearly basis (Reynolds 1980, 197). Parties, then, amassed huge amounts of money.

With all these resources flooding the polls on election day, voting was truly an interesting spectacle. On election day, party agents would offer voters plenty of liquor as an incentive to vote their ticket. Hence, “the street or square outside the voting window frequently became a kind of

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4. Judges used as a rough proxy whether the prospective voter had the ability to grow a beard (Bensel 2004, 20).

alcoholic festival in which many men were clearly and spectacularly drunk [up to the point that] some could not remember whether or not they had voted” (Bensel 2004, 20). American elections, even before the Gilded Age, were engineered according to these “principles.” When running for the Virginia House, a young George Washington “spent nearly 40 pounds—a considerable sum for the day—on gallons of rum, wine, brandy, and beer; all used to win over the votes of his neighbors” (Campbell 2005, 5).<sup>5</sup>

The Australian ballot system lowered the frequency of most of these malpractices significantly (Rusk 1970, 1221). However, as vote-selling and vote-buying were so embedded into what was considered normal, the immediate effect of the Australian system was to lower turnout levels (Reynolds and McCormick 1986, 851).

The *modus operandi* of clientelism has changed today, and both the frequency of vote-buying/selling, and the importance of party machines, have declined. Scholars have pointed out that “party machines are a thing of the past” (Stokes et al. 2013, 230). However, there are still some contemporary accounts of vote-buying/selling in American elections. For instance, Campbell (2005, 243-244) explains how a Democratic leader in Logan County, West Virginia, accepted \$35,000 in cash in exchange for supporting Senator Kennedy. As the Democratic leader explained, “this money was for one purpose: ‘We bought votes with it [...] that’s the way real politics works.’” Other examples are the famous primary election in March 1972 in Chicago (262) or the elections at the coal-rich Appalachian mountains during the 1980s (275). Similarly, non-academic sources find that during the 2010 elections, “selling votes [was] common type of election fraud” (Fahrenthold 2012). Others find that “[v]ote-buying is extremely common in *developed* [...] countries” (Leight, Pande, and Ralston 2016, 1). If vote-buying is “a thing of the past,” why do we still see it? How common is vote-selling, then? The next section attempts to quantify—in an unbiased way—the willingness to sell votes in a representative sample of U.S. voters.

## V. EXPERIMENTAL DESIGN

The study of individual preferences depends on truthful answers. However, there might be circumstances under which individuals might not want to answer truthfully due to social pressure. For instance, to avoid being judged by the interviewer, individuals might not want to reveal that they

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5. \$1,250 in 2017 U.S. dollars. Conversion based on Williamson (2018).

have done something illegal, like selling one's vote. If this systematic source of bias is not considered, it will pose threats to causal inference.

List experiments are well suited to elicit truthful answers (Blair 2015). List experiments administer two lists of items; one to the control group, one to the treated group. Both lists look exactly the same (say, each one containing the three same items), however the treatment list includes (traditionally) a fourth item, which is the sensitive item related to some socially condemned behavior. Respondents are asked how many items on the list they would endorse, not which ones. For instance, if an experimental subject answers "2," the interviewer will not know whether that number includes the sensitive item. Consequently, if the survey respondent wants to endorse the sensitive item, the answer will be "masked" by the other items in the list. This concealment makes this technique suitable to study socially condemned behaviors, such as vote-buying (González-Ocantos et al. 2012; Hicken et al. 2018; Corstange 2012, 2008; Blair and Imai 2012), drug use (Druckman et al. 2015), sexual preferences (LaBrie and Earleywine 2000), attitudes towards race (Kuklinski et al. 1997; Redlawsk, Tolbert, and Franko 2010), among others.

Methodologically, given that both lists are assigned at random, the mean number of nonsensitive activities that respondents endorsed should be equal across the two lists. However, if there are any differences in means between the two groups, the differences should be attributed only to the presence of the sensitive item.

While list experiments are common, researchers unfortunately "[utilize] only a difference in means estimator, and [do] not provide a measure of the sensitive item for each respondent" (Glynn 2013, 159). Blair and Imai (2012) and Imai, Park, and Greene (2015) provide a statistical framework to more efficiently analyze list data. They formalize two assumptions, namely, there are (1) "no design effects" (i.e. the inclusion of a sensitive item has no effect on respondents' answers to control items), and (2) "no liars" (i.e. respondents give truthful answers for the sensitive item). When the two assumptions hold, and given that the item count for types  $y = 0$  and  $y = 4$  are fully observed,<sup>6</sup> experimental subjects with item count types  $y = 1$ ,  $y = 2$  and  $y = 3$  can be inferred using multivariate techniques.

Using these statistical methods allows for inferring who answered "yes" to the sensitive item. Second, the statistical analyses permitted studying the relationship between preferences over the sensitive item (i.e. vote-selling) and an individual's characteristics, such as income, party

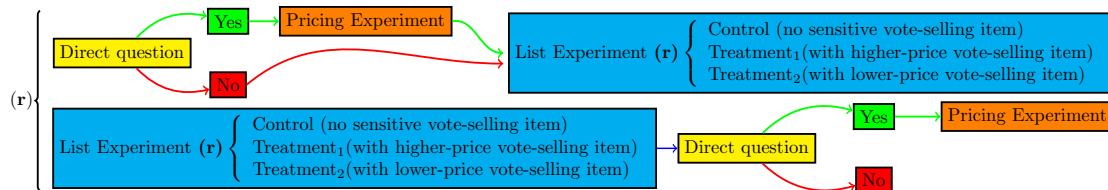
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6. For an hypothetical treatment list of four items.

identification, among others. Third, since a “direct” question over the sensitive item was included in the design, it was also possible to estimate the amount of social desirability bias.

The data ( $N=1,479$ ) were collected in 2016 and are representative at the national level.<sup>7</sup> Figure A1 shows the geographical distribution of survey respondents broken by party identification.

The experiment was framed as a study about crime in the United States, not a study about vote-selling.<sup>8</sup> Before splitting the subject pool into their respective experimental conditions, participants were asked to read an excerpt<sup>9</sup> in which four illegal activities were described (including vote-selling). All were formatted as pieces of news. The idea was to explain to “newsreaders” what “vote-selling” was.



**Figure 2: Experimental Flow of the List Design.**

*Note: This figure shows the flow of the list experiment. Notice that (1) the order in which experimental subjects answered both the direct question and the list experiment was randomized, (2) there are two treatments, one with a selling price of \$100 (“low”) and one with a selling price of \$500 (“high”).*

To prevent possible priming effects,<sup>10</sup> and as suggested in Figure 2, the order in which experimental subjects answered the direct question<sup>11</sup>, and the list experiment, was randomly assigned. To be sure, all subjects answered both the direct question and the list experiment. To further prevent the possibility of biased answers when asking the direct question to individuals in the treated group, the direct question stated that there would be assigned, at random, the hypothetical possibility to do one of the illegal things mentioned previously in the excerpt. However, all participants were directly asked whether they would be interested in selling their votes. Direct answers were then used to estimate the proportion of “liars.”

7. The data were collected by *Research Now SSI* between March 2nd and March 6th. Survey respondents belong to the online panel owned and administered by SSI. Notice of IRB exemption Protocol #E16-292 is kept in file at the Office of Research and Regulatory Affairs of [REDACTED] University.

8. To isolate the risks and costs associated with engaging in any illegal activity, the next sentence was included: “assuming you would not go to jail.”

9. See the appendix for wording.

10. Blair and Imai (2012, 54) explain that asking the direct question to individuals in the treated group might bias the results.

11. See the appendix for wording.

Subjects answering “yes” to the direct question, answered as a follow-up a pricing experiment in which they were asked to put a price on their votes. Subjects who answered “no” to the direct question, were asked a follow-up question asking them whether they were sure they did not want to sell their votes. Pricing experiments are straightforward (Figure 3). Following standard practice in marketing research, participants slid two handles, one indicating which price was considered “too cheap,” and another indicating which price was considered “too high” for one’s vote. Both sliders ranged from \$0 to \$1,000, in \$1 increments. The intersection of the “too cheap” and “too high” empirical distributions was used to estimate the optimal selling price for a vote.



**Figure 3: Pricing Experiment.**

*Note: As shown in Figure 2, all participants slid both handles, one indicating which price was considered “too cheap,” one indicating which price was considered “too high” for one’s vote. The intersection of the “too cheap” and “too high” empirical distributions was used to estimate the optimal selling price for a vote.*

Moving forward, the list experiment contemplated one control, and two possible treatments, each with different vote-selling prices. Since it is difficult to price a vote, and based on a number of pretests, it was decided to consider both an arbitrarily low (\$100) or an arbitrarily high (\$500) price. Participants randomly assigned to the treatment condition, only answered one of these two treatments. More than hard pricing tests, these two treatments account for possible different elasticities that might have interacted with individual socio-economic backgrounds, mainly income.<sup>12</sup>

Subjects randomly assigned to the control condition answered the following question:

Now, you will have to type HOW MANY, if any, of the following illegal activities

<sup>12</sup> Holland and Palmer-Rubin (2015, 1189) explain that “the poor are thought to be more susceptible to vote buying.”

you might engage in, assuming you would not go to jail.

- (1) steal an iPod from a large department store
- (2) speed on the highway because you're late for work/school
- (3) download your favorite music from the internet illegally

Type in HOW MANY (NOT WHICH), if any, of these things you would do.

In turn, subjects randomly assigned to the treatment condition answered one of the following two treatments. Subjects assigned to the “low” price condition read the exact same vignette, but the next line was added in the third place: (3) sell your vote to a candidate for \$100. Those assigned to the “high” price condition read the following line: (3) sell your vote to a candidate for \$500.<sup>13</sup>

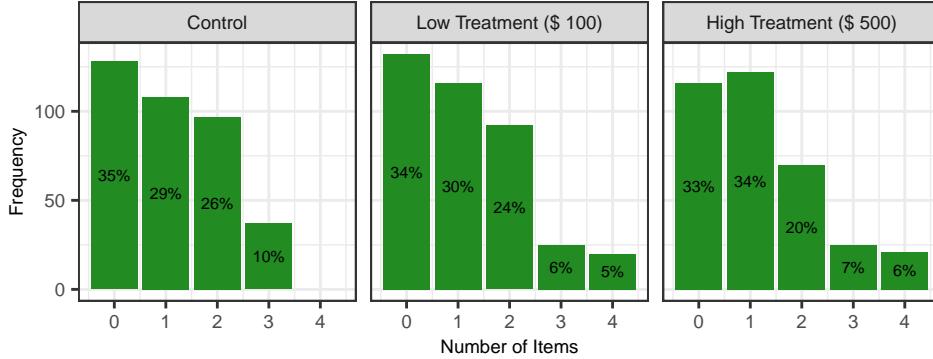
Figure 4 shows the distinct frequencies of participants declaring how many (if any) illegal things participants would do. Notice that the figure shows the total number of items, not which ones. For instance, a frequency of “3” does not mean the frequency of the third item, but the total number of individuals answering that they would do three of the illegal activities described in the vignette.<sup>14</sup> The order of the items was not randomized so as not to violate the stable unit treatment value assumption, or “SUTVA.”<sup>15</sup>

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13. Since one of the two sentences was added, item (3) download your favorite music from the internet illegally was moved to the fourth place.

14. The experimental design passes the standard tests for design effects (floor and ceiling effects). See Table A1.

15. Morton and Williams (2010, 98) explain that the treatment should be invariant, or “stable.”



**Figure 4: Frequency and Percentages of Subjects Declaring How Many (if any) Illegal Things They Would Do.**

*Note:* Notice that the X-axis denotes the number of items, not which ones. Percentages show proportions per condition.

The paper acknowledges that there is considerable friction and transaction costs in the real world that might mean that actually creating a market for vote selling would not be easy. For instance, party identification might increase (or decrease) the cost of selling one's vote, presumably preventing (or fostering) the transaction. For instance, if the party of both sellers and buyers coincide, that might represent a win-win situation for both, presumably fostering vote-selling. This experimental design does not consider blocking on party identification, as that might have increased the number of cells considerably.<sup>16</sup>

## I. Would U.S. Citizens Sell Their Vote?

Following the advice of Blair and Imai (2012) and Blair et al. (2016), the list data were analyzed using a statistical multivariate approach. Numerical results are shown in Table 1. Four covariates were included: income, education, party identification, and political ideology. These variables have been widely considered in the clientelism literature before (Nazareno, Brusco, and Stokes 2008; González-Ocantos, Kiewiet de Jonge, and Nickerson 2014; Bahamonde 2018; Weitz-Shapiro 2012).<sup>17</sup>

16. To  $3 \times 2 \times 3 = 18$  cells: Republican/Democrat/Independent vote-selling treatments, High/Low vote-selling prices, Republican/Democrat/Independent party identifications. Such experiment is not only much more expensive, but statistically more complex.

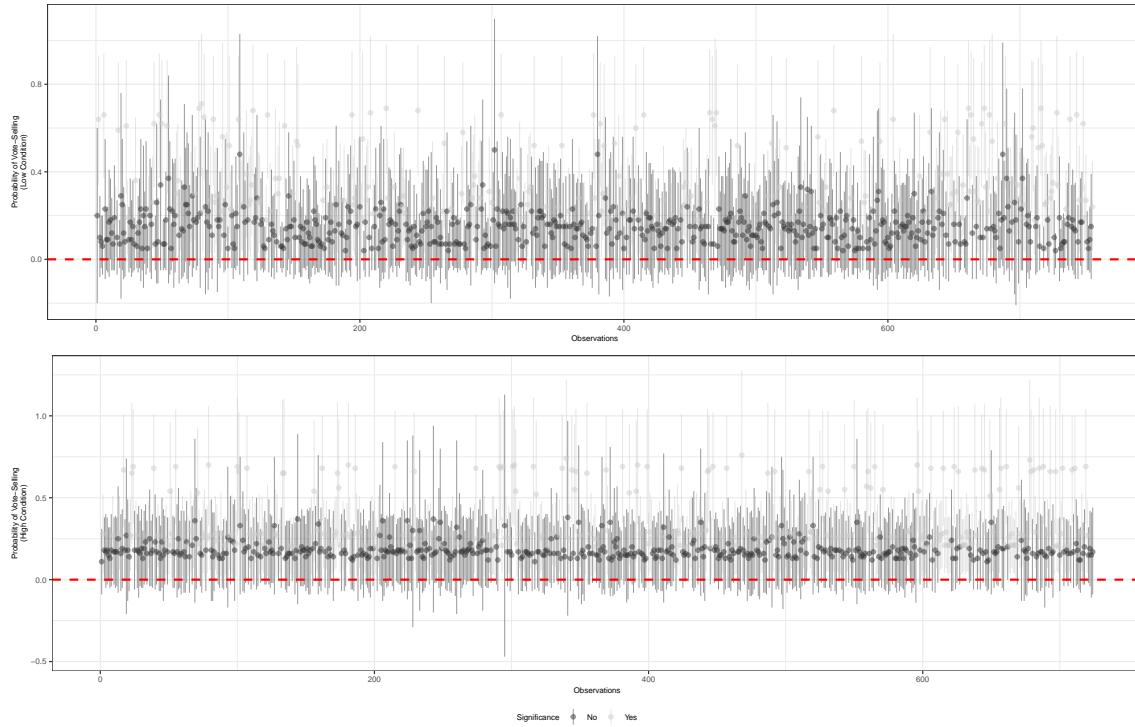
17. The R package `list` was used (Blair et al. 2016). The estimation method used was the “ml” and the maximum number of iterations was 200,000. The remaining arguments were left at their default values.

Variables	Sensitive Items				Control Items			
	Low Treatment		High Treatment		Low Condition		High Condition	
	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Intercept	-0.06	1.03	0.82	1.2	-0.73	0.22	-0.76	0.24
IdeologyLiberal	-1.36	0.8	-2.11	0.9	0.41	0.19	0.36	0.2
IdeologyModerate	-1.79	0.76	-1.74	0.88	0.1	0.18	0.3	0.19
IdeologyConservative	-2.1	0.89	-1.86	0.87	0.23	0.2	0.34	0.21
IdeologyVeryConservative	-1.88	1.12	-2	1.03	0.01	0.25	0.09	0.25
Party IdRepublican	-0.18	0.75	-0.6	0.73	-0.53	0.15	-0.55	0.15
Party IdIndependent	-1.2	0.89	-0.55	0.65	-0.37	0.13	-0.35	0.13
Party IdSomething Else	-0.23	1.02	0.32	1.1	-0.4	0.25	-0.24	0.27
Income	0.06	0.08	0.02	0.08	0.02	0.01	0.01	0.02
Education	0.02	0.16	-0.03	0.17	0.01	0.03	0	0.03

**Table 1: Multivariate Analysis of the List Experiment.**

*Note:* Table shows estimated coefficients from regression models where the outcome variables are whether or not subjects would sell their vote to a candidate for \$100 or \$500.

Using basic inferential statistics, individual probabilities of vote-selling were estimated (Figure 5). Using this information, it is possible to estimate the proportion of individuals selling their votes. In combination with the estimates of the direct question, it was also possible to estimate the number of “liars.”



**Figure 5: Individual Estimated Probabilities of Vote-Selling.**

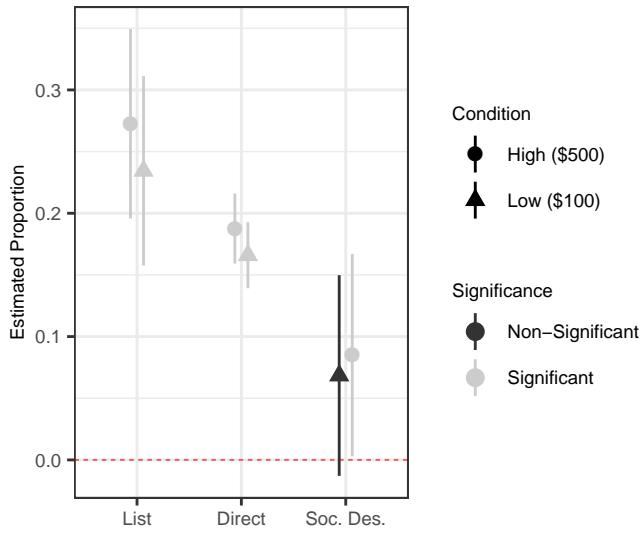
Note: Figure shows the individual probabilities of vote-selling ( $N = 1,479$ ) under the “low” and “high” conditions. After fitting the model in Table 1, and following the advice of Blair and Imai (2012) and Imai, Park, and Greene (2015), individual probabilities of vote-selling under the “low” and “high” conditions were estimated. A total of 501 estimations are significant (both conditions). The figure also shows 95% confidence intervals.

Moving forward, Figure 6 shows the estimated proportion of vote-sellers, the proportion of declared vote-sellers (based on the direct question), and the difference between the two (“liars”). Each estimation is divided by treatment (“high”/“low”). Since the estimated proportion of vote-sellers does not increase with the high-price treatment, it is then reasonable to think that there are not specific concerns associated with the design of the treatments.

Substantively, the figure suggests that after combining the estimates of the “low” and “high” treatments, approximately 25% of the nationally representative sample would be willing to sell their vote.<sup>18</sup> While a considerable proportion answered the direct question affirmatively (18%),<sup>19</sup> the analyses still suggest that survey respondents systematically under-reported their true answers:

18. This number was calculated averaging over the “high” (27%) and “low” (23%) conditions.

19. This number was calculated averaging over the “high” (19%) and “low” (17%) conditions.



**Figure 6: List Experiment Data: Declared and Predicted Vote-Sellers.**

*Note:* The figure shows the proportion of declared and predicted vote-sellers, and its difference (“liars”). These estimations were obtained from the model specified in [Table 1](#). The figure shows 95% confidence intervals. Since the vote-selling prices were set arbitrarily, the reason for two conditions (“high” and “low”) was to control for possible price elasticities. While there are some perceptible changes, they are not statistically significant. Consequently, these arbitrary decisions do not threaten the identification strategy.

approximately 8% of the nationally representative sample lied about it.<sup>20</sup>

## II. Who are the Most-Likely Vote-Sellers?

Using the estimated coefficients in [Table 1](#), [Figure 7](#) shows the estimated effect of each variable on vote-selling.

Democrats and liberals are systematically more likely to sell. These findings are in line with research that studies the different constitutive values of liberals and conservatives. Political psychologists have found that liberals, when compared with conservatives, construct their moral systems primarily upon narrower psychological foundations. Particularly, liberals consider less important both the authority/respect and the purity/sanctity dyads (Graham, Haidt, and Nosek [2009](#), 1029). This might lead liberals to engage more frequently in behaviors that might be considered “wrong,”

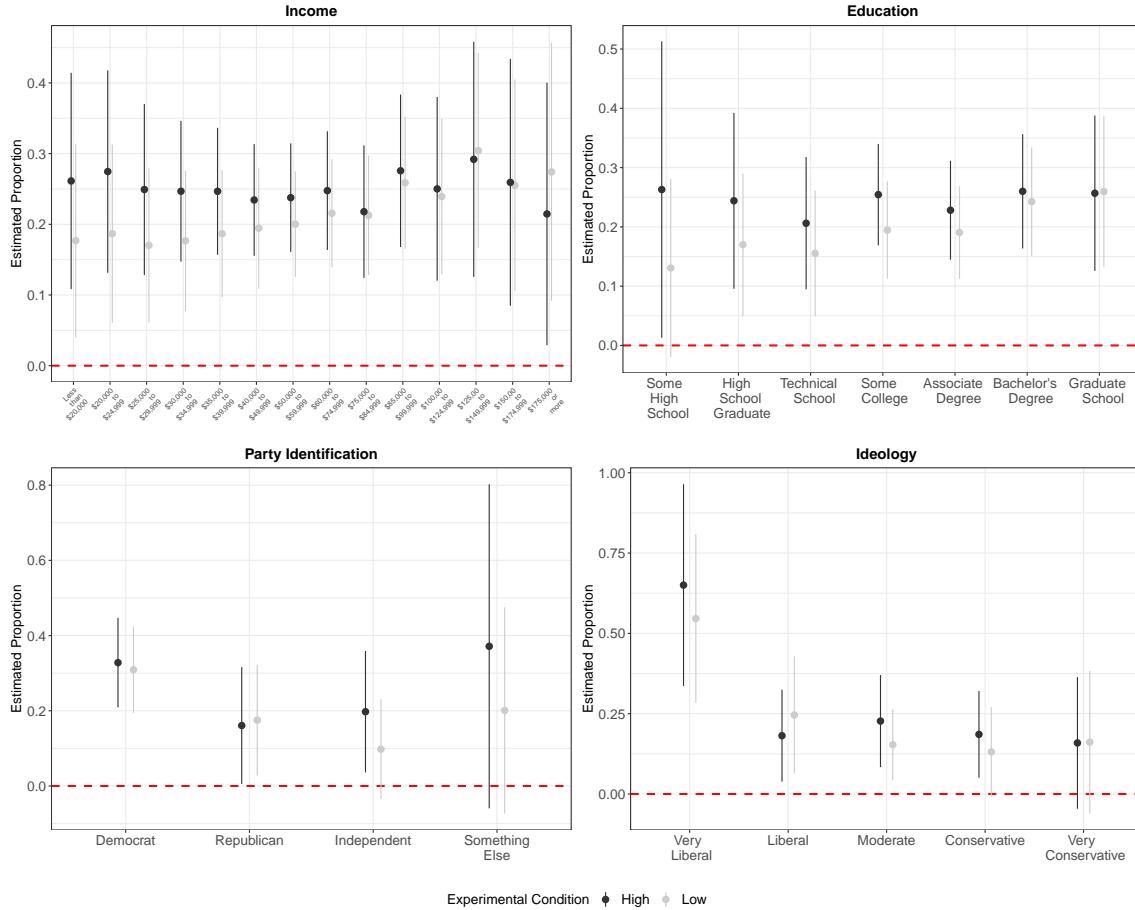
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<sup>20</sup> This number was calculated averaging over the “high” (8%) and “low” (7%) conditions. The “low” condition is barely non-significant, and hence it does not alter the substantive results.

such as vote-selling. In fact, Gray, Schein, and Ward (2014, 7) explain that conservatives “see impure violations as relatively more wrong.”

Education and income levels do not seem to have a systematic impact on vote-selling. Interestingly, poverty has long been associated with vote-selling (Calvo and Murillo 2004; Weitz-Shapiro 2012; Kitschelt 2000; Carlin, Singer, and Zechmeister 2015). Brusco, Nazareno, and Stokes (2004), Stokes et al. (2013) and Nazareno, Brusco, and Stokes (2008) explain that since the poor derive more utility from immediate transfers relative to returns associated with future (and risky) policy packages, clientelistic political parties only target the poor. For instance, Weitz-Shapiro (2014, 12) explains that “[a]lmost universally, scholars of clientelism treat and analyze [this] practice as an exchange between politicians and their poor clients.” However, this canonical predictor has recently been questioned. Szwarcberg (2013) “challenges the assumption [that brokers] will always distribute goods to low-income voters in exchange for electoral support,” while González-Ocantos et al. (2012) and Holland and Palmer-Rubin (2015) find that income had little or no effect on vote-buying. In fact, Bahamonde (2018) advances an argument for why brokers would also target non-poor individuals.

While the differences between the two treatments are not statistically significant—which in fact confirms that the arbitrarily low and high treatments were well-chosen—there seems to be a substantive pattern regarding these two treatments. Factors that heavily determine economic status (income and education), seem to be more elastic to the buying price of the vote: even when poor individuals do not seem to sell more (when compared with wealthier individuals), there does seem to be important within-group differences between the treatments. Particularly, low-income and less educated individuals are willing to sell their vote (just like the rest), but more so under the high-price condition. This might indicate that, for them, it is worthwhile to behave illegally, but only when the payoff is “large enough.” These results are in line with experimental and applied economists who argue that “risk aversion decreases as one raises above the poverty level and decreases significantly for the very wealthy” (Riley and Chow 1992, 32). In other words, less educated and low-income individuals, who are more fragile and precarious, tend to avoid risks, and hence, illegal activities. However, a discrete increase in the payoff makes the immediate monetary transfer more attractive, lessening risk aversion.

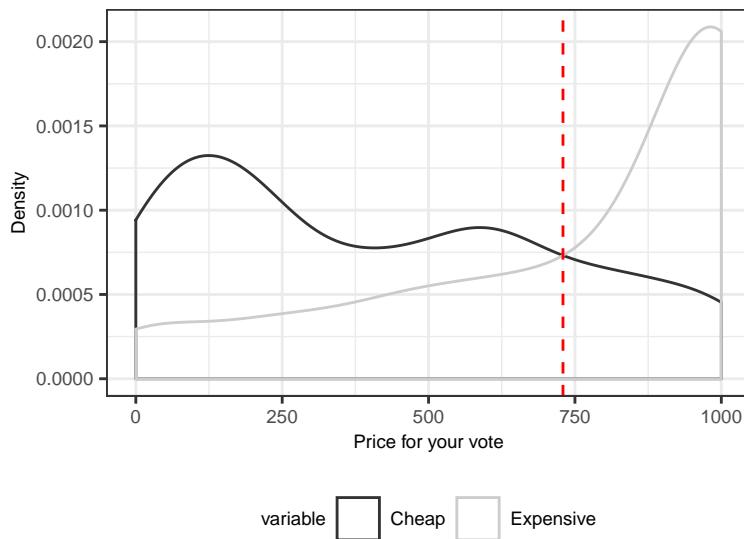


**Figure 7: List Experiment: Predicting Vote-Selling.**

**Note:** After fitting the model on the list experiment data (see [Table 1](#)), this figure shows the predicted probabilities and their corresponding 95% confidence intervals for: income, education, party identification, and ideology. Since the vote-selling prices were set arbitrarily, the reason for two experimental conditions ("high" and "low") was to control for possible price elasticities. While there are some perceptible changes, they are not statistically significant. Consequently, these arbitrary decisions do not threaten the identification strategy.

### III. Where do Supply and Demand Meet?

What would be the tipping point for vote-sellers? As shown in [Figure 2](#), a pricing experiment was conducted in addition to the list experiment. Subjects were directed to declare which price was considered “too cheap” and which was “too expensive.”<sup>21</sup> With these two pieces of information, it was possible to construct two supply curves. The “too cheap” curve, representing the lower bound (mean = \$418) and the “too expensive” curve, representing the upper bound (mean = \$744). Substantively, the optimal selling price is located where both curves intersect. [Figure 8](#) indicates that the average survey respondent would sell his/her vote for \$730.



**Figure 8: Pricing Experiment: Ideal Selling Price.**

**Note:** Subjects who answered “yes” to the direct question ( $N = 189$ ) were asked to price their votes via a pricing experiment (see [Figure 3](#)). This figure shows the empirical distributions of the “too cheap” and “too expensive” answers. The intersection of these two supply curves (the vertical dashed line) represents the estimated optimal selling price. The data suggest that the right price for one’s vote is \$730.

These results are not unrealistic. While the selling price is really high, it matches with what others have found. Bahamonde (2018) finds that clientelist political parties in Brazil do target non-poor voters at considerably higher prices. In turn, Shawn (2012, 6) noted that a broker purchased one

21. Since there is no other way of knowing what “cheap” and “expensive” mean without mentioning directly what specific good is being considered, it was necessary to ask survey respondents directly how much they would sell their votes for. Only 189 individuals would sell their votes when asked directly.

man's vote for \$800 during the 2010 elections in eastern Kentucky.

However, moving beyond anecdotal evidence, these results align with Stokes et al. (2013). From the demand-side, vote-buying is no longer an efficient strategy for party machines. Industrialization has driven up the median income of the electorate, increasing the selling price, turning vote-buying into an increasingly expensive strategy to win votes. Evidently, with the selling price so expensive, the demand-side (i.e. parties) are unable to catch up with the supply-side, making vote buying in the United States a rare event. This situation has forced party machines to turn to other, less prohibitively costly alternatives. Thus, these results confirm that from the supply-side (i.e. voters) the vote is still for sale, only for a very high price—a price that party machines cannot really afford.

## VI. GENERAL DISCUSSION

There seem to be two conflicting pictures. On the one hand, and leaving concerns of social desirability bias aside, we “know”—using *non-experimental* data—that most people have never been offered the possibility to sell their votes (as per Figure 1). On the other, the results presented here strongly suggest that they would. While buyers (e.g. parties) are not buying, there is a large proportion of *latent* vote-sellers willing to sell their votes.

While vote-buying/selling in the United States was commonplace during the 19th century, higher median incomes have increased the cost of this strategy as a feasible tool to win elections, in turn, making vote-buying rare in the United States. The paper confirms this hypothesis by suggesting that an important estimated proportion of U.S. voters—25%—is very much willing to sell their votes, but for an estimated very high price—\$730.

Overall, these results are striking, and the author is not aware of any other experimental design in which subjects in an industrialized democracy are asked whether they would sell their votes, and moreover, find positive results.

The paper began by establishing the tension between supply and demand sides within a clientelistic relationship. In order to study the micro-dynamics of clientelism, more hypothetical questions should be fielded. If clientelism is conceptualized as a transaction between party machines and citizens, studying only realized transactions should produce only partial answers. Geddes (1990, 131) explains the well-known problems of studying “only cases that have achieved the outcome of interest.” Questions involving hypothetical scenarios, on the contrary, can potentially shed light on unrealized

transactions. Notably, González-Ocantos, Kiewiet de Jonge, and Nickerson (2014) constitutes one of the few examples in the study of hypothetical behaviors in the vote-buying literature. Following their lead, the paper presented evidence of vote-selling in the United States.

While the paper is rather descriptive in nature, the author believes that the exercise was rather worth pursuing. The experimental evidence of a large critical mass willing to sell their votes in a developed country was novel. Also, a new experimental measurement to capture unbiased attitudes towards democracy was introduced. However, it was well beyond the goal of this paper to investigate the long-term structural causes of vote-selling in the United States as well as the substantive implications of democratic attitudes on vote-selling. Hopefully, the paper sets the stage for future research and encourages other scholars to field the experimental designs presented in this paper in a comparative setting, such that both developed and developing countries are included. Future research should also consider different values placed on different offices.<sup>22</sup> It is reasonable to think that presidential, Senate, House, state legislature, mayor, and city council elections, follow different incentives and constraints to buy and sell votes. And, future research should consider blocking on party identification. For example, designing a more complex experiment in which not only the price varies (like it does in the presented design), but also the vote-selling treatment is partisan.

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22. I owe this point to [redacted].

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## VII. APPENDIX

### I. Experimental Manipulations and Vignettes

**Distractor Paragraph.** The next paragraph was used to distract subjects from the main purpose of the study, and also to define what vote-selling was.

Washington, D.C.- A department store downtown had a robbery incident last week, reporting several missing iPods from their inventory. Authorities also inform that a group of local residents are trying to ``sell'' their votes to political candidates ahead of a local election for city council. Residents approached some of the candidates running for office and offered to vote for that candidate in return for monetary compensation. In a different subject matter, the local police station released a report on driving habits and behaviors in the Capitol district last week. Finally, cyber-crime has become an increasingly serious issue in the area in the past few years.

**Direct Question.** All subjects read the next paragraph, and then answered the direct question:

Now you will be entered into a random lottery for the opportunity to do ONE of the illegal things you just read before. This means that you might be randomly offered to hypothetically do ANY of the activities mentioned before.

After a random assignment, you have been selected for the opportunity to hypothetically sell your vote. This means that you will have the hypothetical opportunity to accept money from a candidate for your vote. Would you be willing to accept the offer, assuming you would not go to jail? By selecting ``Yes, '' you could earn up to \$1,000.

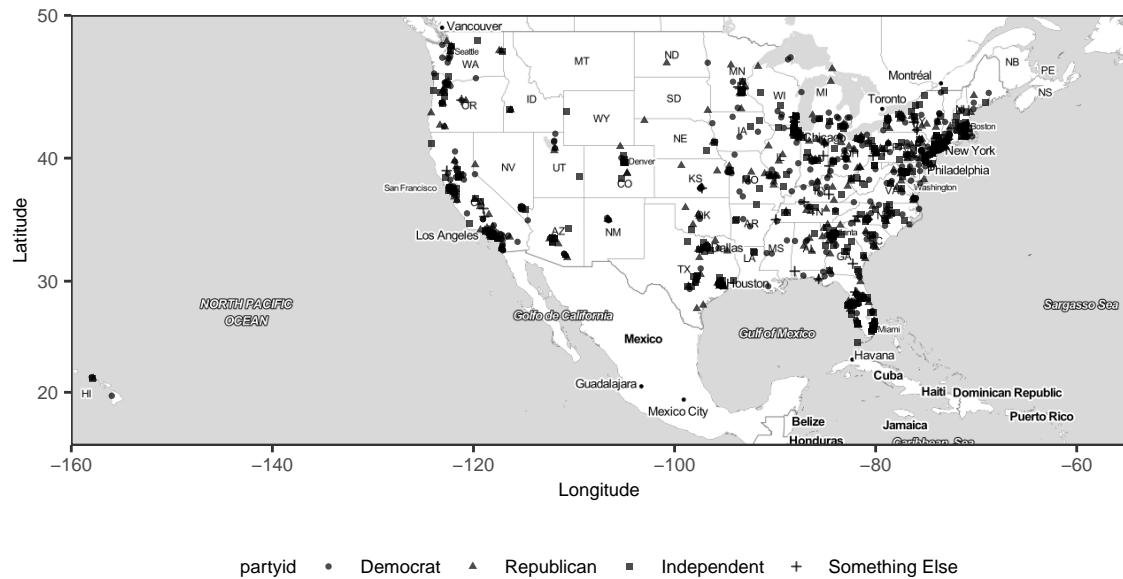
## II. Testing for Design Effects

**Table A1:** *Test for List Experiment Design Effects.*

<b>Respondent Types</b>	<i>Low Condition</i>		<i>High Condition</i>	
	<i>Est.</i>	<i>SE</i>	<i>Est.</i>	<i>SE</i>
(y = 0, t = 1)	0	0.03	0.02	0.04
(y = 1, t = 1)	-0.01	0.03	-0.03	0.04
(y = 2, t = 1)	0.02	0.02	0.03	0.02
(y = 3, t = 1)	0.05	0.01	0.06	0.01
(y = 0, t = 0)	0.34	0.02	0.33	0.02
(y = 1, t = 0)	0.3	0.03	0.33	0.04
(y = 2, t = 0)	0.25	0.03	0.23	0.03
(y = 3, t = 0)	0.05	0.02	0.04	0.02

**Note:** Since the Bonferroni-corrected p-values of the *low* (0.86) and *high* (0.33) conditions are above the specified alpha (0.05), I fail to reject the null of no design effects.

### III. Geographical Distribution of Survey Respondents



**Figure A1:** Geographical Distribution of Survey Respondents broken by Party Identification.

## NOTES

1. But see Levitsky and Ziblatt (2018).
2. For the British case during the Victorian era, see Kam (2017).
3. The U.S. Bureau of the Census did not exist. Consequently, it was relatively easy to invent names, “repeat,” or use any other subterfuge to “stuff the ballot box.” In fact, “a St. Louis politician admitted registry fraud but argued that there was no proof that the names he copied into the registry were of real people and, therefore, no crime had been committed” (Argersinger 1985, 680).
4. Judges used as a rough proxy whether the prospective voter had the ability to grow a beard (Bensel 2004, 20).
5. \$1,250 in 2017 U.S. dollars. Conversion based on Williamson (2018).
6. For an hypothetical treatment list of four items.
7. The data were collected by *Research Now SSI* between March 2nd and March 6th. Survey respondents belong to the online panel owned and administered by SSI. Notice of IRB exemption Protocol #E16-292 is kept in file at the Office of Research and Regulatory Affairs of [redacted] University.
8. To isolate the risks and costs associated with engaging in any illegal activity, the next sentence was included: “assuming you would not go to jail.”
9. See the appendix for wording.
10. Blair and Imai (2012, 54) explain that asking the direct question to individuals in the treated group might bias the results.
11. See the appendix for wording.
12. Holland and Palmer-Rubin (2015, 1189) explain that “the poor are thought to be more susceptible to vote buying.”
13. Since one of the two sentences was added, item (3) download your favorite music from the internet illegally was moved to the fourth place.

14. The experimental design passes the standard tests for design effects (floor and ceiling effects). See **Table A1**.

15. Morton and Williams (2010, 98) explain that the treatment should be invariant, or “stable.”

16. To  $3 \times 2 \times 3 = 18$  cells: Republican/Democrat/Independent vote-selling treatments, High/Low vote-selling prices, Republican/Democrat/Independent party identifications. Such experiment is not only much more expensive, but statistically more complex.

17. The R package **list** was used (Blair et al. 2016). The estimation method used was the “ml” and the maximum number of iterations was 200,000. The remaining arguments were left at their default values.

18. This number was calculated averaging over the “high” (27%) and “low” (23%) conditions.

19. This number was calculated averaging over the “high” (19%) and “low” (17%) conditions.

20. This number was calculated averaging over the “high” (8%) and “low” (7%) conditions. The “low” condition is barely non-significant, and hence it does not alter the substantive results.

21. Since there is no other way of knowing what “cheap” and “expensive” mean without mentioning directly what specific good is being considered, it was necessary to ask survey respondents directly how much they would sell their votes for. Only 189 individuals would sell their votes when asked directly.

22. I owe this point to .

# Sectoral Origins of Income Taxation: Industrial Development in Latin America, and The Case of Chile (1900-2010)

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May 7, 2019

## Abstract

Building on the fiscal sociology, and sectoral approaches, this paper outlines the conditions under which the timing of the implementation of the income tax was most likely to happen. The argument stresses the role of sectoral contestation, and how the tax was an important critical juncture for state-building in Latin America. My quantitative analyses cover almost a hundred years of sectoral outputs. I also examine the Chilean case to illustrate the causal mechanisms at work. I find that higher levels of sectoral contestation—characterized by the rising of the industrial class—posed credible threats to incumbent landowners-elites, in turn accelerating the implementation of the income tax.

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*The only important coercion which is  
crucial to development is taxation*

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Arthur Lewis, 1965

*The budget is the skeleton of the state  
stripped of all misleading ideologies*

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Schumpeter, 1991

There seems to be strong agreement that fiscal capacities are a prerequisite for state-building. For instance, Levi (1989, 1) explains for the continental cases that, “the history of state revenue production is the history of the evolution of the state.” Unfortunately, however, most efforts have been devoted to understanding the relationship between the politics of taxation and state development only in a limited number of European cases,<sup>1</sup> overlooking the origins of fiscal and state expansion in the developing world; and particularly, in Latin America (Di John 2006, 5). In fact, in a recently edited volume, Monson and Scheidel (2015, 3) explain that the “New Fiscal History has furnished a valuable set of concepts and questions but so far its scope has been limited to post-classical Europe.”<sup>2</sup> Moreover, the bulk of the research done on Latin America has mostly focused on *recent* tax reforms (Flores-Macías, in Flores-Macías 2017). For instance, Fairfield (2013) studies different strategies policymakers pursue to tax elites starting in 1990, Mahon, Bergman, and Arnson (2014, 3), Mahon (2004) and Focanti, Hallerberg, and Scartascini (2013) have studied the causes of tax reform in Latin America starting in the 1960s, 1980s, and 1990, respectively. Similarly, Ross (2004) studies the relationship between taxation and representation between 1971 and 1997, whereas Sokoloff and Zolt (2007) study the evolution of tax institutions, comparing the U.S. with Latin America (Sánchez 2011; Bergman 2003a). However, comparative time series studies focusing on the structural *origins* of income taxation in Latin America seem scarce. By providing a set of broader consequences for state consolidation, this paper is an effort to fill this gap in the literature.

Building on the fiscal sociology approach, I develop an argument centered on the development of the modern fiscal apparatus in Latin America, explaining that it was product of sectoral conflicts and compromises between the industrial and agricultural elites. The paper presents several panel-data analyses covering almost 100 years of data for a number of Latin American countries. It also presents the Chilean case to illustrate the causal mechanisms at work. I find that the emergence of the

industrial sector *accelerated* the implementation of the income tax, while the expansion of the agricultural sector *retarded*, or even *precluded* fiscal development. These findings go in line with Beramendi, Dincecco, and Rogers (2016), particularly, in that as long as agriculture is the leading economic sector, the fiscal apparatus is less likely to emerge.<sup>3</sup>

I argue that the early implementation of the income tax in Latin America was product of an inter-sectoral conflict that took place around in the early 1900s between the agricultural and industrial sectors.

Initially, Latin American political institutions and social norms—largely inherited from the colonial period—were designed to serve the interests of the landowning elites (Mamalakis 1971, 90,109). However, the economic structural transformation, characterized by “a secular decline of agriculture and substantial expansion of manufacturing” (Johnston and Mellor 1961, 567), imposed tight constraints on the way politics was run by the incumbent agricultural political elites. Given the initial advantage of the landed elites, the emergence of the industrial sector lead to the reduction of inter-sectoral inequality. It also lead to the rise of bargaining power of the industrial class, positioning them as challenger elites.<sup>4</sup> In other words, the political monopoly of agricultural elites was disturbed with the rising of a new, and strong political elite backed by favorable material conditions rooted in industrial expansion. Industrial emergence, in turn, posed credible political, economic, and military threats to agricultural incumbents. Threats increased the opportunity costs of conflict, generating pressures for inter-elite compromises, in particularly, the implementation of the income tax. The paper also explains why industrial elites actually preferred to impose the income tax, and links this to state consolidation.

Some scholars situate the relevant state-building critical juncture either before the colonial period (Mahoney 2010), or at the end of it (Kurtz 2009, 2013; Soifer 2015). While the literature situates these critical moments before the class compromises identified in this paper, the argument identifies the income tax as an important *additional building block* in that process. Hence, here the focus is on state *consolidation*, rather than on state *formation*.

The paper is organized as follows. The argument is explained in two different sections. The first section explains the nature, and mechanics of the sectoral conflicts that lead to income taxation, paying special attention to the role of taxation on state consolidation in Latin America. The following section explains that the timing of implementing the income tax acted as a critical juncture, setting countries in a development/underdevelopment path. To contextualize the theoretical argument, the

following section presents the case of Chile between 1900 and 1950, focusing particularly on the cross-class economic and political dynamics that led to the implementation of the income tax. In an effort to generalize this historical evidence, the quantitative section presents several panel-data analyses (duration models and Cox regressions) covering almost 100 years of data, for a number of Latin American countries. Lastly, the paper provides some concluding remarks, and discusses some pending issues.

## I. SECTORAL CONFLICTS AND THE ROLE OF TAXATION ON STATE FORMATION

The paper examines the well-established link between direct taxation and state-making, but it emphasizes the path-dependent consequences of sectoral conflicts on state consolidation in the Latin American context, filling an important gap in the literature of the political economy of the developing world.<sup>5</sup> And such, it sees the implementation of the income taxation as an important critical juncture for state consolidation.

The opening premise is that income taxation fosters state consolidation. Following Schumpeter who sees “taxation in terms of group conflicts [and] class interests” (Monson and Scheidel 2015, 14), and Musgrave (1992, 99) who explains that since taxation—especially on incomes—requires such a high degree of state penetration, this article contends that public finances offer an important element for any theory of state development.

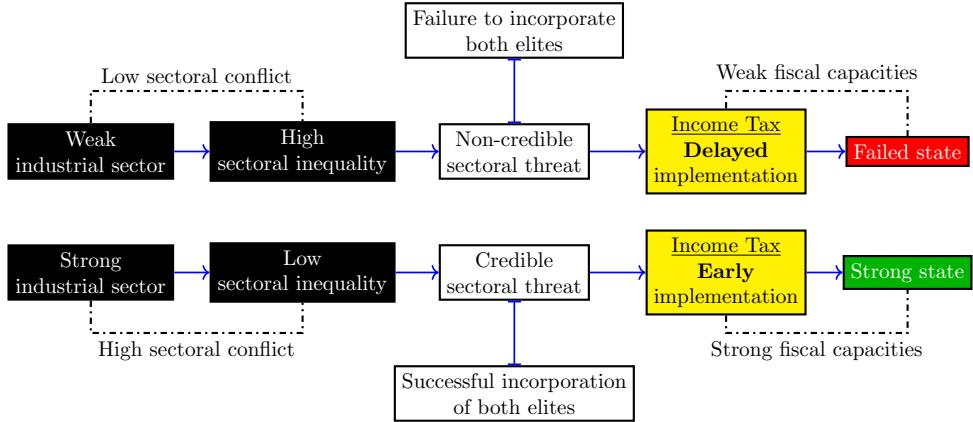
According to fiscal sociologists, indirect taxes do not foster a strong fiscal apparatus.<sup>6</sup> According to Best (1976, 53), “indirect taxes are but substitutes for direct taxes,”<sup>7</sup> and hence they are typically administered by weak states (Moore 2004b, 14). Since indirect taxes are easier to levy (Krasner 1985, 46),<sup>8</sup> this kind of revenue is generally considered “unearned income” (Moore 2004a, 304), or an “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—particularly tariffs—have a very low impact on state-building. Since customs administrations have always been concentrated in a few critical locations—especially ports, tariffs and customs duties—they did not require an elaborate fiscal structure (Bertola and Ocampo 2012, 132), compromising state consolidation. In fact, when early Latin American states depended heavily on international trade taxes, the state apparatus tended to be less developed (Campbell 1993, 177).

Industrial and agricultural elites have different preferences towards taxation (Acemoglu and

Robinson 2009, 289, Best 1976, 50). Since land fixity increases the risk premium of the landed elite's main asset (Robinson 2006, 512),<sup>9</sup> they systematically resist taxation. In turn, as capital can be reinvested in nontaxable sectors (Hirschman 1970),<sup>10</sup> industrialists' preferences toward taxation are more elastic.

These conflicting sectoral preferences about taxation have broader implications for state centralization, and consolidation (Hechter and Brustein 1980, 1085). Since the landowning classes opposed taxation, and since taxation fostered state centralization, ultimately, the sectoral conflict over taxation had bigger consequences for state consolidation. Where the landowning class was powerful, income taxation came in late, compromising state formation. However, when the emergence of a challenger capitalist class posed credible threats to agricultural incumbents, the conflict was likely to be resolved in favor of expanding the early fiscal apparatus, particularly, by implementing the income tax, fostering state building. This particular paper builds on Mares and Queralt (2015, 3), who find that the income tax was adopted "at a time when the economic power of incumbent landowning elites was severely threatened by the rise of a new economic elite linked to the emerging manufacturing sector." Similarly, leveraging a number of cases, including some Latin American countries, Beramendi, Dincecco, and Rogers (2016, 18) explain 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." Relatedly, Flores-Macías (2014) finds that Colombian elites were willing to impose higher taxation levels on themselves, upon the establishment of an elite-government alliance, fostering closer monitoring levels, particularly regarding public spending.

The nature of the sectoral threats is rooted in the greater access industrialists had to military resources. Favorable material conditions permitted the capitalist class to buy off factions of the early state armies (as the Chilean case illustrates). From a sectoral inequality point of view, the emergence of strong industrial political elites implied a reduction in levels of inter-elite economic inequality, closing the gap respect to access to military resources each elite had. Importantly, having both elites access to similar military resources, war was most likely to exhaust all existent assets without producing positive outcomes for either sector,<sup>11</sup> putting heavier pressures to reach agreements rather than engaging in armed conflicts. Here I focus on one such agreement, the implementation of the income tax law. Critically, credible sectoral threats—as the paper contends—made the political incorporation of non-agricultural political elites more likely.



**Figure 1: Causal Argument**

The implementation of the income tax law had positive spillovers on state consolidation. Income taxation was not only important because of the new revenue it collected, but also for state consolidation (Musgrave 1992, 98, Moore 2004a, 298). Kaldor points out that the revenue service is the “point of entry.” Once this institution is established, the expected marginal cost of improving/implementing other “state-capacities” is lower (Brautigam, Fjeldstad, and Moore 2008, 15). In other words, there were *technical complementarities*<sup>12</sup> between implementing the income tax, and fostering overall levels of state institutionalization. The literature is consistent in that the *introduction* of the income tax is associated with state expansion. For instance, Besley, Ilzetzki, and Persson (2013, 208) 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, while 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.” In Chile, bureaucrats that were sent to collect and administer taxes eventually learned to solve land disputes and dispense justice, among other state tasks. 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. Others have found that literacy levels rose in 1907 from 40% to 66% in 1925 (Engerman, Sokoloff and Mariscal, in Engerman and Sokoloff 2011, ch. 5). The share of national revenue accounted for by income taxes after implementing the income tax in 1924 rose from 6% in 1920 to 23.7% in 1940 (Engerman,

Sokoloff and Zolt, in Engerman and Sokoloff 2011, 178). Humud (1969, p. 154) documents that the income tax was widely enforced, generating considerable resources for the Chilean treasury (in Bowman and Wallerstein 1982, 451-452). The dependence on custom taxes decreased from 70.2% to 41.1% during those same years (Engerman, Sokoloff and Zolt, in Engerman and Sokoloff 2011, ch. 6). Finally, I find in a different project that the income tax in Chile produced state-capacities over time (Bahamonde, n.d.). All these developments suggest that policies that expanded the reach of the state increased considerably *after* implementing the income tax.

## II. THE TIMING OF THE IMPLEMENTATION OF THE INCOME TAX: LATE AND EARLY IMPLEMENTERS

When countries implement the income tax is a substantively important quantity of interest. Income taxation should have positive spillover effects on state development only if its implementation is situated during the formative years of the polity. Early implementers should have persistent comparative advantages through learning-by-doing, and agglomeration effects. Otherwise, once other major institutions are set in place (and once there is a clear set of winners and losers), even if some kind of direct taxation is (belatedly) imposed, it should be very costly to alter the underlying incentives of that particular institutional order. Since late implementers had lower levels of sectoral conflict—too low to trigger a critical juncture—they kept reproducing the legacies of the post-colonial backwards institutions.

While all countries in the region eventually implemented some system of direct taxation (see Figure 2), the process late implementers went through did not reflect the domestic sectoral dynamics explained in this paper, but other forces. While early implementers consolidated the state *in light* of taxation, late implementers evolved *despite* taxation. Moreover, implementing the income tax in contexts where the post-colonial agricultural economic elites were still the ruling political elites represents a missed opportunity to transform the state. In fact, I find somewhere else that in a number of Latin American countries that, when the income tax is adopted under contexts of sectoral contestation, economic growth is more likely to be sustained in the long run (Bahamonde, n.d.).

The political incorporation of industrial elites promoted lower levels of defection. Industrial elites were willing to impose an income tax on their own incomes, in exchange for being able to participate in the political life of the polity. In turn, political incorporation altered the post-colonial

(backwards) institutional order by crystallizing a process of state consolidation via the expansion of the fiscal system. This reasoning is in line with Beramendi, Dincecco, and Rogers (2016, 7) who argue that “so long as agricultural elites are the dominant political power-holders in society, then fiscal capacity should remain relatively small, because such elites will prefer *not* to invest in greater fiscal capacity.”<sup>13</sup>

To add some context, a brief example about two divergent cases is presented. Chile imposed the income tax law very early, in 1924, and the Chilean *Servicio de Impuestos Internos* is among the finest tax institutions in Latin America (Bergman 2003b, Fairfield 2010, 38). Unlike Chile, Guatemala imposed the income tax law very late, in 1963. By 1967, the national income tax office employed only 194 people, with only 9 of them having a college degree (Di John 2006, 5). In fact, Cabrera and Schneider not only find that “Guatemala collects among the lowest tax levels in Latin America,” but also that “the revenues it does collect are gathered inefficiently” (Mahon, Bergman, and Arnson 2014, 128). That is, while Guatemala did eventually implement income taxation, the persistence of backwards institutions have precluded Guatemala’s ability to implement a modern fiscal apparatus. This paper contends that endogenous sectoral conflicts played an important role in explaining fiscal modernization. In this case in particular, non-agricultural elites have not been strong enough to trigger a critical juncture. When these endogenous forces have been weak or nonexistent, income taxation was implemented for other reasons, not transforming the state. In fact, the income tax law in Guatemala was implemented exogenously by the US-backed dictator Colonel Enrique Peralta Azurdia, not necessarily reflecting the inter-sectoral domestic dynamics. The next section expands the Chilean case.

### III. UNPACKING THE MECHANISMS: CHILE 1850-1950

**A two-sector society** Historians still debate whether agriculturalists and industrialists comprised two *different* elites. Some claim that this dualism is incorrect (Mamalakis 1976, 125). They argue that since landowners also invested in industry (Kirsch 1977, 57, 95, Bauer 2008, 180, Coatsworth and Williamson 2002, 23),<sup>14</sup> there was a blurry class division between the mining, banking, and agricultural sectors (Bauer 2008, 30, 44, 94, 108). I contend that there is a series of stylized facts that suggests that there was indeed a structural cleavage between the two sectors.

However, there were certain practices that masked the sectoral cleavage. For example, it was

common that industrialists invested in real estate. 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.”<sup>15</sup> In fact, this practice shows how the credit system was oriented to give unfair advantage to the landed elites (Unda 2017, 9, Mamalakis 1969, 11). Similarly, Zeitlin (1984, 174) finds that while there were some instances where there were mixed investments, “the combined ownership of capital and landed property was a distinctive quality of *certain* [elites] actors.”<sup>16</sup> There were also other instances where miners invested in banking. However, Segall (1953) argues that Chilean bankers, after the crisis of the mining sector around the 1870s, acquired a number of mineral deposits given as collateral years before, again suggesting that the lack of economic dualism is rather apparent. 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.”<sup>17</sup>

In addition to that, the nature of the main factors of production of agriculturalists (land), and industrialists (capital), accelerated the sectoral cleavage. Borrowing from the Lewis model of economic growth, I explain elsewhere that there were a number of structural conditions that should have prevented massive cross-sectoral investments (Bahamonde, n.d.). Given the transference of labor from agriculture to the industrial sector,<sup>18</sup> and given that the agricultural sector is determined to lag behind the industrial sector,<sup>19</sup> elites invested in both sectors should experiment important allocative inefficiencies, and deadweight losses. This puts heavy pressures to invest in one sector, or the other, but not both. Granger-causality tests and VAR models (not shown here) show that in developed Latin American countries, agricultural expansion caused industrial expansion (modern growth). The opposite is true in non-developed Latin American countries: industrial expansion caused agricultural expansion (backwards growth).<sup>20</sup>

**Sectoral Antagonism** In all Latin American economies during, and right after the colonial period, agriculture was the most important sector, economically and politically (Keller 1931, 13). And by extension, the economic interests of the agricultural elite were the only economic interests represented in politics (Wright 1975, 45-46).<sup>21</sup> For example, Collier and Collier (2002, 106) argue that initially, the “national government was dominated by the central part of the country, with owners of large agricultural holdings playing a predominant role” (see also McBride 1936, 15).

Moreover, political institutions, and social norms inherited from the colonial period, were designed to allocate economic inputs (and hence *growth*) in a way that benefited the landowning class only (Bahamonde, n.d.).

However, despite that in some cases a strong industrial sector emerged, their corresponding elites were kept from participating in politics with the same privileges and conditions that the landowning political elites had. Consequently, the opportunity costs of implementing policies designed to enhance the agricultural sector were low. Zeitlin (1984, 13) argues that “landowners controlled both the vote and the labor power of the agrarian tenants (*inquilinos*) and dependent peasants (*minifundistas*), and this was the *sine qua non* of their continuing political hegemony.” In Congress, and the presidency itself, landowners were the single most important group (Bauer 2008, 45), leaving the modern sector heavily under-represented (Baland and Robinson 2008, 1748). Consequently, fiscal pressures in favor of agricultural taxes were minimal compared with mining taxes,<sup>22</sup> leaving the agricultural sector systematically—and substantially—undertaxed relative to other sectors (Best 1976, 56).<sup>23</sup> Bauer (2008, 118) explain that “[i]n those areas where the government did interfere in the countryside, the effect was to strengthen the position of the landowning class.” For example, the little public infrastructure that existed, mostly benefited the agricultural sector (Rippy 1971; Marichal 1989; Zeitlin 1984; Bauer 2008).

This asymmetry led these two “antagonistic elites” (Keller 1931, 37-38) to confront in the civil wars of 1851-1859 and 1891, between a “large landed property [elite against a] productive capital [elite]” (Zeitlin 1984, 23). President Balmaceda’s overthrowing explains the sectoral nature of these conflicts. On the one hand, he was mainly supported by the landed elites, but later overthrown in 1891 by a mainly industrial/mining coalition (186). While his agenda on “industrial” infrastructure (mainly roads and railroads) benefited mostly agricultural areas (124), his attitude towards the banking sector—closely linked to the mining sector, 118—was “all but confiscatory” (175). On the other hand, however, he failed to secure a coalition with his own sector. Zeitlin (1984, 127) explains that the “decline of wheat exports [...] came precisely when a vast new market for agriculture was growing in the nitrate territory.” As the agricultural sector supplied the industrial areas with foodstuff, it simultaneously increased the sectoral dependence of the agricultural elites on the industrial sector, forcing the “landed proprietors [to] become dependent to a considerable extent on the continuing prosperity of the major nitrate capitalists” (129). While it would be inaccurate to say that Balmaceda was *completely* supported by agriculturalists, and *completely* opposed by

industrialists, this example illustrates how a failed inter-sectoral alliance, and a biased strategy regarding the provision of public goods against industrialists led these two groups to a series of military conflicts.

However, lower levels of inter-elite inequality gave both elites access to similar military resources, preventing subsequent conflicts. While *Balmacedistas* managed to secure the support of the army, *congresistas* (the anti-Balmaceda group) managed to gather support of the navy (Leonard et al. 2013, 176). Ultimately, the conflict left a permanent scar in the Chilean society. While the civil war lasted only nine months, it took 10,000 lives (out of a total population of 3 million people), and cost more than \$100 million (Zeitlin 1984, 86), a significant amount for a small country. This legacy materialized in an inefficient, but politically stable system for several years. In part, the immobilism was due to the fact that the political reforms that gave way to the “parliamentary” period came out from inter-elite alliances (Collier and Collier 2002, 108). However, the intention to avoid more violence (at least among the elites) tended to persist. For instance, while all “ministers, counselors of state, members of the constituent congress [,] municipal officials, provincial governors and intendants, members of the judiciary and even the lowest functionaries and ordinary employees of Balmaceda’s government were investigated [or] brought to trial” (Zeitlin 1984, 87), there were a number of amnesties issued. Similarly, there were a number of *aborted* coups in 1907, 1912, 1915 and 1919 (Collier and Collier 2002, 109). All in all, there seemed to be a clear avoidance of more conflict.<sup>24</sup>

Under such circumstances, there were heavier pressures for a sectoral compromise. Three institutional components were considered: an income tax, industrial protectionism, and equal access to the state.<sup>25</sup> In fact, Lederman (2005, 53) and Haber (2005, 18) find that in Chile, the timing of protectionist and income taxation cycles matches.

**Implementing the Income Tax** The income tax law was passed in Chile in the middle of big political instability. In 1920, President Alessandri obtained a very close victory against Luis Barros Borgoño (Collier 1999, 111), who was supported by “the dominant political and landed aristocracy” (Haring 1931, 2). Governability was seriously compromised as the election left the senate in control of the landowning class, who roundly opposed tax reforms (5). Particularly, the opposition had “serious differences [...] over [Alessandri’s] legislative program, especially in connection with the proposed income tax” (3). In 1924, the income tax law was passed. As others explain, the non-agricultural

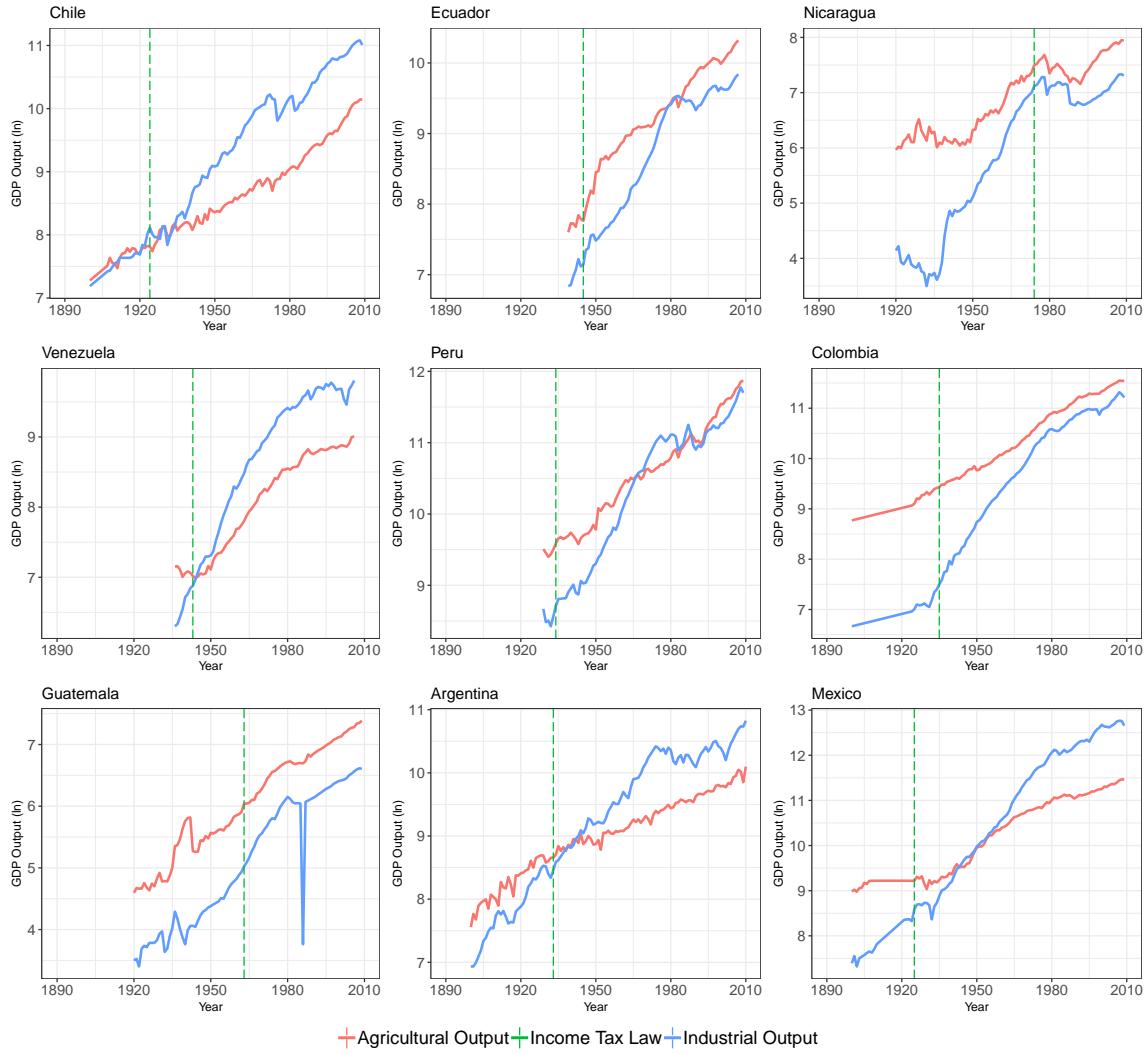
“accepted taxation, while demanding state services and expecting to influence how tax revenues were spent” (Carmenza Gallo, in Brautigam, Fjeldstad, and Moore 2008, 165).<sup>26</sup> The law taxed 2% on professional income above 2,400 pesos, 3.5% on net profits in industry and commerce above the same sum, 5% on income from mining, and 9% per cent on incomes from real estate (James 1924, 552). Humud (1969, p. 154) explains that in “1930 [the tax] would become second only to import duties in size” (Bowman and Wallerstein 1982, 451-452).

The Chilean case suggests a number of hypotheses. First, there existed a structural economic cleavage between the industrial and agricultural sectors. Second, agricultural political elites implemented policies that played in their own favor. Third, the rise of the industrial class challenged the landowning classes. Fourth, given their similar degree of economic and military resources, both elites compromised the income tax. As explained before, implementing the income tax early had positive consequences to state consolidation. The next section is an attempt to generalize, and test, one particular link of this chain: the rise of the industrial classes, and the early implementation of the income tax.

#### IV. ECONOMETRIC ANALYSES

Following the economic development typology suggested in Mahoney (2010, 5), nine polities were selected. Three “higher level” countries (Argentina, Chile, and Venezuela), three “intermediate level” countries (Mexico, Colombia, and Perú), and three “lower level” countries (Ecuador, Nicaragua, and Guatemala). Sectoral conflict, and particularly, the degree in which the industrial elites challenged incumbent landowners, was proxied via industrial and agricultural sectoral growth rates, as presented in the MOxLAD data.<sup>27</sup> The dataset spans from 1900 to (potentially) 2010.<sup>28</sup> According to Astorga, Berges, and Fitzgerald (2005, 790), these data provide extended comparable sectoral value-added series in constant purchasing power parity prices. These data, and similar strategies, have been employed before (see Thies 2005). Importantly, I do not combine the agricultural sectoral growth rates nor do I construct an index. Since I am interested in the *contribution* of each individual sector in the acceleration of the implementation of the income tax law—keeping constant the other—preserving *both* variables *separately* is a better strategy.

Using secondary information, Table 1 states when the income tax was implemented. Figure 2 shows both sectoral outputs (independent variables), and the year when the income tax law was



**Figure 2: Industrial and Agricultural Outputs, and The Passage of the Income Tax Law.**

*Note:* Figure shows historical sectoral outputs, and year of the passage of the income tax law. Following convention, the figure shows logged values.

*Source:* [MOxLAD](#), and other sources compiled by the author (see [Table 1](#)).

passed (dependent variable). Since population has been associated with the probability elites expand the franchise (Engerman and Sokoloff 2005, 892-893), and consequently the tax base, I include total country-year population as a control variable.

Table 2 shows 3 models.<sup>29</sup> Following Aidt and Jensen (2009), Model 1 computes the lagged conditional hazard ratio of a country which has not yet adopted the income tax, adopts it in

Country	Available Data	Year Income Tax	Law	Source
Chile	1900 - 2009	1924	<i>Ley</i> 3996	Mamalakis (1976, 20) and <a href="#">LeyChile.Cl</a> (official)
Peru	1929 - 2009	1934	<i>Ley</i> 7904	Gobierno del Perú (1934) (official)
Venezuela	1936 - 2006	1943	<i>Ley</i> 20851	<i>Gaceta Oficial</i> (official) and Ventura and Armas (2013, 27)
Colombia	1900 - 2009	1935	<i>Ley</i> 78	Figueroa (2008, 9)
Argentina	1900 - 2010	1933	<i>Ley</i> 11682	<a href="#">Infoleg.Gob.Ar</a> (official)
Mexico	1900 - 2009	1925	<i>Ley de Impuesto sobre la Renta</i>	Unda (2017, 8)
Ecuador	1939 - 2007	1945	-	Aguilera and Vera (2013, 135)
Nicaragua	1920 - 2009	1974	<i>Ley</i> 662	<a href="#">Legislacion.Asamblea.Gob.Ni</a> (official)
Guatemala	1920 - 2009	1963	<i>Decreto</i> 1559	Instituto Centroamericano de Estudios Fiscales (2007, 165)

**Table 1:** Sample, Data Available, and Year the Income Tax was Implemented

a given year, as a function of industrial and agricultural outputs.<sup>30</sup> Countries drop out of the sample when they adopt the income tax. Lagging the independent variables should account for non-contemporaneous factors that might conflate the contribution of sectoral growths, such as prior state capacities, among others. Model 2 shows the estimated coefficients of a generalized estimating equation (GEE).<sup>31</sup> Generalized estimating equations were introduced by Liang and Zeger (1986) to fit clustered, repeated/correlated, and panel data (Zorn 2006, 322). This method is especially well suited to analyze binary data (Hanley et al. 2003), something particularly useful given the nature of the dependent variable (e.g. whether a polity has implemented the income tax or not). GEE methods require analysts to parameterize the working correlation matrix. Though Hedeker and Gibbons (2006, 139) explain that “the GEE is robust to misspecification of the correlation structure,”<sup>32</sup> Zorn (2006, 338) explains that whereas the choice of estimator makes little or no difference, the unit on which the data are grouped makes a big difference. Hence, following the advice of Hardin and Hilbe (2013, 166), who point out that when “the observations are clustered (not collected over time) [...] the exchangeable correlation structure” should be used, I assume an “independence” working covariance structure, which also corrects for small-sized panel designs.<sup>33</sup> Substantively, GEE models provide an estimated marginal mean, or the *weighted average* of all

	(1) Cox (1 lag)	(2) Logit GEE	(3) Conditional Logit (FE)
Manufacture Output <sub>t-1</sub>	4.923*** (1.851)		
Agricultural Output <sub>t-1</sub>	-4.208** (1.638)		
Total Population	0.000*** (0.000)		
Manufacture Output (ln)		1.924*** (0.514)	0.668*** (0.143)
Agricultural Output (ln)		-1.596*** (0.603)	-0.941*** (0.281)
Total Population (ln)		1.259 (1.052)	1.030*** (0.391)
AIC	12.796		4505.538
R <sup>2</sup>	0.059		0.341
Max. R <sup>2</sup>	0.085		0.997
Num. events	9		610
Num. obs.	241	842	842
Missings	0		0
PH test	0.388		
Num. clust.	9		

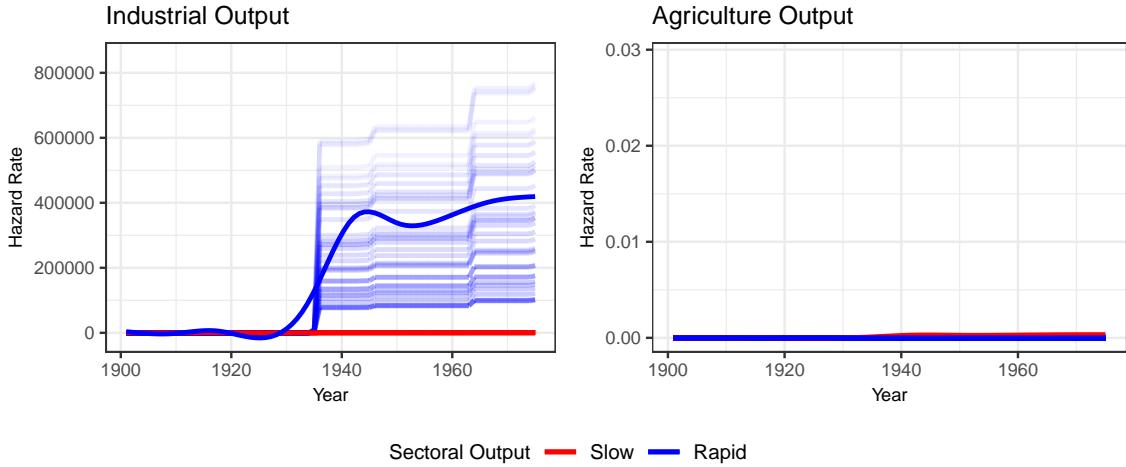
\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Robust standard errors, models 1 and 2. Country fixed effects in 3. Intercept omitted.

**Table 2:** Sectoral Origins of Income Taxation: Income Tax Law and Industrial Development

cluster-specific effects (or conditional means). Model 3 is a conditional logit model (“fixed effects”).<sup>34</sup> One important advantage of this strategy is the ability to account for country-specific effects. For example, fiscal expansion could be a function of country-specific prior state-building capacities.<sup>35</sup> A number of scholars rightly argue that post-colonial state-capacities are in part a function of pre-colonial state-capacities (Wimmer 2016, 1416, Mahoney 2010, Lange, Mahoney, and Hau 2006, 1426). Fixed-effects should be able to account for these and other unobserved or hard-to-measure covariates, which if left unaccounted for, would introduce omitted variable biases (Angrist and Pischke 2008). **Table OA1** in the Online Appendix section shows other models, including one with a different transformation to capture different shapes of the baseline hazard, and another one to account for possible spatial dependency. The results do not vary. All models suggest that the rise of a strong industrial sector largely accelerates the implementation of the income tax law. Moreover, a strong agricultural sector not only has zero impact on fiscal development, but a negative one.

Using the estimations from Model 1, I follow Gandlerud (2015) and King, Tomz, and Wittenberg (2000), and in **Figure 3**, simulate 5,000 times the hazard rate of implementing the income tax law, conditional on industrial and agricultural growth rates.<sup>36</sup> While the outcome of interest does *not* depend *directly* on time (**Figure OA1**), sectoral outputs do grow in time (**Figure 2**).<sup>37</sup> Consequently, it will be necessary to account for this tendency by allowing estimations to vary with time as well. Since the hazard rate “is the probability that a case will fail at time  $t$ ” (Licht 2011, 231), I take advantage of this quantity of interest which allows some dependency on both time, *and* the covariates (Box-Steffensmeier and Jones 2004, 15). **Figure 3** strongly suggests that the faster the agricultural sector develops, the less likely the implementation of the income tax. This relationship does not change at later stages of development, suggesting that polities with a strong agricultural elite are not associated with fiscal development. However, rapid industrial development is associated with an earlier implementation of the income tax law.

What the quantitative analyses suggest are twofold. First, the stronger the industrial sector, the earlier the tax is implemented. Second, agricultural expansion, in fact, *delays* the implementation of the income tax. In simple, industrial expansion is the one to “blame for” implementing the income tax. Substantively, *when* countries implement their income taxes is an important factor for state development. Particularly, *early* implementers situated the timing of implementing this state-making institution before the post-colonial order was crystallized, impeding the consolidation of the landed political elites. Early implementers in fact were able to consolidate the state *in light*



**Figure 3: Hazard Rate of Implementing the Income Tax Law.**

*Note:* Using estimations of Model 1 in Table 2 (Table OA1), figure shows 5,000 simulations with different sectoral growth speeds. ‘Slow’ is the minimum value, while ‘rapid’ is the maximum value for each sectoral output. The figure also shows the 95% confidence intervals.

of taxation. These results are robust to a number of alternative hypotheses, specifications, and functional forms. Concretely, I do not find evidence in favor of spatial dependency, neither do I find different results once the variables are lagged-logged—to capture different shapes of the baseline hazard—see Table OA1. Furthermore, every approach used (duration model, pooled model, and fixed effect model) in Table 2 gives exactly the same substantive results. Importantly, the simulation plot shows very clear patterns. As long as the landowning elites are the most influential elites (backed up by the expansion of their material conditions), fiscal development, and the positive spillovers on state consolidation associated with it, are expected to be very unlikely to emerge.

Moreover, by simulating a quantity of interest in Figure 3 that accounts for possible time dependency (e.g., the hazard rate), I am able to incorporate—at least indirectly—different waves of democratization, and other factors that are expected to happen as time goes by, such as the impact of international markets, like crises or economic booms.

## V. DISCUSSION

Historically, agriculturalists had been a hegemonic group, protected by an institutional order inherited during colonial times. In cases where a strong challenger class had failed to emerge, post-colonial

norms survived due to institutional inertia, crystallizing a backwards political economy. However, in cases where the emergence of an industrial elite was backed by favorable material conditions (rapid industrial growth), their leverage to challenge incumbent landowners was higher. As the challenger elite expanded its economic power, it was easier for their corresponding political elites to implement favorable fiscal policies for them earlier in history. The paper paid special attention to the case of the implementation of the income tax.

The fiscal sociology framework was also discussed. Given the initial advantage of the landed elites, the emergence of a strong industrial sector meant higher levels of sectoral contestation. The nature of the conflict, as argued, was rooted into different sectoral preferences towards taxation. However, and at the same time, since taxation fosters state consolidation, the sectoral cleavage around fiscal policies was ultimately a conflict about state centralization and state consolidation. The paper argues, and finds, that the emergence of a strong capitalist class accelerated the implementation of the income tax, and this was an important critical juncture, fundamental in explaining state consolidation in Latin America. The Chilean case strongly suggest that (1) the income tax increased levels of state consolidation via positive spillovers, and that (2) industrialists accepted to be income taxed, in exchange for having fair access to the state. Importantly, these elite compromises took place during the formative years of the Chilean state. The quantitative models presented in this paper are an effort to generalize this argument.

An important issue addressed in the paper, both from a methodological, and substantive perspectives, was the timing of implementing the tax. While the theory broadly connects sectoral contestation, income taxation, and state consolidation, the duration and spatial models presented in the paper only connect the first two components. However, the motivation for studying only these two first elements of the causal chain should be understood as an effort to trace the structural and domestic origins of state consolidation. And hence, the broader argument is that sectoral contestation is a channel that leads to state consolidation. Somewhere else, I provide quantitative over time evidence in relationship with income taxation, and state consolidation itself (Bahamonde, n.d.).

Future research should explore more avenues of fiscal expansion, emphasizing domestic channels of political development, particularly considering different types of bargaining dynamics between the agricultural and industrial elites. To the best of my knowledge, Beramendi, Dincecco, and Rogers (2016) and this paper are among the few of such accounts.<sup>38</sup>

## NOTES

1. Schneider (2012, 2) explains that even when we have gained considerable knowledge of fiscal expansion in the European cases, the study of developing countries is lacking especially in the presence of “new leading sectors.”
2. Some important exceptions are Yun-Casalilla, O’Brien, and Comín (2015) and Monson and Scheidel (2015) who study a number of premodern Latin American states.
3. See for similar results Pessino and Fenochietto (2010, 78).
4. Mamalakis (1971, 112) explains that in “Latin America, agriculture-linked parties lost power between 1900-1960, while those parties linked with mining, industrial, and service sectors gained power.”
5. Gabriel Ondetti explains in (Flores-Macías 2017) that to “[his] knowledge, there is no study that explicitly applies [the] notion [of path dependence] to explain variance in contemporary tax burdens.”
6. However, see Brewer (1990, 56). The English state made extensive use of its navy to prevent smuggling and enforce the excise, an indirect tax. The excise employed an important number of state agents and helped to develop skilled state bureaucracies and an efficient fiscal system.
7. However, under certain circumstances, indirect taxes are more efficient. Kiser (1994, 291) explains that when the levels of tax variability are high, direct taxation can actually have negative effects, especially when overtaxation is a possibility.
8. See also Flores-Macías, in Flores-Macías (2017).
9. However, see Freeman and Quinn (2012).
10. See Ronald Rogowski in Drake and McCubbins (1998, ch. 4). However, see Bates and Lien (1985, 15).
11. Richard Salvucci in Uribe-Uran (2001, 48).
12. Which are situations in which “an increase in the output of [a] commodity [...] lowers the marginal costs of producing [other] commodity” (Hirschman 1958, 67).
13. Emphasis in original. See also for a similar approach Ansell and Samuels (2014) and Collier and Collier (2002).
14. 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.” Similarlt, 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.”
15. Emphases are mine.
16. Emphasis is mine.
17. Emphasis is mine.

18. The industrial sector uses capital and labor with increasing returns to scale, while agriculture uses land (which is fixed) as the main input (Jorgenson 1961, 311, Ranis and Fei 1964, 59, Jorgenson 1967, 291, Skott and Larudee 1998, 279-280, Vollrath 2009, 290).

19. To clarify, “the agricultural sector declines relative to the overall economy but continues to expand absolutely” (Nerlove 1994, 14). In other words, it is the “the proportional contribution of agriculture to the growth” that decays (Kuznets 1961, 45), implying that in the long run the agricultural sector “must also grow” (Ranis and Fei 1961, 534), especially given the continuing dependence on a constant supply of food (Nicholls 1963, 2).

20. The developed/non-developed typology presented in Mahoney (2010, 5) was used.

21. Mamalakis (1969, 19) refers to this period as the *traditional pattern of government-export sector coalition*.

22. Mining was one of the first manifestations of industrial activity. For example, while an agricultural income tax was imposed, it was weak and abolished after the civil war of 1891.

23. Bauer (2008, 81) provides a very plausible explanation for why the agricultural sector was “structurally” protected against taxation. As he explains, “[t]he availability of an easily accountable source of public revenue—bags of nitrate or bars of cooper—meant that any need for the Chilean government to intrude into the affairs of landowners was reduced [...] the state kept its political hands off the countryside until the overwhelming urban demands for more food and political support in the 1960s.” Zeitlin (1984, 38) also points out that “public revenues came almost exclusively from taxes on mining and its exports.”

24. Similarly, Geddes (1991) argues that competition between two rival parties of about the same size creates clearer incentives to invest in political institutions.

25. The SOFOFA pursued a very strong protectionist agenda. Sokoloff and Zolt (2007, 122) explain that the expansion of “manufacturing production [...] helped to nurture the development of a powerful constituency for higher tariffs.”

26. Emphases are mine. She refers specifically to the mining elites.

27. “These data build on the studies and statistical abstracts of the Economic Commission for Latin America, but also rely on Mitchell’s International Historical Statistics, International Monetary Fund’s International Financial Statistics, the World Bank’s World Development Indicators and a variety of national sources.” I used the *agriculture value-added* and *manufacturing value-added* variables. 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.” Both of them are expressed in local currency at 1970 constant prices.

28. Since countries are “censored” once they implement the income tax law, they leave the sample (potentially) before 2010.

29. All tables were produced using the **texreg** package (Leifeld 2013). All Cox models were computed using the **survival** R package (Therneau 2015). The GEE logistic regression was computed using the **geepack** package (Hojsgaard, Halekoh, and Yan 2016). The simulations were performed using the **simPH** R package (Gandrud 2015).

30. Following Box-Steffensmeier and Jones (2004, 49), the next equation was fitted:

$$h_i(t) = \exp(\beta_1 \text{Industrial Growth}_{i,t-1} + \beta_2 \text{Agricultural Growth}_{i,t-1} + \beta_3 \text{Total Population}_{i,t-1}) h_0(t) \quad (1)$$

for all countries  $i$  and years  $t$ .

31. Following Zorn (2006, 331), the next equation was fitted:

$$\pi_{i,t} = \Phi(\beta_1 \log(\text{Industrial Growth}_{i,t}) + \beta_2 \log(\text{Agricultural Growth}_{i,t}) + \beta_3 \log(\text{Total Population}_{i,t})) \quad (2)$$

where  $\pi$  is the logit link function, and  $\Phi$  is as scale parameter (i.e. the cumulative distribution function), for all  $i$  countries, and years  $t$ .

32. Carlin et al. (2001, 402) argue that “[r]elatively minor differences in estimates may arise depending on how the estimating equations are weighted, in particular within the generalized estimating equation (GEE) framework.” Westgate and Burchett (2017) and Gardiner, Luo, and Roman (2009, 227) make the same point.

33. Hardin and Hilbe (2013, 166) explains that if “the number of panels is small, then the independence model may be the best; but [analysts should] calculate the sandwich estimate of variance for use with hypothesis tests and interpretation of coefficient,” which is what I report in Table 2.

34. More formally,

$$\pi_{i,t} = \Phi(\beta_0 + \beta_1 \log(\text{Industrial Growth}_{i,t}) + \beta_2 \log(\text{Agricultural Growth}_{i,t}) + \beta_3 \log(\text{Total Population}_{i,t}) + \alpha_i) \quad (3)$$

where  $\alpha$  are the country fixed effects for all countries  $i$ .

35. I thank Matthias vom Hau for this suggestion.

36. Box-Steffensmeier and Jones (2004, 15) explain that the hazard rate is the most common quantity of interest analysts focus on. Figure 3 shows 95% confidence intervals.

37. The economics literature refers to these kinds of time series “integrated” or I(1) processes.

38. In p. 19, they argue that their “paper is among the first to systematically establish that fiscal development may take place even in the absence of interstate military competition and warfare.”

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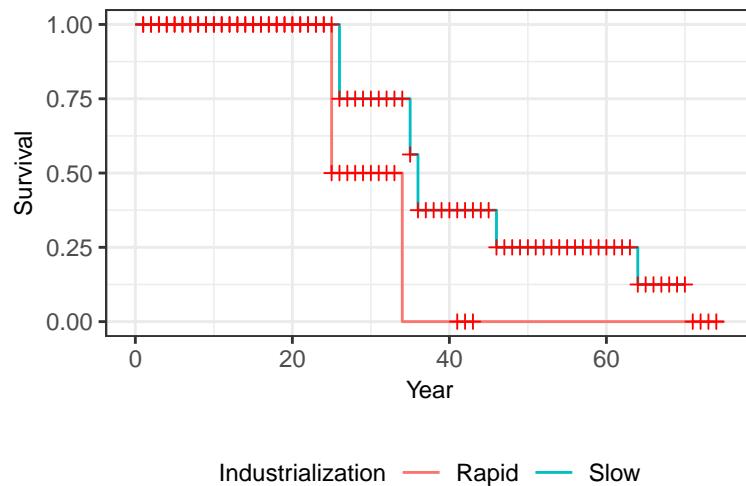
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## VI. ONLINE APPENDIX

### I. Kaplan-Meier Curves: Ruling out Spurious Time Dependency

It is important to rule out the possibility that income taxation and sectoral development, are not linked through a spurious, time-dependent relationship. In other words, the occurrence of the outcome of interest (income taxation), should not be directly related to time itself, but to the rise of the industrial elite. Within the framework of survival analyses, [Figure OA1](#) shows the failure rate of the sample average country of implementing the income tax, if industrial development had increased/decreased by half (“rapid”/“slow”).<sup>39</sup> The figure clearly shows that the implementation of the income tax law is largely accelerated when the size of the industrial sector increases, and that this relationship does not depend directly on time. It is important to note that this figure shows the unparameterized behavior of the failure rate, e.g., the *empirical* distribution of failures that comes directly out of the data, before any model is actually estimated. In other words, this is the dependent variable estimated in the Cox models.



**Figure OA1:** *Kaplan-Meier Curves: Size of the Industrial Sector and the Accelerated Rate of the Imposition of Income Tax Law*

## II. Alternative Models: Lagged-logged Independent Variables and Spatial Dependency

Model 1 is a Cox regression, but with lagged logged variables. By including time-transformed variables, in the form of a lagged independent variable—to account for partial adjustment of behavior (Wawro 2002)—it is possible “the use of the natural log transformation [to capture] different forms (or “shapes”) of the baseline hazard” (Box-Steffensmeier and Jones 2004, 75). Model 2 accounts for possible spatial-temporal dependence.<sup>40</sup> Given that most countries in the sample are contiguous neighbors, it is reasonable to expect a “domino” effect.<sup>41</sup> Theoretically, being the first country in implementing the income tax might not require the same level of domestic “effort” as being the last one. Early-implementers might not have prior experience, making it harder for them to pass the law. To account for this possible spatial-temporal dependence, a cumulative count of countries which have implemented the law at time  $t$  was included.<sup>42</sup>

	(1) Cox (1 lag, ln)	(2) Spatial Dependence
Manufacture Output <sub><math>t-1</math></sub> (ln)	7.685** (3.333)	
Agricultural Output <sub><math>t-1</math></sub> (ln)	-6.971** (3.227)	
Total Population (ln)	5.059** (2.228)	4.676* (2.682)
Manufacture Output (ln)		7.148 (4.815)
Agricultural Output (ln)		-6.465 (4.636)
AIC	10.894	11.056
R <sup>2</sup>	0.068	0.065
Max. R <sup>2</sup>	0.088	0.085
Num. events	9	9
Num. obs.	232	241
Missings	0	0
PH test	0.877	0.667

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Robust standard errors in all models

**Table OA1:** Sectoral Origins of Income Taxation: Alternative Explanations

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

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## Abstract

Fiscal sociologists have argued for a long time that direct taxation, as an important milestone of state-building, fosters state capacity. In turn, high-capacity states not only have better fiscal capacities, but also stronger state institutions (constitutions, property rights, etc.), which are associated with economic development. This paper finds that while virtually all countries in Latin America imposed the income tax law, the policy fostered state development—and economic development—only when the law was implemented under circumstances of fast industrial expansion. Importantly, time series econometrics allow me to distinguish between “fast industrial expansion,” and “economic development in the long-run.” I argue that the presence of strong industrial political elites at the time of implementation of the policy marked a critical juncture in the development process. Since industrial elites were interested in adopting such policy (unlike the landowning classes), when industrialists were strong, they sought to foster its implementation. Via the political incorporation of industrial political elites, the policy was associated with the implementation of other state institutions that reversed the backwards post-colonial institutional order. However, when industrialists were weak, the political hegemony of agricultural elites was preserved, truncating both institutional and economic development. Leveraging the dual sector model of economic growth, and the fiscal sociology paradigm, I explain how balanced inter-sectoral growth, and income taxation, promoted economic growth and state consolidation in the early 20th century Latin America. The empirical strategy leverages economic history data since the 1900s for a number of Latin American countries, and the Chilean case during the 1920s to contextualize the causal mechanism.

**Keywords**— Lewis model; income taxation; economic history; elites.

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

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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.<sup>1</sup> 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.<sup>2</sup> 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 economic and political development.

In addition to that, 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.<sup>3</sup> Alas, the study of sectoral divisions—e.g., 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 and industrial elites. While political economists have already studied the role of sectoral conflicts in the context of political development, most of the time the focus has been on democratic development. Using the same sectoral approach, this paper stresses how sectoral conflicts are also associated with state-building and economic development.

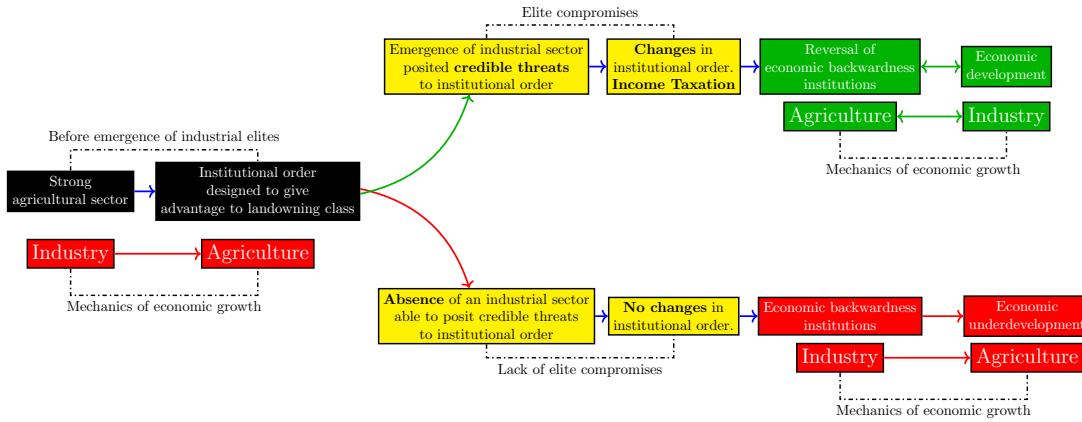
Hirschman (1958, 66) explains that “tensions, disproportions and disequilibria” among the industrial and agricultural sectors promote development. Building on that, in this paper I underline the conditions under which higher levels of sectoral contestation between the industrial and agricultural political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

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.<sup>4</sup> 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, causing long-term economic growth. The paper exploits sectoral outputs from 1900 to 2009 for a number of Latin American countries,<sup>5</sup> 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., fast industrial expansion—both economic and political development were promoted.

## 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 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 alter 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 sector, 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. That is, 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



**Figure 1: Causal Mechanism**

structure of every factory. It also required knowledge on investments, levels of production and exports, among others. All these tasks shared important *technical complementarities* with other state activities, such as solving land disputes, dispensing justice, providing infrastructure, etc. In other words, the acquired expertise in taxing private incomes, was transferred—at marginally lower costs—to other state institutions.<sup>6</sup> 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, the policy only fostered state development when it was implemented under circumstances of high sectoral conflict. That is, under circumstances where the industrial political elites were strong enough to challenge agricultural political elites, who have dominated the economy and the politics since colonial times. 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,<sup>7</sup> economic elites have systematically been divided on their preferences towards fiscal policy,<sup>8</sup> and consequently, state centralization. As land fixity increases the risk premium of their main asset, agriculturalists have typically resisted taxation.<sup>9</sup> In contrast, industrialists' preferences toward taxation have been more elastic, as capital can be reinvested in nontaxable sectors.<sup>10</sup> This sectoral cleavage was more likely to resolve in favor of direct taxation when income inequality among the elites was low,<sup>11</sup> or as I argue here, where sectoral competition was high. That is, when the industrial elites were strong enough to contest

agricultural political elites. Importantly, higher dependence on infrastructure made industrial elites to be more willing to “pay” for public infrastructure, by imposing an income tax on themselves. In fact, Beramendi, Dincecco, and Rogers (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.”

Importantly, where both economic sectors were equally developed, both of their corresponding political elites had the same means—and leverage—to voice their strategic preferences about taxation. Conflict, in particular, was an inefficient strategy, as both sorts of elites had access to the same military capacities.<sup>12</sup> Important for this argument is Kurtz (2009, 484)’s assertion 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.” Specifically, my argument stresses the political incorporation of both elites. In other words, 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,”<sup>13</sup> 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 eventually implemented in practically all Latin American countries, it did not necessarily 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, only 9 of

whom had graduated from college.<sup>14</sup> 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. The next section explains the dual sector model of economic growth, focusing on how balanced growth happens, and why it is important for political development.

## 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*

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Smith (1904, I.11.59)

The “dual sector” or “balanced growth model,” explains the mechanics of modern economic growth,<sup>15</sup> 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.”<sup>16</sup> 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 extensions of the 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.”<sup>17</sup> 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 economy because “it reflects several vital social *and* economic distinctions.”<sup>18</sup> 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.”<sup>19</sup> 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.<sup>20</sup>

Economic development depends on the emergence of the industrial sector, which in turn depends on the development of a productive agricultural sector.<sup>21</sup> As Kuznets (1961, 59) puts it, “economic growth is *impossible* unless there is a substantial rise in product per worker in the agricultural sector.”<sup>22</sup> Similarly, Hayami and Yamada (1969, 105) argue that “[i]ndustrialization and modern economic growth are basically *conditioned* by the level of agricultural productivity.”<sup>23</sup> 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.<sup>24</sup>

The political correlate is that a weak inter-sectoral structure—e.g., a lack of structural complementarity between the two sectors—will truncate the emergence of a strong political challenger—the industrial class—able to contest the landed elites. However, under cases of balanced growth, each

sector's corresponding political arm had the same military resources and access to other bargaining assets, fostering inter-elite cooperation. I contend that higher levels of inter-elite contestation promoted 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. In simple, political development is more likely to be sustained under sectoral balanced economic growth because it fosters a *level* "playing" political field.

The first reason for why a productive agricultural sector is key to industrial development is that 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."<sup>25</sup> Technologies such as "crop rotation, pest control, seed breeding [and] fertilizer use [represent] the major potential source of agricultural labor productivity,"<sup>26</sup> increasing also "non-agricultural value added per worker."<sup>27</sup> 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.<sup>28</sup>

Surplus of labor naturally leads to a reallocation of redundant workers into the industrial sector, which is the crux of economic development.<sup>29</sup> Nurkse (1953) in fact argues that development *means* to employ the surplus labor.<sup>30</sup> The literature coincides in that the "natural" role of the agricultural sector is to provide labor to the industrial sector.<sup>31</sup> 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."<sup>32</sup> 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 it means *redundant labor force*.<sup>33</sup> In fact, Nurske (1961, 225) points out that the concept "is commonly used to denote

all types of rural unemployment.”<sup>34</sup>

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.<sup>35</sup> “It is *self-evident* that without increasing food output, the capitalist sector must remain in a stationary state.”<sup>36</sup> 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.”

### III. DUALISM IN CHILE: A BRIEF ILLUSTRATIVE CASE

Historically, agriculturalists in Chile 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.<sup>37</sup> Collier and Collier (2002, 106) argue that the “national government was dominated by [...] owners of large agricultural holdings.”<sup>38</sup> 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.<sup>39</sup>

Historians still debate whether agriculturalists and industrialists comprised two *different* elites. Some claim that this dualism is incorrect.<sup>40</sup> They argue that since landowners also invested in industry,<sup>41</sup> there was a blurry class division between the mining, banking, and agricultural sectors.<sup>42</sup> 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 estate. 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.”<sup>43</sup> 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,”<sup>44</sup> 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.”<sup>45</sup> In fact, Freeman and Quinn (2012) explains that asset diversification constitutes a later development “in international markets [roughly after 1980].” 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 economic hegemony initially promoted political biases, such as biased public investments.<sup>46</sup> 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 sets of elites access to similar military capacities. 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. There were a number of *aborted* coups in 1907, 1912, 1915 and 1919,<sup>47</sup> suggesting an equilibrium where no type of elite had more capacities than the other. 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 for 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.”<sup>48</sup> 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,<sup>49</sup> the tax was important because it fostered state-making. Musgrave (1992, 99) argues that since taxation (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”<sup>50</sup> or “easy-to-collect source of revenues.”<sup>51</sup> Given the relatively lower costs states have to incur to collect them, indirect taxes have a very low impact on state-building.<sup>52</sup> 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.<sup>53</sup> 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.<sup>54</sup>

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.<sup>55</sup> This argument goes in line with Besley, Ilzetzki, and Persson (2013), who explain that implementing the income tax law has been “associated with investments in public administrative structures that support tax collection” in a number of countries, including Chile. The expertise the state accumulated was transferred to other state institutions via spillovers. 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. 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. 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 the nature of the implementation of the income tax. Aghion, Alesina, and Trebbi (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.<sup>56</sup> The Chilean example suggests that inter-elite agreements helped to sustain these state-making policies over time.

#### 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*

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Kuznets (1961, 41)

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

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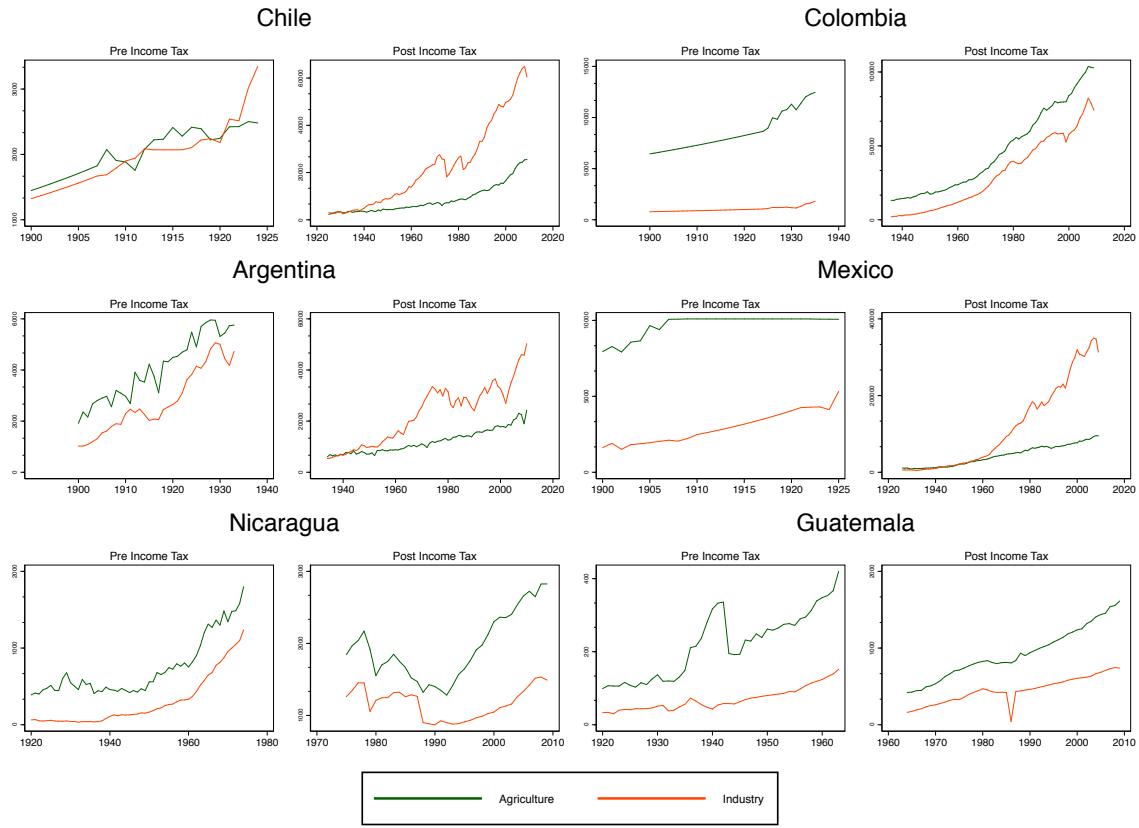
Temple and Wößmann (2006, 212)

**Granger-causality Tests** Due to institutional inertia, where industrial expansion was slow relative to agriculture, the landowning elites kept enjoying the advantages of the post-colonial institutional order, which had generated economic growth in a way that mostly benefited their own sector. Even when the income tax was implemented in these countries, the policy did not reflect the sectoral cleavage. That is, industrial elites were too weak to trigger the implementation of the income tax law, causing no major changes to the political order. However, in cases where industrial elites were strong enough to pose credible threats, the income tax was implemented due to the emergence of a strong industrial sector. In the first set of cases, we should see that the income tax was *not* associated with the reversal of the institutions that permitted balanced growth, perpetuating unbalanced growth. However, in the second set of cases, we should see that the income tax was associated with the reversal of backward institutions, permitting balanced growth. Empirically, we

should see in the first set of cases that the agricultural sector grew *at the expense* of the industrial sector, *both before and after* of the implementation of the income tax. In the second set of cases, however, 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, the industrial sector did *not* grow *at the expense 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.<sup>57</sup>

I utilize the **MOxLAD** data, particularly the *agriculture value-added* and *manufacturing value-added* variables.<sup>58</sup> The dataset spans from as early as 1900 to as late as 2009.<sup>59</sup> **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).<sup>60</sup> 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 implemented. The econometric analyses in this section intend to recover Mahoney’s typology, linking the mechanics of economic development with fiscal expansion. To simplify, I expect *advanced* countries to have *unbalanced* growth *before* the implementation of the income tax, but *balanced* economic growth *after* the implementation of the tax. I also expect *less advanced* countries to have *unbalanced* economic growth *both before and after* the implementation of the tax—e.g., null results in favor of a reversal in sectoral Granger-causation.

In **Table 1** I test for Granger-causality both prior to and after the implementation of the income tax law.<sup>61</sup> 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 economically backwards 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).<sup>62</sup> 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 the expense of the modern sector. This reversal was possible due to the incorporation of political



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

outsiders—the industrialists—and how they were able to shape the institutional order in a way that also benefited their own 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).<sup>63</sup> In Nicaragua and Guatemala, however, the tests suggest the exact opposite (all p-values are significant at the .05 level).<sup>64</sup> The implementation of the income tax did *not* reverse the initial economic backwardness equilibrium. I contend that when implemented, the tax did not reflect the inter-sectoral economic cleavage. 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-making institutions—e.g. the income tax law. 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 income tax law, but 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 equilibrium. This section tests whether the implementation of the income tax is associated with long-run economic development. Given that the implementation of the income tax had positive spillovers on other state institutions, I expect income taxation to be associated with long-run economic growth. In non-advanced cases, the tests should show null results. For instance, and following Mahoney (2010, 5) again, the implementation of the income tax law should *not* cause long-term economic growth in Guatemala and Nicaragua.

The link between industrial and agricultural growth is an endogenous one.<sup>65</sup> 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 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.<sup>66</sup> 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.<sup>67</sup> 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 economic backwardness between the two sectors. Consequently, I expect to find evidence of cointegration only in “developed” and “semi-developed” cases, as specified in Mahoney (2010, 5).<sup>68</sup>

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,<sup>69</sup> suggesting that industrialists in “developed” and “semi-developed” countries were strong enough to pose credible

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	1925 - 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 - 1925	Agriculture → Industry	6.17	0.10
			Industry → Agriculture	29.71	0.00
	Post	1925 - 2009	Agriculture → Industry	8.90	0.06
			Industry → Agriculture	4.41	0.35
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

threats to agricultural incumbents, challenging the post-colonial institutional order. These higher levels of sectoral contestation, in turn, fostered long-term economic growth via the reversal of backward political institutions. However, in “less developed” countries, industrialization was slow, and as a consequence, their corresponding political elites were too weak to represent any major threat to the *status quo*. Consequently, the political order beneficial for the landed elites remained

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

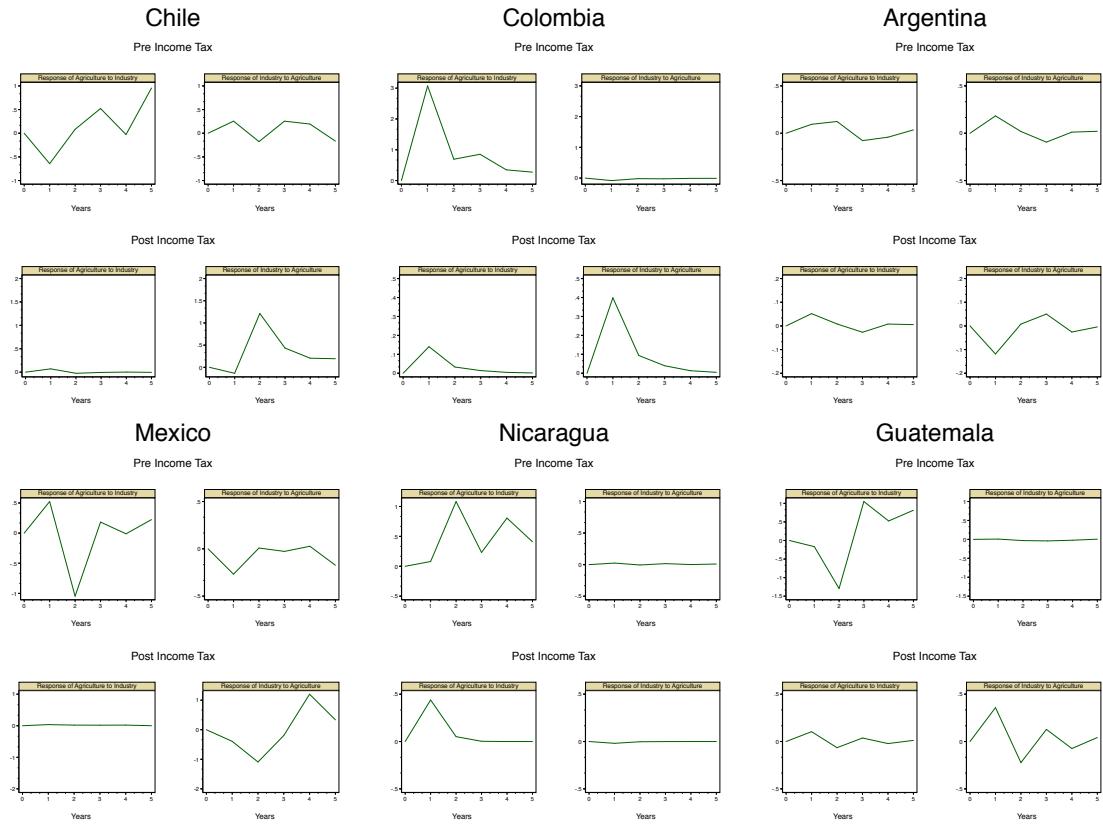
unchallenged, compromising long-term economic growth.

Following Johansen (1988), I estimate the long-run sectoral relationship using a vector-autoregressive (VAR) approach. One important advantage of this method is that VARs are estimated via MLE, not requiring being specific about the number of cointegrated vectors (as opposed to error correction models).<sup>70</sup> Formally, I fit Equation 1 in differences, one per country, both before and after the income tax law was passed.<sup>71</sup>

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

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.<sup>72</sup>

Given that “it is often difficult to draw any conclusions from the large number of coefficient estimates in a VAR system,”<sup>73</sup> econometricians usually turn to the analyses of *impulse response functions* (IRFs), which are derived from VAR analyses.<sup>74</sup> “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.”<sup>75</sup> 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. Following the same typology described in Mahoney (2010, 5), 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



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

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, but response to equilibrium. That is, the reaction of one sector once the other one is shocked.<sup>76</sup>

Figure 3 suggests that all “developed” countries switched from unbalanced to balanced growth after implementing the income tax law. For example, a shock to industrial growth in Chile, before the implementation of the tax law, had a positive and increasing effect on agricultural output. However, after the income tax is adopted, a shock on industry has a negligible effect on agricultural output. This suggests that political institutions before the tax was implemented were oriented to channel most economic resources in a way that advantaged the agricultural sector (and the landed elites). This equilibrium is reversed after the income tax law is implemented, one 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 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 institutional order that was permitting unbalanced growth. The lack of sectoral challenges left the traditional institutional order unaltered, preserving the political advantages the landowning elites had enjoyed since colonial times.

## V. DISCUSSION

Since colonial times, agriculturalists had been the hegemonic group protected by persistent backwards institutions. 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, and fostering long-term balanced economic growth. In turn, balanced growth reinforced sectoral interdependence, precluding sectoral dominance of either political elite. 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).

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## VI. APPENDIX

Country	Available Data	Year Income Tax	Law	Source
Chile	1900 - 2009	1924	<i>Ley</i> 3996	Mamalakis (1976, 20) and <a href="#">LeyChile.Cl</a> (official)
Colombia	1900 - 2009	1935	<i>Ley</i> 78	Figueroa (2008, 9)
Argentina	1900 - 2010	1933	<i>Ley</i> 11682	<a href="#">Infoleg.Gob.Ar</a> (official)
Mexico	1900 - 2009	1925	<i>Ley de Impuesto sobre la Renta</i>	Unda (2017, 8)
Nicaragua	1920 - 2009	1974	<i>Ley</i> 662	<a href="#">Legislacion.Asamblea.Gob.Ni</a> (official)
Guatemala	1920 - 2009	1963	<i>Decreto</i> 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	-3.073 (0.03)	-3.146 (0.02)	.156†	Stationary
		Industry	1.575 (0.99)	1.422 (0.99)	.171†	I(1)
	Post	Agriculture	1.961 (0.99)	2.064 (0.99)	.161†	I(1)
		Industry	0.169 (0.97)	1.120 (0.99)	.313†	I(1)
	All	Agriculture	3.431 (1.00)	3.607 (1.00)	.341	I(1)
		Industry	0.672 (0.98)	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	3	✓-	✓-	✓-	✓-	✓-
	Post	4	✓-	✓-	✓	✓-	✓
Nicaragua	Pre	2	✓	✓-	✓-	✓-	✓
	Post	1	✓	✓-	✓-	✓-	✓
Guatemala	Pre	3	✓	✗	✓-	✓-	✓
	Post	1	✓-	✓-	✓-	✓-	✓

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

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