Research Portfolio

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Contents

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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. Using a Bayesian Poisson regression the paper shows that death tolls decrease (state capacity increases) once the income tax law was implemented in 1924. 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 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 (*Bahamonde, H. Still for Sale: The Micro-Dynamics of Vote Selling in the United States, Evidence From a List Experiment.* Acta Politica*, forthcoming.*), 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. The quantitative empirical 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 vote. Would they sell, and at what price, or would they consistently opt out of vote selling? A novel experimental dataset representative at the national level comprises 1,479 U.S. voters who participated in an online list experiment in 2016, and the results are striking: Approximately 25% would sell their vote for a minimum payment of $418. Democrats and Liberals are more likely to sell, while education or income levels do not seem to impact the likelihood of 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 ignorants 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**.

More information, syllabi, my research, teaching and diversity statements, as well as other papers are available on my website: 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 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. Using a Bayesian Poisson regression the paper shows that death tolls decrease (state capacity increases) once the income tax law was implemented in 1924. 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.[1] 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 I find that death tolls associated with earthquakes systematically decreased (that is, *state capacities increased*) after the income tax law was implemented

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.

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.

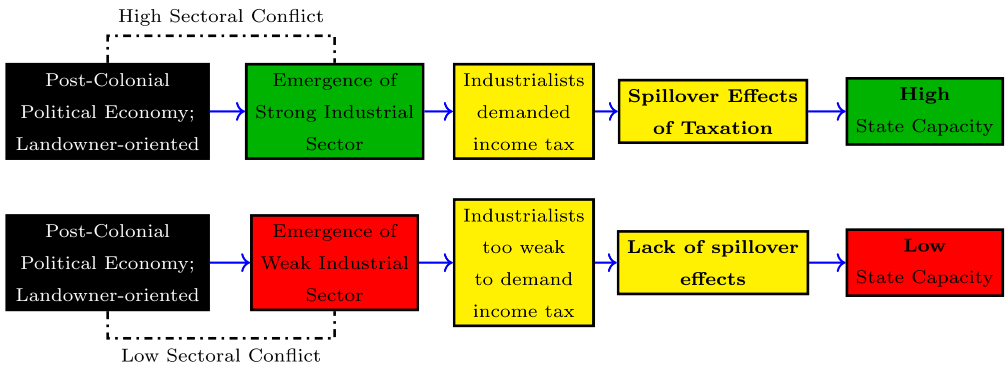

Figure 1: Causal Mechanism.

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."[2]

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.[3] 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

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.[4] 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)).[5] 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—

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[6] 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 state*ness* 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.

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).[7]

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

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, Sybblis, 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 logistically 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."[8] 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

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,[9] 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

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.[10] 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.

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.[11] The dataset spans from 1900 to potentially 2010.[12] 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.

Table 1 shows 3 models.[13] 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.[14] 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).[15]

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 (Hojsgaard, 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 π is the logit link function, and Φ is as scale parameter (i.e. the cumulative distribution function), for all i countries, and t years.

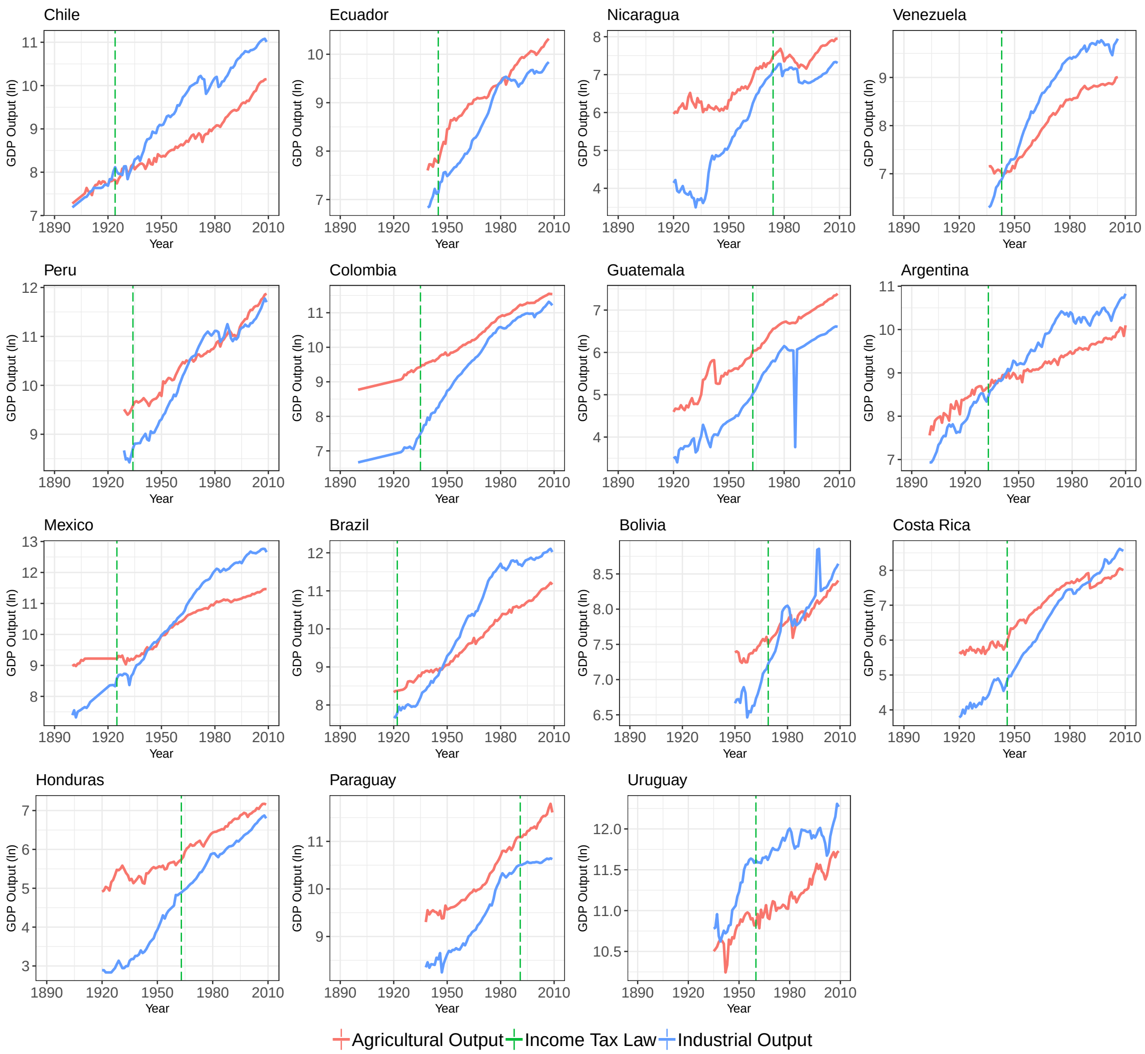

Figure 2: Industrial and Agricultural Outputs, and The Passage of the Income Tax Law in Latin America.

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).[16]

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$_{t-1}$	2.033^{***}		
	(0.682)		
Agricultural Output$_{t-1}$	-2.438^{***}		
	(0.857)		
Total Population	0.000^{*}		
	(0.000)		
Manufacture Output (ln)		1.384^{***}	0.227^{**}
		(0.357)	(0.095)
Agricultural Output (ln)		-1.827^{***}	-0.330^{*}
		(0.421)	(0.173)
Total Population (ln)		1.424^{***}	0.983^{***}
		(0.408)	(0.225)
AIC	33.311		9043.609
R^2	0.049		0.223
Max. R^2	0.110		0.997
Num. events	15		1258
Num. obs.	415	1658	1658
Missings	0		0
PH test	0.073		
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").[17] 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.[18] 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.[19] 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

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 α are the country fixed effects for all countries i.

18. I thank 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.

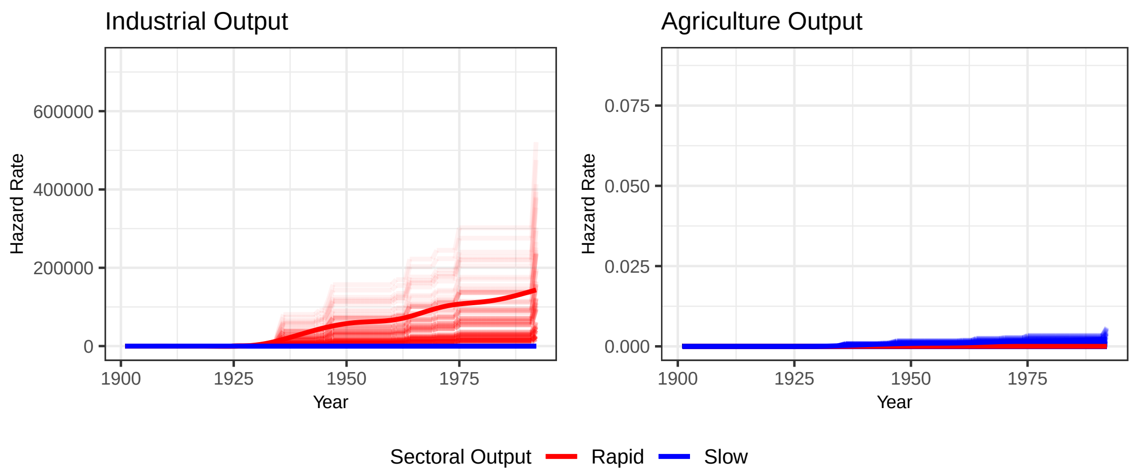

Figure 3: Hazard Rate of Implementing the Income Tax Law in Latin America.
Note: *Using estimations of Model 1 in Table 1, figure shows 1,000 simulations with different sectoral growth speeds. 'Slow' is the minimum value, while 'rapid' is the maximum value for each sectoral output. The figure also shows 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,[20] 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.[21] Adding archival census data, I coded the main economic activity of the affected municipality[22] and whether the municipality was urban or rural.[23] The death-tolls and magnitudes proportionated by the NOAA dataset were contrasted case by case with historical press archival information.[24] Magnitudes, in particular, were also compared with the International Seismological Centre.

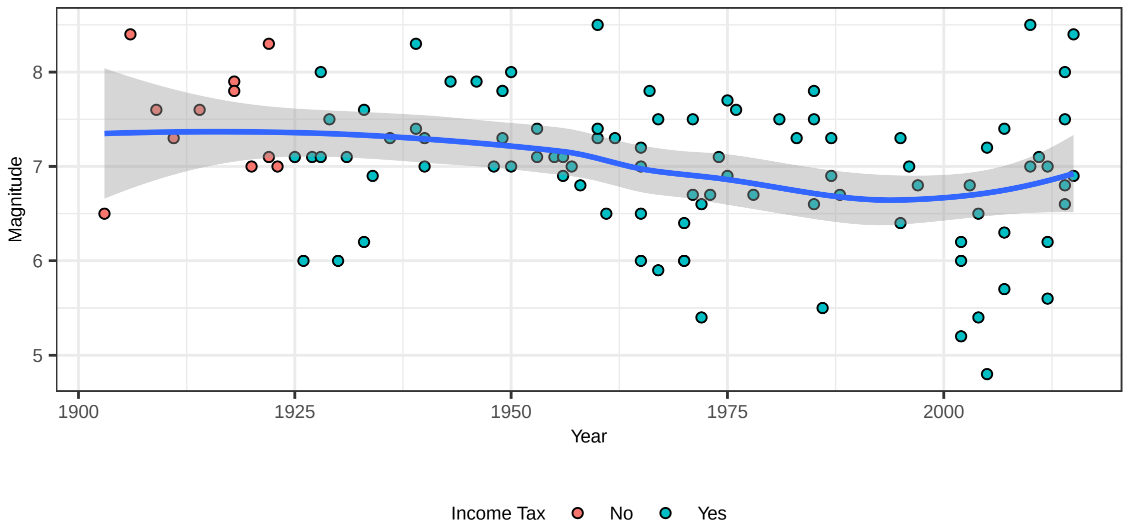

Figure 4: Earthquakes in Chile: 1903-2015.
Note*: Figure shows earthquakes over time (N=103). Additionally, the figure shows earthquakes before and after the implementation of the income tax in 1924. A smoothing function was added to show that there are not statistically significant different decreases/increases in magnitudes over time.*

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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 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°, 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°) 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—β_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. [25]

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

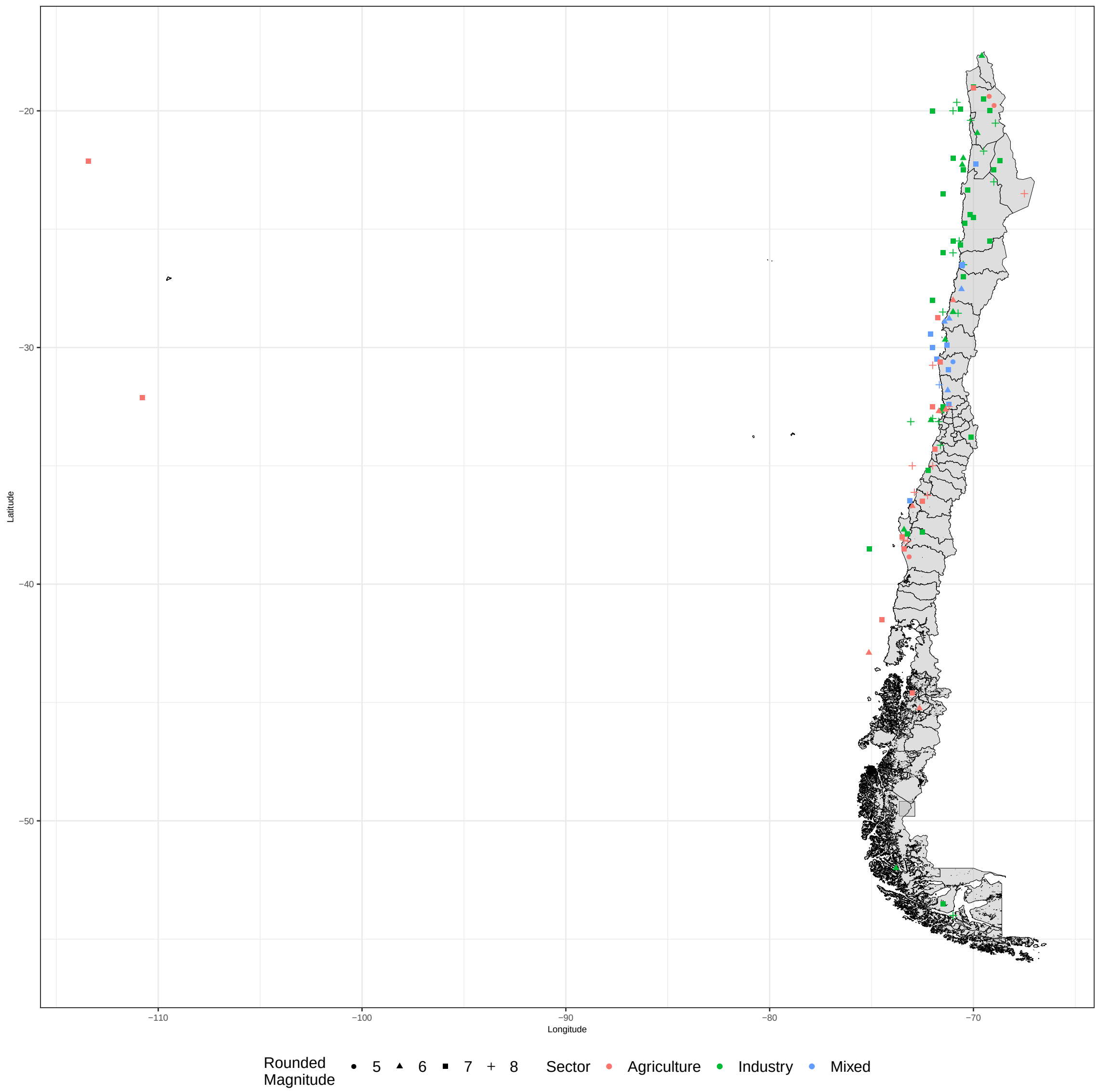

Figure 5: Data Used in the Analyses: Geographical Distribution of Earthquakes in Chile, 1903-2015.
Note: *The figure shows a total of 103 earthquakes using a combination of archival information and external sources. Each quake was colorized according to the predominant economic sector at the municipal 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:[26]

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

where

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 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.

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

$k_{1,...K}$ 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. β_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.[27]

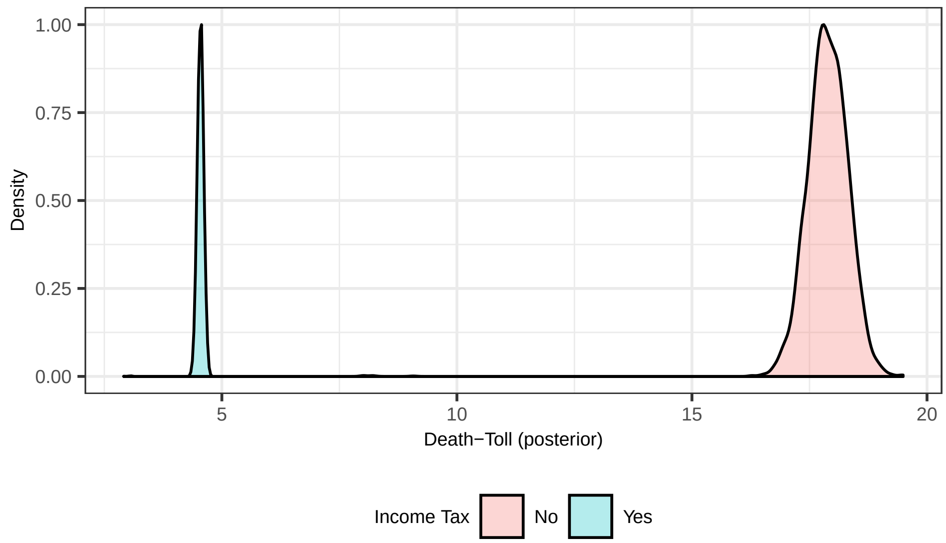

Figure 6: Conditional Effects of Earthquake Magnitudes on Implementing the Income Tax Over Time in Chile.
Note: *Using the estimations from Table 2 (Equation 4), and following the advice of Brambor, Clark, and Golder (2006), the figure shows the conditional effect of earthquake magnitudes on implementing the income tax in Chile in 1924 ($\beta_1 + \beta_3 \times$ 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

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."[28] 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,"[29] not *all* their members. There were also other instances where miners invested in

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."[30] 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,

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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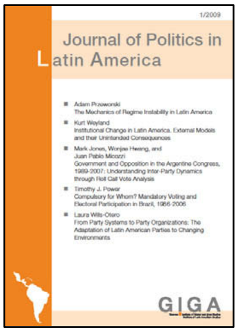
VI. Online Appendix

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

Table 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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Keywords: Brazil, clientelism, vote-buying

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There is no agreement on when, how, and why parties choose to aim clientelist practices at individuals or groups.[1] 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).[2]

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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1 I am grateful to Robert Kaufman, Daniel Kelemen, Richard Lau, Paul Poast, Geoffrey Wallace, Douglas Jones, Ezequiel González-Ocantos, Juan Pablo Luna, Jorge Bravo, Eric Davis, Adam Cohon, Edwin Camp, Luciana Oliveira Ramos, Giancarlo Visconti, William Young, Johannes Karreth, and the reviewers and editor of *JPLA*. I also thank participants of the Latin American Studies Association 2014 conference, the Southern Political Science Association 2015 meeting, the Western Political Science Association 2015 meeting, and the 2014 Graduate Conference at the Political Science Department, Rutgers University. Any errors that remain, of course, are my responsibility. This work was partially funded by the Center for Latin American Studies at Rutgers University. I am grateful to the School of Arts and Sciences and the Department of Political Science for their travel grants.

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.[3] 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

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).[4] 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.[5]

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

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

	Non-Poor Individuals	**Poor Individuals**
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.[6] 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

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.[7] 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

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 receiving 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 absence 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 individuals – given their relatively higher incomes – have more "patience." This is especially important for brokers. In practice, potential clients' timing constrains 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*,[8] "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."

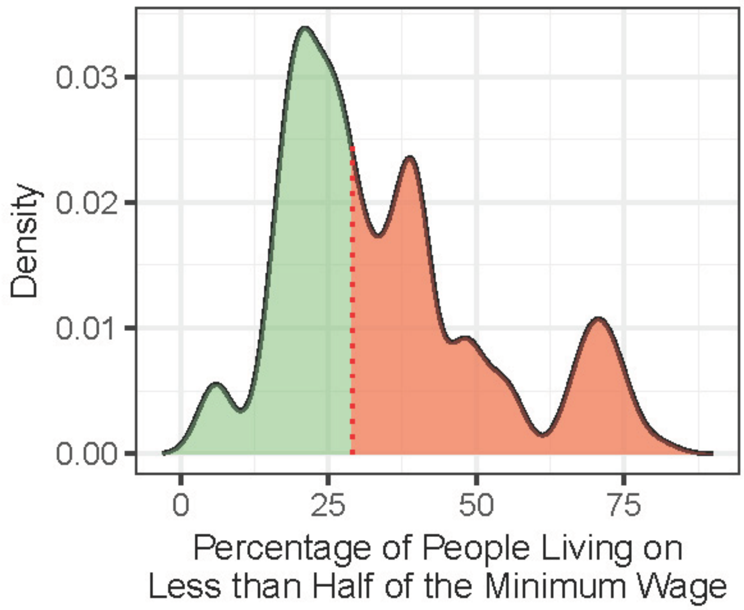
To test this hypothesis, I use survey data from 2010 from The Latin American Public Opinion Project (LAPOP) (2010).[9] Though the LAPOP survey provides a question for income, people who are somewhat better off than their neighbors but live in poor areas may not "feel" poor. If this is the case, it could 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

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,[10] 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

10 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,[11] 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,[12] 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 ($r = -0.44$).[13]

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.[14] The idea is to obtain a good covariate balance, as in Figure A3 (in the Appendix), to then estimate any appropriated statistical model.[15] From a statistical standpoint,

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),[16] and prevent analysts from making extreme counterfactuals.[17] 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).[18]

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).[19] The score is used to weight each observation in the model.[20]

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).

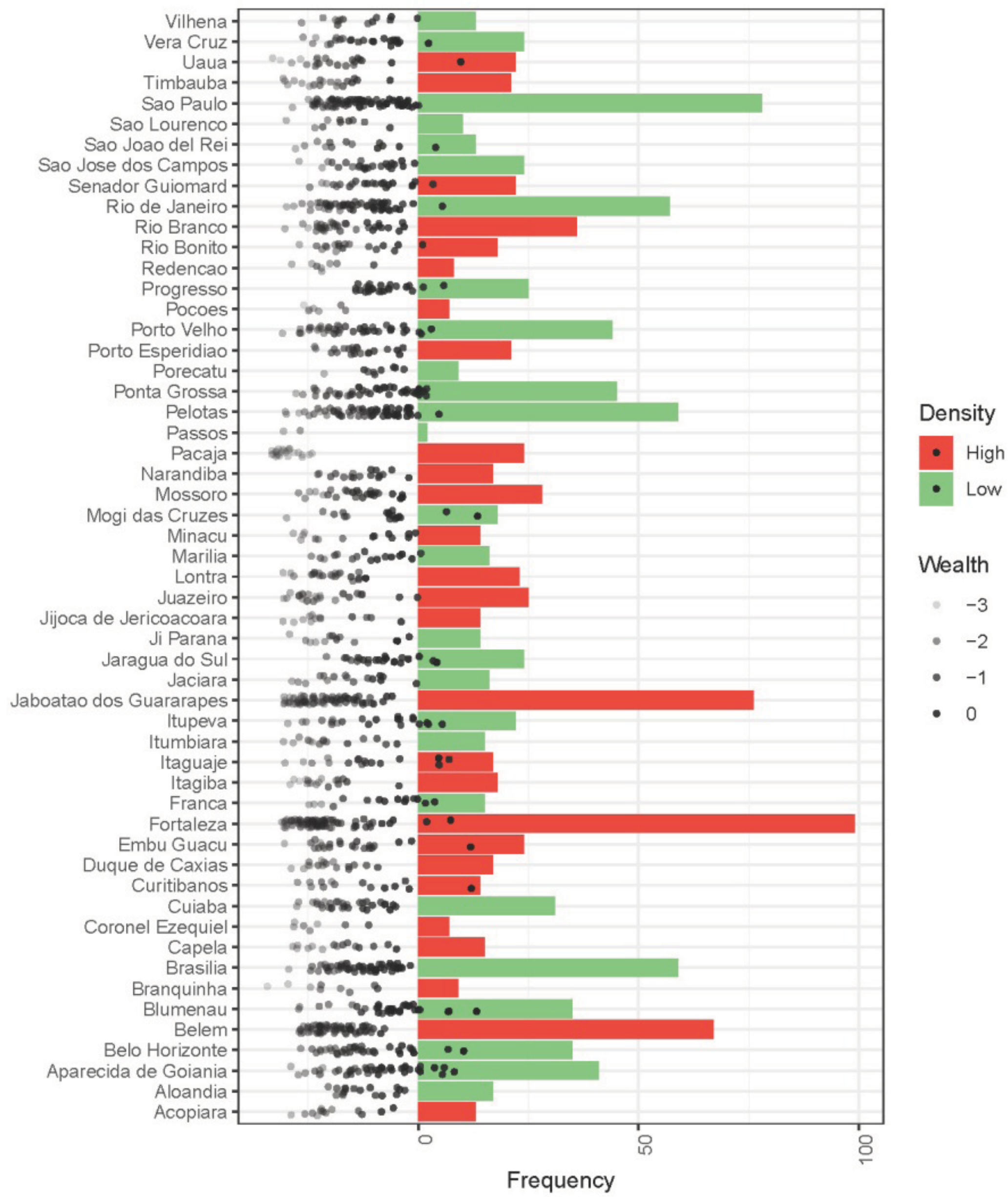
17 King and Zeng (2005). The matching routine used was the *full* matching routine (Hansen 2004; Rosenbaum 2010), via the *MatchIt* R package (Ho et al. 2011).

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 Irepoglu (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.[21]

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.[22] Brokers usually target civic associations. Following Holland and Palmer-Rubin (2015: 28), an additive index to measure civic participation (Political Involvement) was created.[23] 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.

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 *cp6*, *cp8* and *cp13*, 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,"[24] 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.[25] 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.[26] 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 nonzero, 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.[27] 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.[28] 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,[29] 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")[30] 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).

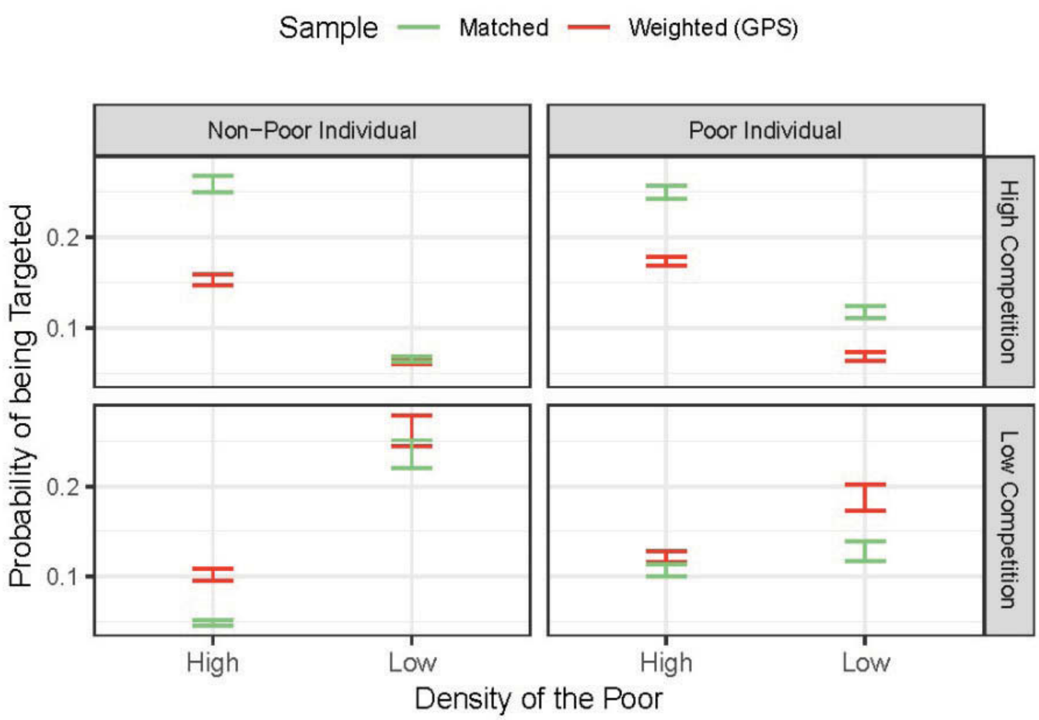
Figure 4 shows in Q2 that clientelism is more likely (25 percent) in situations where poor individuals are nested in poor groups ("high" density of the poor). As I have argued here, brokers will have incentives to engage in group targeting, taking advantage of the spillover effects of clientelism, leveraging 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

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).[31] 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 Corrup-tion	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

	Matched	Weighted
(Intercept)	1.404	2.958
	(1.968)	(2.691)
Wealth Index	1.374	1.320
	(0.990)	(1.209)
Municipal Opposition	-0.040	-0.061
	(0.025)	(0.032)
High Poor Density	-6.550**	
	(2.399)	
Municipal Population	-0.115*	-0.101
	(0.048)	(0.053)
Urban	-0.091	-0.077
	(0.401)	(0.416)
Political Involvement	0.046	0.047
	(0.055)	(0.055)
Support for Democracy	-0.056	-0.051
	(0.046)	(0.048)
Party Id.	-0.082	-0.087
	(0.053)	(0.052)
Perception of Corruption	0.240**	0.267**
	(0.088)	(0.089)
Years of Education	0.051*	0.054**
	(0.021)	(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

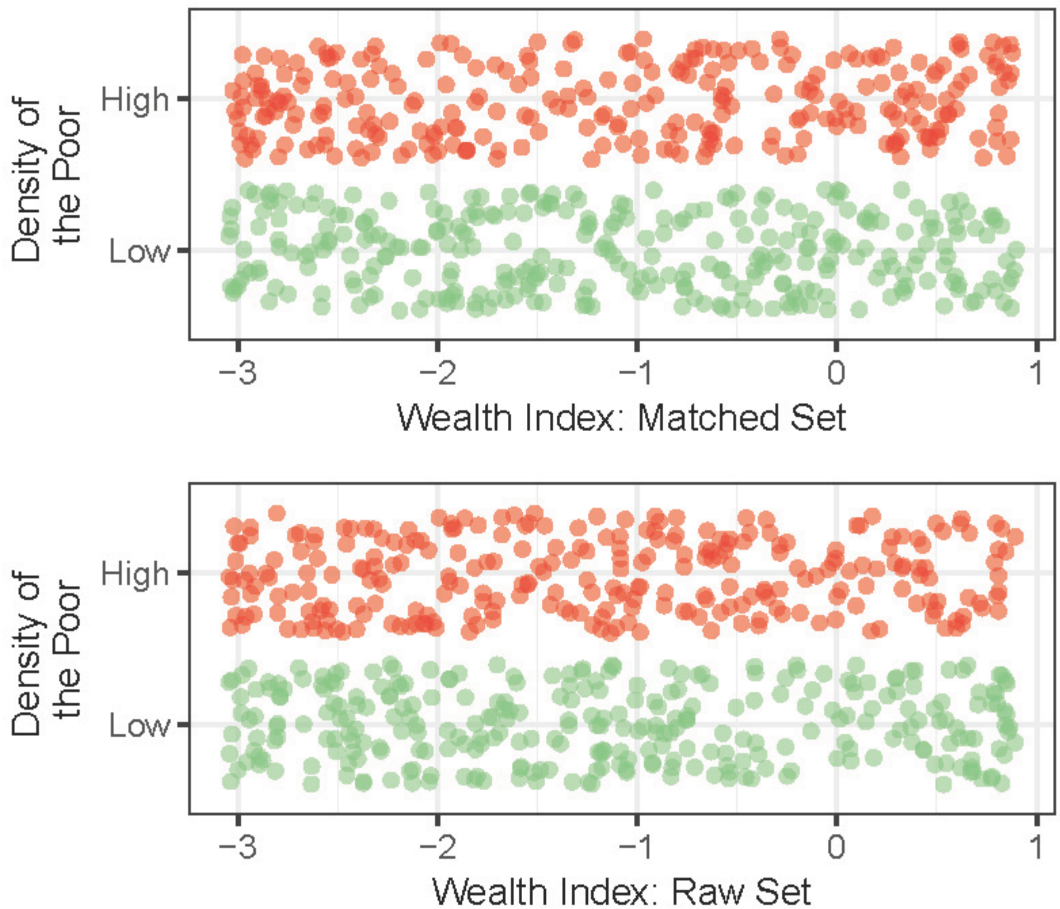


Figure A2. Frequency of Individuals by Municipality, Pre- and Post-Matching Deletion

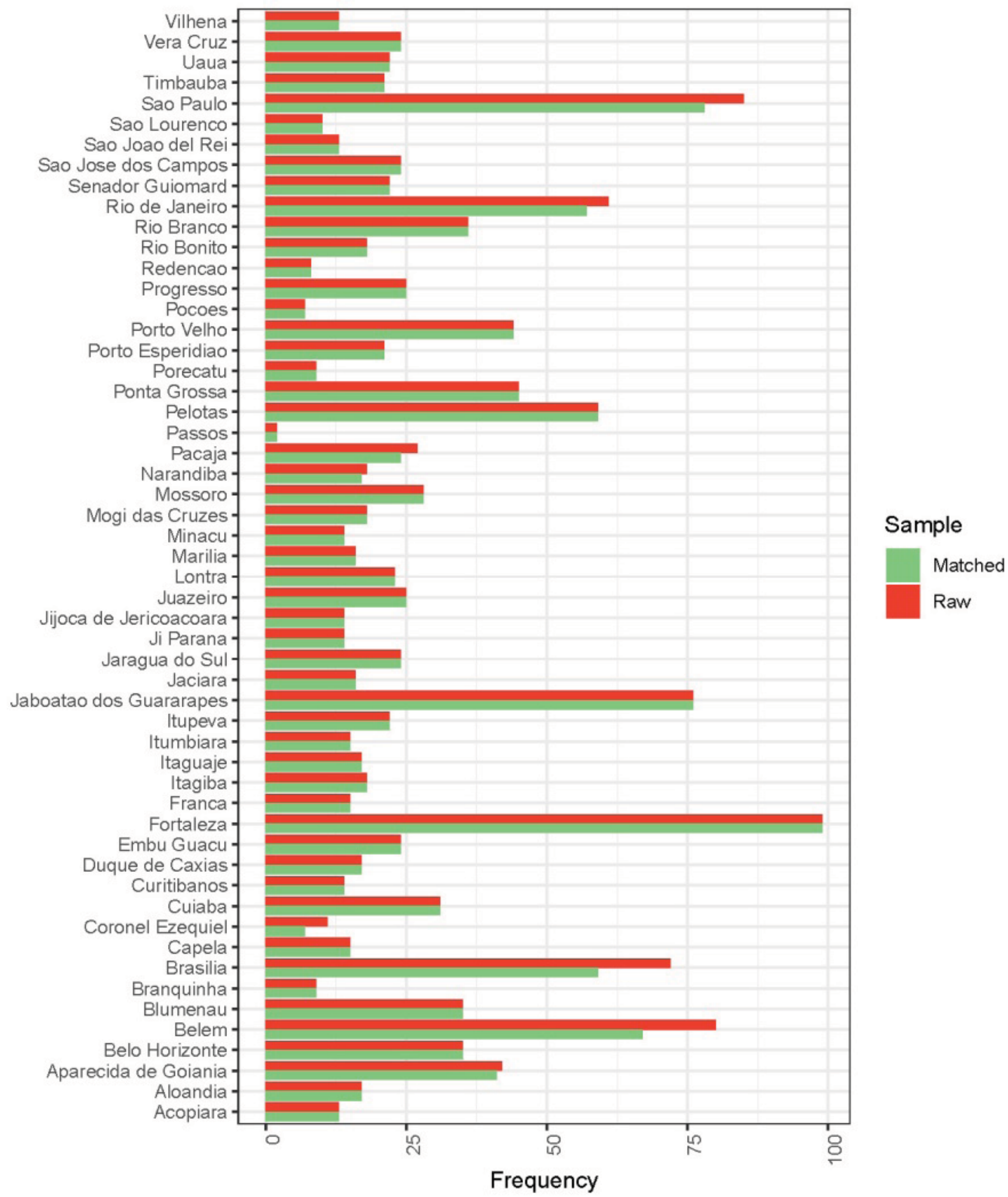


Figure A3. Pre- and Post-Matching Balance: Distribution of Propensity Scores

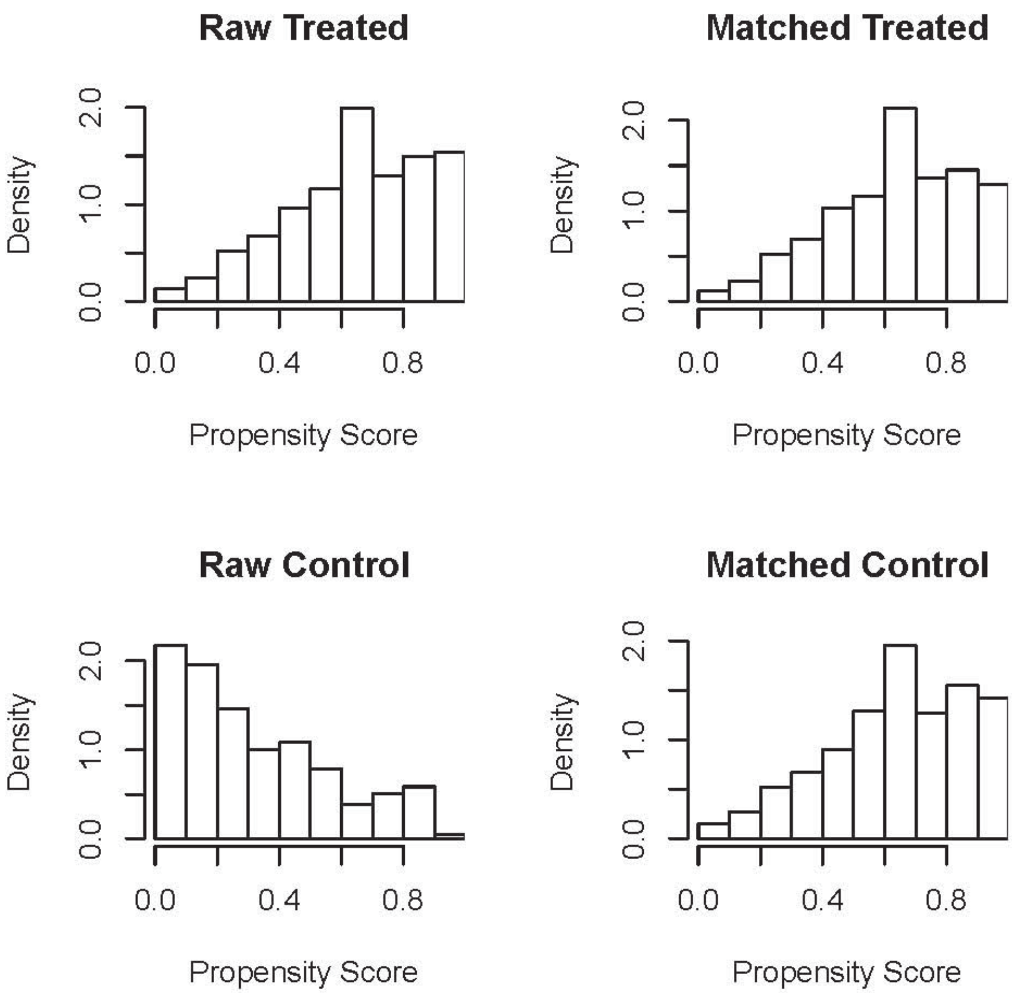
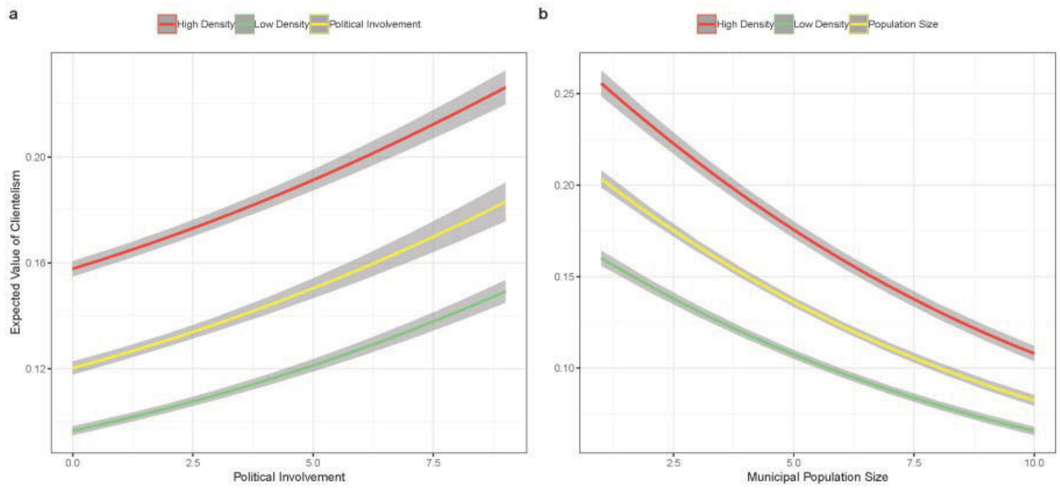


Figure A4. Simulated Expected Probability of Being Targeted: Political Involvement and Population Size



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. The quantitative empirical 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 vote. Would they sell, and at what price, or would they consistently opt out of vote selling? A novel experimental dataset representative at the national level comprises 1,479 U.S. voters who participated in an online list experiment in 2016, and the results are striking: Approximately 25% would sell their vote for a minimum payment of $418. Democrats and Liberals are more likely to sell, while education or income levels do not seem to impact the likelihood of vote selling.

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

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I. Vote Sellers and Vote Buyers

Prior research on clientelism usually focuses on whether parties have attempted to buy votes (Vicente and Wantchekon 2009; Vicente 2014; Rueda 2015, 2017; 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). Unfortunately, while this is an important question, it overlooks the conditions under which citizens would sell their vote. In fact, Nichter and Peress (2017) explain that studies continue to view clientelism typically as a top-down process, generally overlooking citizens' demands. Since several questions pertaining to vote sellers remain unanswered, a bottom-up reconceptualization is necessary. For instance: *What would voters do if offered the chance to sell their vote? Would they sell it? And at what price?*[1]

To illustrate the issue at hand, Figure 1 shows responses of U.S. citizens asked whether a candidate or a member of a political party has offered something in exchange for their vote, completely ignoring voters' preferences. The figure begs the question of whether survey respondents who answered "never" *would* still be willing to sell their votes.

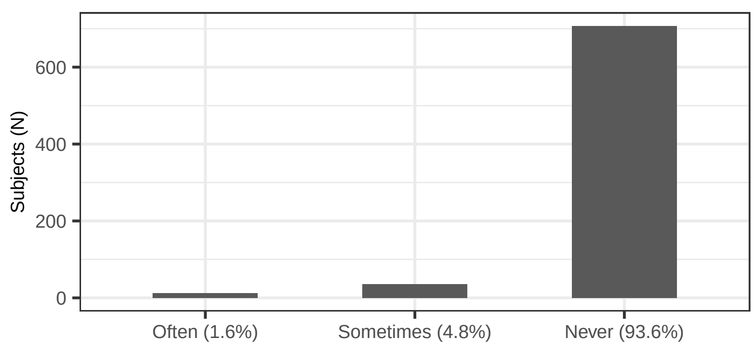

Figure 1: Frequency of Clientelism in the United States (2010).
Note: *Figure shows the frequency of survey respondents, N = 755.*
Source: *LAPOP, 2010 wave for the United States. Question is* `clien1`: *"In recent years and thinking about election campaigns, has a candidate or someone from a political 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?"*

It seems that whether studies focus on vote buying or vote selling depends partly on methodological rather than theoretical decisions.[2] On the one hand, historical and/or ethnographically based contributions describe clientelist transactions from the point of view of voters, focusing on the conditions that make vote selling most likely (Posada-Carbó 1996; Sabato 2001; Auyero 2000; Szwarcberg 2013; Borges 2019). On the other hand, statistical, survey, and/or experimentally based work mostly explores issues related to vote buying. For example, using a field experiment in Benin, Wantchekon (2003) stresses the role of incumbency on vote buying. Jensen and Justesen (2014, 227) focus on the impact of "poverty on vote buying," while Khemani (2015, 84) shows that "vote buying in poor democracies is associated with lower [public] investments." Hence, and except for several important quantitative studies (Corstange 2012; Imai, Park, and Greene 2015; Nichter and Peress 2017; Hicken et al. 2015, 2018; Michael and Thachil 2018), the emphasis of statistical studies remains on studying vote buying. Importantly, other statistically based studies have explored attitudes toward vote buying (Bratton 2008; Weitz-Shapiro 2012). They suggest that a strong stigma is attached to vote buying, which might make voters unwilling to sell their vote. For instance, González-Ocantos, Kiewiet de Jonge, and Nickerson (2014, 208) designed a list experiment to study attitudes toward vote buying in Latin America. They conclude that most respondents find vote buying "unacceptable when provided with a hypothetical example."

While the quantitative literature has advanced several important avenues of research, it has overlooked many important questions. The wording of the Latin American Public Opinion Project (LAPOP) question illustrates part of the issue. By focusing on vote buying, it gives the falsely optimistic impression that U.S. voters systematically "oppose" vote buying, "thus" rarely engaging in clientelism (as Figure 1 strongly suggests). Furthermore, most quantitative studies were conducted primarily in developing countries, seriously narrowing the scope of our inferences. In part, this is because the clientelism literature usually focuses on realized behaviors only—that is, actual clientelist transactions. Unfortunately, by ignoring attitudes of potential vote sellers, particularly when it comes to the willingness to sell, selection bias seriously threatens causal inferences.

This paper makes both methodological and substantive contributions to the literature by leveraging a list experiment on hypothetical vote selling in a consolidated democracy. We believe that studying hypothetical behaviors—such as the willingness to sell—is a valuable exercise. Geddes (1990, 131) explains the well-known selection issues of studying "only cases that have achieved the outcome of interest." Hence, if we are interested in understanding the micro-dynamics of clientelism—particularly as a supply-and-demand issue—we should incorporate the preferences of both sellers and buyers, potential and/or actual. Since the focus of this paper is on the willingness to sell, we believe that we can also learn from *unrealized* clientelist transactions. Following the lead of González-Ocantos, Kiewiet de Jonge, and Nickerson (2014), this paper presents experimental evidence of hypothetical vote selling in the United States.

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 and March 6. This experiment made possible both the identification of the demographic factors that would make U.S. voters more likely to sell their vote, and at what price, and the investigation of whether they would systematically lie about selling their vote. 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 for at least $418, and would systematically lie about it (approximately 8%). Given that these data are representative at the national level (i.e., 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 the willingness to sell.

While this paper essentially describes the phenomenon, it leaves for future research further consideration of the causes of hypothetical vote selling in the United States. Ultimately, this paper attempts to bring voters back into the quantitative study of clientelism, particularly by studying their willingness to sell.

II. The United States as a Case

At first, many advanced democracies were clientelist political systems. For instance, Stokes et al. (2013, 200) explain that in the nineteenth-century United States, "vote buying was commonplace" and "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" (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).[3]

However, vote buying currently seems to have declined considerably, for two competing reasons. Stokes et al. (2013, 201) show 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. Figure 1 suggests that 93.6% of U.S. respondents have never received a clientelist offer from a political party. While only a very small percentage (4.8%) report receiving such an offer from a political party, we do not know whether survey respondents *would* sell their votes. This paper presents systematic evidence that they would. Consequently, the counterintuitive results presented in this paper make our descriptive efforts worth pursuing. Representing the United States as a "crucial case," both the narrative and the findings follow a "least-likely" design approach. 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 mostly considers developing countries and describes vote sellers as poor (Weitz-Shapiro 2014, 12), uneducated (González-Ocantos, Kiewiet de Jonge, and Nickerson 2014), and undemocratic (Carlin and Moseley 2015). Thus, previous literature implies that the willingness to sell votes in the United States should be low, making it a difficult case study on vote selling.

The evidence that this paper presents may be associated with a probable erosion of American democracy.[4] In a highly controversial pair of articles, Foa and Mounk (2016, 7) document a deep "crisis of democratic legitimacy [that] 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 many (unanswered) questions regarding the actual value that American electoral institutions hold for citizens, possibly undermining the legitimacy of the integrity of voting. Is voting unimportant enough to lead U.S. citizens to sell their votes if offered the possibility?

The next section gives a historical account of vote buying and vote selling in the United States. The section also attempts to situate both within a historical context. It particularly shows how vote buying and vote selling transitioned from their status as an important institution in American elections to a scarcely practiced electoral method. The following section explains the experimental design. Immediately thereafter, the paper presents the statistical analyses of the experimental data. The last section offers some working hypotheses and possible lines for future research.

III. Vote Selling and Patronage in the United States: A Brief Historical Account

While all 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), several norms aimed to prohibit bribery, clientelism, and patronage. For instance, as early as 1725, the New Jersey legislature had already outlawed many electoral malpractices (Bensel 2004, 59). However, these restrictions were systematically bypassed. To circumvent property qualifications, for instance, office-seekers (and their supporters) commonly bought "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" (p. 6).

Weak institutions, poor bureaucracies, and bad-quality record-keeping helped to foster electoral malpractice.[5] First, most states did not have actual registration laws, making voter eligibility difficult to determine (Argersinger 1985, 672). Historians frequently report that judges at polling places had a hard time determining not only the age of the potential voter,[6] 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, it was often up to 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 also helped to sustain vote selling in the United States. For example, in Kentucky and Missouri, the law required voters to verbally announce their choices at the polling places, instead of using party tickets (Bensel 2004, 54). Of course, the *viva voce* method was convenient for party workers who usually swarmed around the polling places. However, the ticket system eventually supplanted this method.

The "party strip" or "unofficial" ballot system also permitted all sorts of fraudulent election practices. The parties themselves produced party tickets. 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. Consequently, party workers hired to monitor the voting window (Argersinger 1985, 672) had 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 the system work. However, political machines were oiled not only with money. On the one hand, many "ticket peddlers" (Argersinger 1985, p. 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" (p. 17). On the other hand, political appointees "from janitor to secretary of state" and some corporations donated annually part of their salaries and revenues (Reynolds 1980, p. 197). Thus, parties amassed huge amounts of money.

With all these resources flooding the polls on election day, voting was truly an interesting spectacle. On that day, party agents would offer voters plenty of liquor as an incentive to vote the party ticket. Hence, "the street or square outside the voting window frequently became a kind of alcoholic festival in which many men were clearly and spectacularly drunk [to the point that] some could not remember whether or not they had voted" (Bensel 2004, 20). Even before the Gilded Age, American elections 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).[7]

The Australian ballot system significantly reduced the frequency of most of this malpractice (Rusk 1970, 1221). However, as vote selling and vote buying were so embedded in what was considered normal, the immediate effect of the Australian system was to reduce turnout (Reynolds and McCormick 1986, 851).

Today, the *modus operandi* of clientelism has changed, 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, some contemporary accounts remain of vote buying and 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 to support 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 (p. 262) and the elections in the coal-rich Appalachian

Mountains during the 1980s (Campbell 2005, p. 275). Similarly, non-academic sources find that during the 2010 elections, "selling votes [was a] 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? The next two sections attempt to quantify—in an unbiased way—the willingness to sell votes among a representative sample of U.S. voters.

IV. Experimental Design

The study of individual preferences depends on truthful answers. However, under certain circumstances, individuals might not want to answer truthfully, due to social pressure. For instance, to avoid having the interviewer judge them, individuals might not want to reveal having done something illegal, such as selling one's vote. Failing to consider this systematic source of bias will pose threats to causal inference.

Since list experiments administer two lists of items (one to the control group, one to the treated group), list experiments are well suited to eliciting truthful answers (Blair 2015). Both lists look identical (e.g., each containing the same three items); however, the treatment list traditionally includes a fourth item, 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 for studying socially condemned behaviors, such as vote buying (Corstange 2008; González-Ocantos et al. 2012; Corstange 2012; Blair and Imai 2012), drug use (Druckman et al. 2015), sexual preferences (LaBrie and Earleywine 2000), and attitudes toward race (Kuklinski et al. 1997; Redlawsk, Tolbert, and Franko 2010).

Given that both lists are assigned randomly, the mean number of nonsensitive activities that respondents endorse 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.

Blair and Imai (2012) and Imai, Park, and Greene (2015) provide a statistical framework to analyze list data efficiently.[8] They formalize two assumptions, namely, that 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 the item counts for types $y = 0$ and $y = 4$ are fully observed,[9] experimental subjects with item-count types $y = 1$, $y = 2$, and $y = 3$ can be inferred using multivariate techniques that allow for inferring who answered "yes" to the sensitive item. In addition, the statistical analyses permit studying the relationship between preferences over the sensitive item (i.e., vote-selling) and an individual's characteristics, such as income and party identification. Also, the design includes a "direct" question on the sensitive item, also making possible an estimation of the amount of social-desirability bias.

Collected in 2016, the data (N=1,479) are representative at the national level.[10] Figure A1 shows the geographical distribution of survey respondents, grouped by party identification. The experiment was framed as a study about crime in the United States, not as a study about vote selling.[11] While pretesting the study, it was decided that the experiment needed to mask a very serious felony (selling one's vote) among other equally serious felonies (such as stealing) and other less serious crimes (such as speeding or downloading music illegally from the Internet). Otherwise, the vote-selling item would have stood out among the other items, making it seem totally negative and undoable, and/or making the true purpose of the study obvious.

Before splitting the subject pool into the subjects' respective experimental conditions, participants were asked to read an excerpt describing four illegal activities (including vote selling).[12] All were formatted as news pieces. The idea was to explain "vote selling" to "newsreaders."

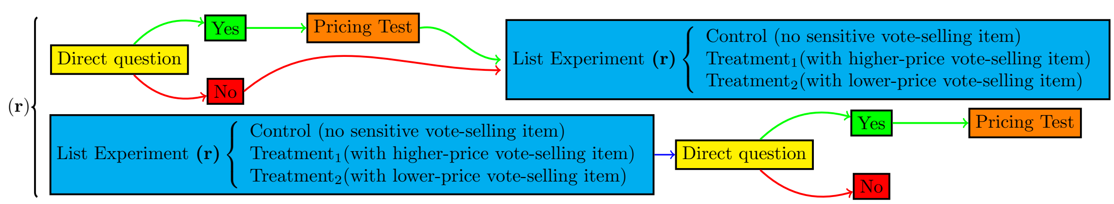

Figure 2: Experimental Flow of the List Design.
Note: *This figure shows the flow of the list experiment. Notice that (1) the order in which experimental subjects answered both the direct question and the list experiment was randomized; (2) there are two treatments, one with a selling price of \$100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

As Figure 2 suggests, to prevent possible priming effects,[13] the order in which experimental subjects answered the direct question[14] and the list experiment were 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 the hypothetical possibility of doing one of the illegal things mentioned previously in the excerpt would be randomly assigned. However, all participants were directly asked whether they would be interested in selling their vote. Direct answers were then used to estimate the proportion of "liars."

As a follow-up, subjects answering "yes" to the direct question answered a pricing test that asked them to indirectly put a price on their votes. Following standard practice in marketing research, participants slid a handle indicating which price was considered "too cheap" for one's vote. The slide ranged from $0 to $1,000, in one-dollar increments. The idea was to capture the respondent's willingness to sell. The pricing test particularly measures the lowest bound at which the participant would perceive the least economic benefit that was still enough to make selling his/her vote interesting. Moving forward, the list experiment contemplated one control and two possible treatments, each with different vote-selling prices. Since pricing a vote is difficult and based on several pretests, an arbitrarily low ($100) or an arbitrarily high ($500) price appeared. Participants randomly assigned to the treatment condition answered only one of these two treatments. More than hard-pricing tests, these two treatments account for possible different elasticities that might have interacted with individual socioeconomic backgrounds, mainly defined by income.[15]

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
    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 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`.[16]

Figure 3 shows the distinct frequencies of participants declaring how many (if any) illegal things they 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 describes the total number of individuals answering that they would do three of the illegal activities described in the vignette.[17] The order of the items was not randomized, to avoid violating the stable unit treatment value assumption (SUTVA)[18]

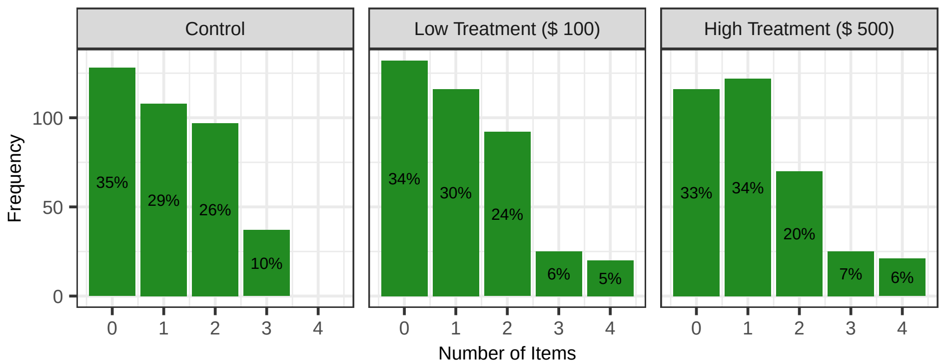

Figure 3: Frequency and Percentages of Subjects Declaring How Many (if any) Illegal Things They Would Do.
Note: *Notice that the X-axis denotes the number of items, not which ones. Percentages show proportions per condition.*

Showing that the probability of being assigned to any condition is not associated with individual covariates is important. Table 1 shows a multinomial logistic model. The dependent variable is the treatment condition (high treatment, low treatment, and control). The independent variables are observable characteristics captured by a short questionnaire included in the study. Four variables were used: income, education, party identification, and political ideology. These were the same set of variables used when estimating likely vote sellers (below). Conveniently, the base category in the multinomial logistic regression is the control condition. The coefficients in the table are all zeros (and statistically nonsignificant). Consequently, these results show no observable differences between the "high" treatment condition and the control group. The same applies to the "low" condition.[19]

The paper acknowledges that considerable friction and transaction costs in the real world might

	High	Low
Ideology	0.019	−0.031
	(0.068)	(0.067)
Party Id.	−0.125	0.022
	(0.083)	(0.080)
Income	−0.021	0.006
	(0.022)	(0.021)
Education	0.049	−0.008
	(0.048)	(0.047)
AIC	2449.471	2449.471
BIC	2499.583	2499.583
Log Likelihood	−1214.736	−1214.736

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Reference category is control condition. Intercept was excluded from the table. N = 1,479.

Table 1: Covariate Balance: Multinomial Logistic Regression for Both Treatment Conditions. **Note**: *The table shows a multinomial logistic regression. The dependent variable is the treatment condition (high, low, control). In both models, the base category is the control condition. The independent variables are observable characteristics captured by a short questionnaire included in the study. This set of covariates is the same as the one used in the statistical analyses of the list experiment. Since all estimated coefficients are close to zero and statistically nonsignificant, we can safely assume that the randomization mechanism worked as expected, i.e., there are no observable differences across the different treatment conditions.*

mean that 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. If the party of both sellers and buyers should match, fostering vote selling might represent a win-win situation for both. This experimental design does not consider blocking on party identification, as that might have increased considerably the number of cells.

V. Statistical Analyses

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

Table 2 shows a simple difference in means analysis between each treated group and the control group. On average, the control group would do 1.116 things on the list. Subjects treated under the "low" condition ($100) would do 1.182 things on the list, while subjects in the "high" condition ($500) would do 1.189 things.

Three important points characterize this bivariate analysis. First, the mean differences between treated groups (i.e., "low" and "high" treatments) are statistically zero, implying that neither treatment should introduce design bias into the experiment. Second, while treated subjects do have

Condition	Mean	Difference with Control Condition	Confidence Intervals	t	df	p-value
Low ($100)	1.182	1.182 - 1.116 = 6.6%	[-9%, 22%]	0.846	748	0.398
High ($500)	1.189	1.189 - 1.116 = 7.3%	[-8%, 23%]	0.913	700	0.361

Table 2: Differences in Means between Treatments (high and low) and the Control Group. **Note***: Table 2 shows two-tailed t-tests between each experimental treated unit ("low" and "high" conditions) and the control group. The table shows that 0.066* $\times$ 100 = *6.6% of subjects would sell their vote under the "low" condition, while 0.073* $\times$ 100 = *7.3% of subjects would sell their vote under the "high" condition. Also, 95% confidence intervals are shown. It is evident that they are quite wide and not statistically significant.*

slightly higher means when compared to the control group (indicating some vote-selling propensity), these differences are not statistically significant. Third, while not statistically significant, 0.066 $\times$ 100 = 6.6% of subjects would sell their vote under the "low" condition, while 0.073 $\times$ 100 = 7.3% of subjects would sell their vote under the "high" condition. While these estimations score substantially under what is found through the multivariate approach used in this study, as shown below, they are also highly inefficient.

Bivariate calculations are statistically inefficient; hence, the data should be analyzed using multivariate techniques instead. Following the advice of Blair and Imai (2012) and Blair et al. (2016), we took a statistical multivariate approach.[20] Exploiting the "low" and "high" treatments, we estimated two identical statistical models. In both models, the outcome variable is the item count of things that subjects would do. The idea is to estimate what we cannot observe (i.e., vote selling), using information that we do observe (i.e., socioeconomic and political variables captured by the questionnaire). The model considers the most common covariates studied in the vote buying literature (Calvo and Murillo 2004; Stokes 2005; Kitschelt and Wilkinson 2006; Nazareno, Brusco, and Stokes 2008; Weitz-Shapiro 2012; González-Ocantos, Kiewiet de Jonge, and Nickerson 2014; Oliveros 2016; Bahamonde 2018)—that is, income, education, party identification, and political ideology.

Leveraging this multivariate approach makes estimating the proportion of hypothetical vote sellers possible. For both the "low" and "high" treatments, Figure 4 shows the proportions of declared vote sellers ("Direct Question"), predicted vote sellers ("List Experiment"), and the difference between the two ("Social Desirability").[21] 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.[22] While a considerable proportion answered the direct question

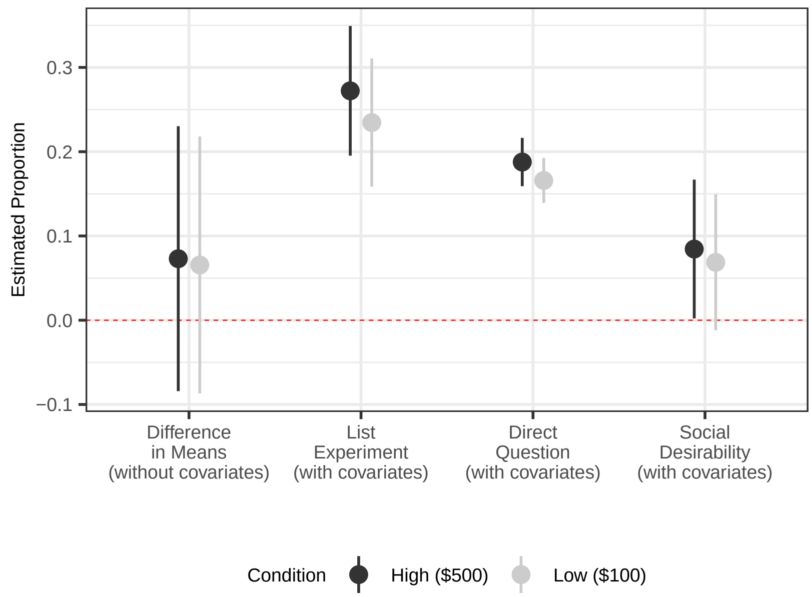

Figure 4: List Experiment Data: Declared and Predicted Vote-Sellers.
Note: *The figure summarizes Table 2 by showing the simple difference in means (without covariates). It also shows the proportion of declared ("Direct Question") and predicted ("List Experiment") hypothetical vote sellers, and the difference ("Social Desirability"). The three sets of main estimates were obtained via a multivariate procedure (including covariates). Combining both "low" and "high" treatments, 25% would be willing to sell their votes. And of those who answered affirmatively when asked directly (18%) an estimated additional 8% lied about it. "Liars" answer the direct question negatively, but they are likely sellers. The figure shows 95% confidence intervals. There are two arbitrarily "low" and "high" vote-selling prices. The reason for having both was to control for possible price elasticities. The figure suggests some small differences that are not statistically significant. Consequently, these arbitrary pricing decisions do not threaten the experimental design.*

affirmatively (18%),[23] the analyses still suggest that survey respondents systematically underreported their true answers—that is, approximately 8% of the nationally representative sample would have lied.[24]

The difference-in-means approach in Table 2 suggests that between 6.6% and 7.3% would be willing to sell their votes. However, the multivariate approach in Figure 4 suggests that 25% would be willing to do so. While at first these differences might seem huge, they are not. As the literature suggests, multivariate approaches to analyzing list-experiment data are far more efficient (Blair and Imai 2012; Blair et al. 2016). Within the framework of regression analysis, the difference-in-means approach is just a bivariate lineal model.[25] Instead, the multivariate approach is also a lineal model, but it incorporates covariates. We claim that due to the multivariate's greater efficiency than that of the difference-in-means approach, the former is a far better approach than the latter. One way of showing the efficiency of a statistical model is by examining its standard errors (King 1986, 676): The worse the data's fit is, the greater the standard errors are, the more imprecise the model is, and the wider are the confidence intervals. Considering the statistical uncertainty of both methods (depicted in Figure 4), it is easy to see that the multivariate approach is far more efficient than the difference-in-means approach. Since it uses more information when fitting the data (the covariates), it gives more precise estimates (narrower confidence intervals). Furthermore, going beyond efficiency issues, the estimates of both methods are statistically indistinguishable. Since the confidence intervals of both approaches overlap, it is not possible to say that the estimated 7.3% and 6.6% are "smaller" than the estimated 25%.[26]

Moving forward, the estimated proportion of vote sellers—"List Experiment" in Figure 4—is calculated using information from subjects with fully observable preferences, i.e., subjects with an item count of 0 or 4. We know that the former would not do anything, and the latter would do all things mentioned in the list (including the sensitive item). Using the identified covariates (income, education, party identification, and political ideology), a model is fitted to predict all subjects with 0's and 4's on the left-hand side. Using this information makes obtaining individual-level vote-selling predictions possible, i.e., participants who would do 1, 2, or 3 things on the list (shown in Figure A2 in the Appendix). Then, these individual-level predictions are compared with the direct question that all experimental subjects answered. If a subject is a predicted vote seller but answers the direct question negatively, it is inferred that due to concerns of social desirability, she might have chosen to lie.

II. What is the Price for which U.S. Citizens Would Sell Their Vote?

Participants were also asked to declare which price they considered "too cheap" for their vote. The intention was to capture the respondent's willingness to sell. The test measures the lowest bound at which participants would perceive the least possible economic benefit but enough to make them sell. Since it is the lowest threshold, the understanding is that a higher price will still be economically attractive.

The results indicate that the average survey respondent would sell his/her vote for \$418 (N = 189), a very expensive price. These results are not unrealistic. While the selling price is very high, it matches what others have found. Bahamonde (2018, 52) finds that clientelist political parties in Brazil do target affluent voters at considerably higher prices. Part of the argument is that higher levels of economic development not only raise personal income, but also shift the broker's vote-buying capacity upward.[27] That is, higher income does not necessarily stop vote buying; it just makes it more expensive.[28]

Stokes et al. (2013) analyze the (im)possibility of expensive vote selling. Industrialization has driven up the median income of the electorate, increasing the selling price while turning vote buying into an increasingly expensive strategy for winning elections. Thus, from the demand-side (parties), vote buying is no longer an efficient mass strategy for party machines. Evidently, with the selling price so expensive, political parties cannot catch up with the supply-side, making vote buying in the United States a rare event (as Figure 1 suggests). This situation has forced party machines to turn to other, less prohibitively costly alternatives. Thus, these results suggest that from the supply-side (i.e., voters), the vote is still up for sale, only for a very high price that party machines cannot afford.

Since the pricing test is based on the direct question, its results require a word of caution. The list experiment does suggest that some respondents lied when directly asked if they would sell their vote. Consequently, we should expect the pricing test to be biased to some degree. Also, only a small proportion of respondents answered the direct question affirmatively. In addition, prices are the product of supply-and-demand dynamics. In this context, prices result from the interaction between parties (buyers) and voters (sellers). This research design observes only the sellers' side. Hence, we limit our inferences even more by thinking about these results as only suggestive of some willingness to sell. Hence, more than acting as definitive and final pricing tests, these findings do seem to suggest that the vote-selling price is high enough to deter political parties from engaging in vote selling. Finally, future research should design and conduct more complex studies where the design incorporates supply-and-demand dynamics.

III. Who are the Most-Likely Vote Sellers?

The proportion of likely vote sellers was estimated using a multivariate approach. The variables used were the most common explanatory factors studied in the clientelism literature. Ultimately, this procedure allows for profiling participants into likely vote sellers. Figure 5 shows estimated vote-selling probabilities at different levels of all variables used in the multivariate approach.

The analyses suggest that Democrats and Liberals are 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 compared with Conservatives, Liberals 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," such as vote selling. In fact, Gray, Schein, and Ward (2014, 7) explain that Conservatives "see impure violations as relatively more wrong."

Unlike the conventional wisdom (Kitschelt 2000; Calvo and Murillo 2004; Weitz-Shapiro 2012; Carlin, Singer, and Zechmeister 2015), Figure 5 shows that education and income levels do not make vote selling more likely. Poverty has long been associated with vote selling. 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 uncertain) policy packages, clientelist 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."[29] The evidence presented in this paper aligns with that of others who have recently questioned the importance of this canonical predictor. 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.[30] Notably, Bahamonde (2018) explains that brokers target individuals when they are identifiable and groups when brokers need to rely on the spillover effects of clientelism. Both mechanisms occur regardless of individual levels of income.

There do seem to be important substantive differences between the "low" and "high" vote-selling treatments. That is, factors that heavily determine economic status (income and education) seem to be more elastic to marginal increments in the buying price. As Figure 5 shows, low-income and less-educated individuals are willing to sell their votes in a similar proportion to wealthier and more-educated respondents. However, poorer and uneducated individuals are more willing to sell their votes, conditional on higher prices. This might indicate that for them, behaving illegally is worthwhile but only when the payoff is "large enough." These results are in line with those of experimental and applied economists who argue that "risk aversion decreases as one rises above the poverty level and decreases significantly for the very wealthy" (Riley and Chow 1992, 32). In other

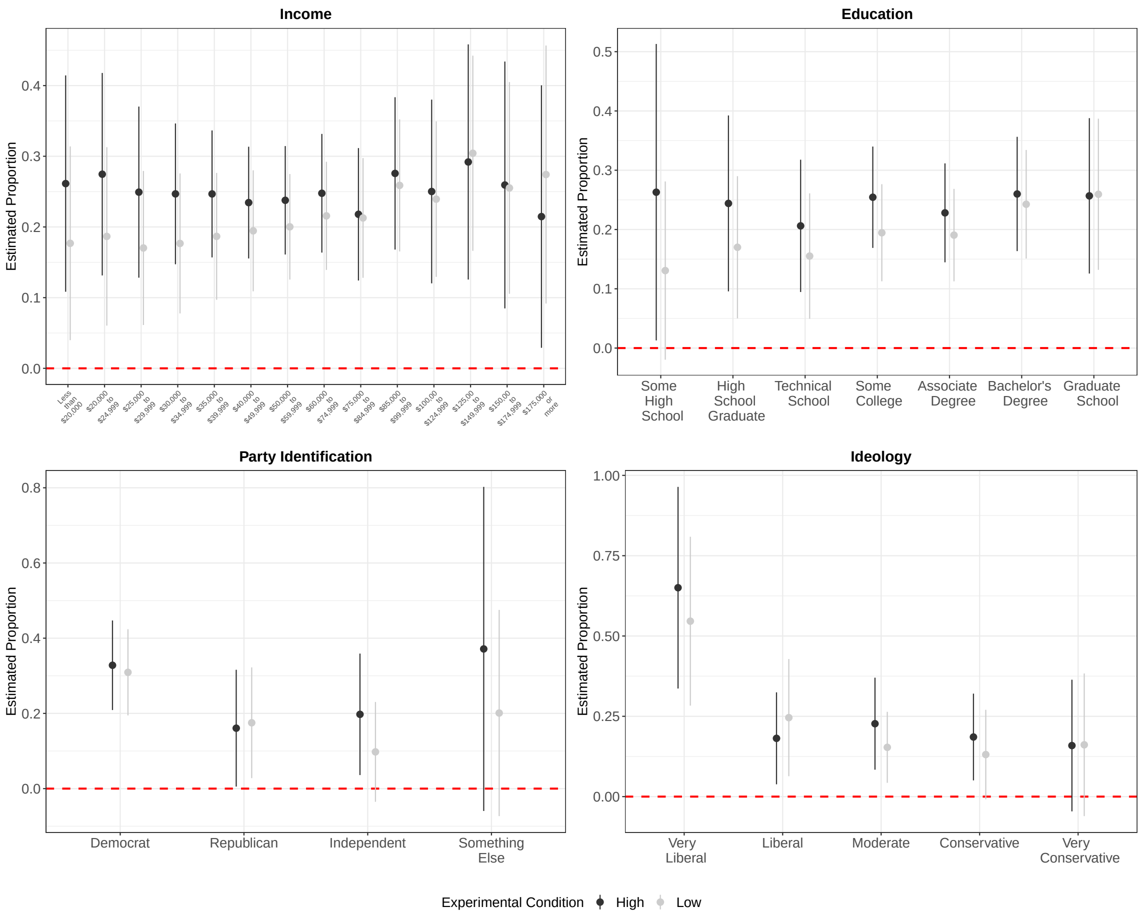

Figure 5: List Experiment: Covariates Used to Estimate Likely Vote-Sellers.
Note: *These variables were used in the multivariate statistical model to estimate individual-level probabilities of vote-selling. The figure shows the predicted probabilities and their corresponding 95% confidence intervals for income, education, party identification, and ideology. Since the vote-selling prices were set arbitrarily, the reason for two experimental conditions ("low" and "high") 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.*

words, less-educated and low-income individuals, who are more fragile and precarious, tend to avoid risks and, hence, illegal activities. On the contrary, higher-income and more-educated individuals seem unaffected by the different stimuli and sell their vote in the same proportion, regardless of the price. For instance, highly educated individuals (graduate school level) sell their vote in the same proportion, under both the "low" (26%) and "high" (26%) conditions.

VI. General Discussion

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

While vote buying/selling in the United States was commonplace during the nineteenth 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 vote, but for an estimated very expensive price—$418. 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, which produces positive results. The paper began by establishing the tension between supply and demand sides within a clientelist relationship and noting that qualitative research usually focuses on vote selling, while quantitative studies usually focuses on vote buying. Furthermore, most of the literature concentrates its efforts on studying developing countries, mostly paying attention to realized clientelist transactions. As discussed, both aspects pose threats of selection bias to our inferences. This paper tries to fill these gaps by studying hypothetical vote selling via an experimental design implemented in an advanced democracy.

While the paper is rather descriptive, the author believes that the exercise was worth pursuing. The experimental evidence of a large critical mass willing to sell their votes in a developed country is novel. It is hoped that the paper sets the stage for future research and encourages other scholars to field the experimental design presented here in a comparative setting, to include both developed and developing countries. Future research should also consider different values placed on different offices.[31] It is reasonable to think that presidential, Senate, House, state-legislature, mayoral, and city-council elections produce different incentives and constraints regarding buying and selling votes. Also, future research should consider blocking party identification—for example, designing a more complex experiment, in which not only the price varies but also the vote-selling treatment is partisan.

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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 vote selling.

```
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 year.
```

Direct Question. All subjects read the next paragraph, and then *all* 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.*

	Low Condition		*High Condition*	
Respondent Types	*Estimate*	*Standard Error*	*Estimate*	*Standard Error*
(y = 0, t = 1)	0.0031	0.0346	0.0183	0.0351
(y = 1, t = 1)	-0.0063	0.0349	-0.0345	0.0353
(y = 2, t = 1)	0.0169	0.0226	0.0299	0.0237
(y = 3, t = 1)	0.0519	0.0113	0.0593	0.0126
(y = 0, t = 0)	0.3429	0.0242	0.3277	0.0249
(y = 1, t = 0)	0.2982	0.0347	0.3264	0.0351
(y = 2, t = 0)	0.2453	0.0299	0.2322	0.0307
(y = 3, t = 0)	0.0481	0.0193	0.0407	0.02

Note: Since the Bonferroni-corrected p-values of the *low* (0.8567) and *high* (0.3298) conditions are above the specified alpha (0.05), I fail to reject the null of no design effects.

III. Geographical Distribution of Survey Respondents

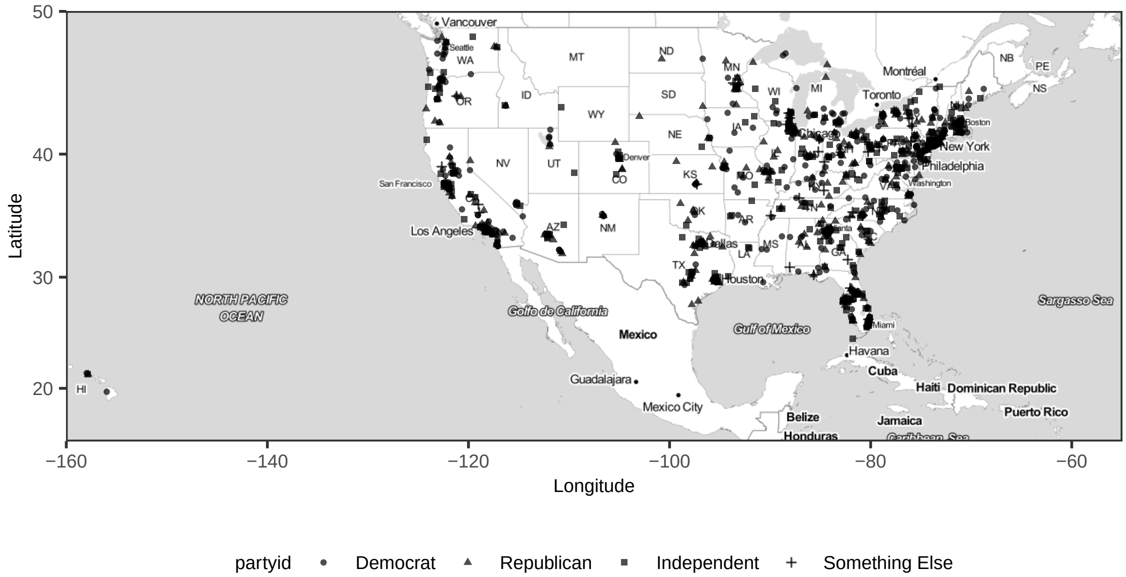

Figure A1: *Geographical Distribution of Survey Respondents by Party Identification.*

IV. Individual Predictions

The vertical axis of Figure A2 shows the estimated probabilities of the entire experimental sample, sorted across the horizontal axis. The figure is relevant as it openly shows the amount of uncertainty of the statistical estimates. Ultimately, these individual-specific predictions will be used to profile likely vote sellers.

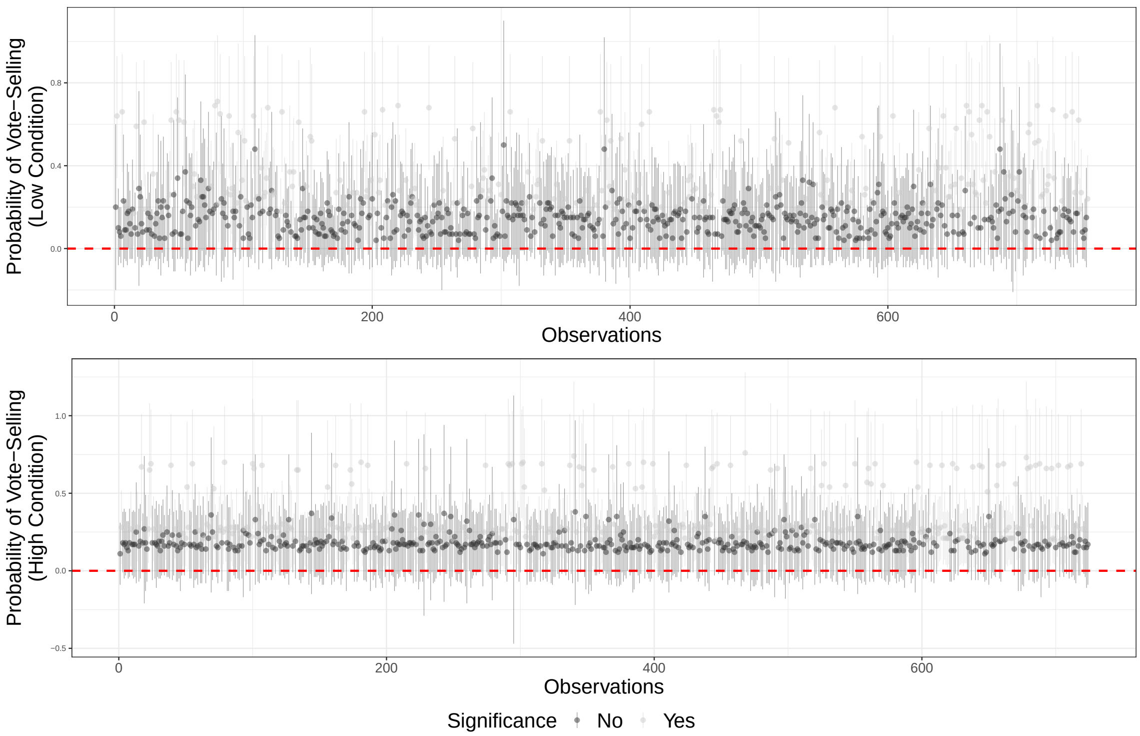

Figure A2: Individual Estimated Probabilities of Vote-Selling.
Note: *Figure shows the individual probabilities of vote-selling (N = 1,479) under the "low" and "high" conditions. After fitting the model, and following the advice of Blair and Imai (2012) and Imai, Park, and Greene (2015), individual probabilities of vote-selling under the "low" and "high" conditions were estimated. The figure also shows 95% confidence intervals.*

Notes

1. It is important to note that clientelism as a practice involves more than just buying or selling votes. Other goods might be involved in the clientelist transaction—for instance, public jobs or public infrastructure, e.g., see for example Dixit and Londregan (1996), Calvo and Murillo (2004), and Khemani (2015). However, this paper's focus is on just vote buying and vote selling.

2. I thank one of the anonymous reviewers for this comment.

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

4. Relatedly, see Levitsky and Ziblatt (2018).

5. 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).

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

7. $1,250 in 2017 U.S. dollars. Conversion based on Williamson (2018).

8. 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).

9. For a hypothetical treatment list of four items.

10. *Research Now SSI* collected the data between March 2 and March 6. Survey respondents belong to the online panel owned and administered by SSI. Notice of IRB exemption Protocol #E16-292 is kept on file at the Office of Research and Regulatory Affairs of Rutgers University.

11. To isolate the risks and costs associated with engaging in any illegal activity, the next phrase was included: "assuming you would not go to jail."

12. See Appendix for wording.

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

14. See Appendix for wording.

15. Holland and Palmer-Rubin (2015, 1189) explain that "the poor are thought to be more susceptible to vote buying."

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

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

18. Morton and Williams (2010, 98) explain that the treatment should be invariant or "stable."

19. I thank the anonymous reviewer at *Acta Politica* for this suggestion.

20. 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 of the package were left at their default values.

21. Since the estimated quantities do not vary across the different treatments ("low" and "high"), it is reasonable to think that there are no specific concerns associated with the (arbitrarily) chosen prices.

22. This number was calculated averaging over the "high" (27%) and "low" (23%) estimates.

23. This number was calculated averaging over the "high" (19%) and "low" (17%) estimates.

24. This number was calculated averaging over the "high" (8%) and "low" (7%) estimates.

25. With just a constant 1 on the right-hand side of the equation.

26. I thank the two anonymous reviewers of *Acta Politica* for stimulating this discussion.

27. Similarly, see Abramo and Speck (2001, 14). For the Philippine case, see Schaffer (2004).

28. In fact, there is some anecdotal evidence suggesting that a broker purchased one man's vote for $800 during the 2010 elections in eastern Kentucky (Shawn 2012, 6).

29. My emphasis.

30. Relatedly, González-Ocantos, Kiewiet de Jonge, and Nickerson (2014, 205) and Corstange (2012, 494) also find very weak results for education in Peru and Nicaragua, and in Lebanon, respectively.

31. I owe this point to Christopher Chambers-Ju.

Inclusive Institutions, Unequal Outcomes: Democracy, State Infrastructural Power, and Inequality 1970-2015

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Abstract

Although the relationship between democratic rule and income inequality has received important attention in recent literature, the evidence has been far from conclusive. In this paper, we explore whether the redistributive effect of democratic rule is conditional on state capacity. Previous literature has outlined that pre-existing state infrastructural power may be necessary for redistributive policies under democratic rule. In contrast to that intuitive view, this study argues that democratic rule combined with high state infrastructural power produce higher levels of income inequality through their positive effects on investor confidence, foreign direct investment inflows, and financial development, which favor income concentration at the top. By making use of a novel measure of state capacity based on cumulative census administration, this research finds empirical support for these claims using data from 184 industrial and developing countries between 1971-2016.

Please consider downloading the last version of the paper here.

Keywords— inequality; state-capacity; foreign direct investment; democracy.

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I. INTRODUCTION

Median voter and selectorate theories posit electoral democracy as fundamentally equalizing (Meltzer and Richard 1981; Boix 2003; Acemogolu and Robinson 2006; Bueno de Mesquita et al. 2003). However, these "redistributive" propositions have not received support in recent, more empirically minded literature (Timmons 2010; Remington 2011; Acemoglu, Naidu, et al. 2015; Wong 2016; Scheve and Stasavage 2017). The critics of redistributive effects of democratic institutions have noted that deficiencies in mechanisms of responsiveness and accountability, clientelism, interest group capture, and institutional legacies of authoritarianism may pose serious obstacles to equalization policies under democratic rule (Albertus and Menaldo 2018). It has also been suggested that such effects might be heavily context-dependent (Hillel Soifer 2013).

By contrast, fewer scholars have posited that democracy may, instead, causally lead to a more unequal income distribution. For example, democratic checks and balances might increase inequality by strengthening the influence of economic elites in policy-making (Remington 2011; Acemoglu, Naidu, et al. 2015), or by blocking redistributive policies through institutional channels, such as legislatures, courts, and bureaucracy (Albertus 2015; Wong 2016; Albertus and Menaldo 2016). In some areas, such as land reform, autocracies have achieved greater success in pro-poor redistribution (Albertus 2015). Other, more distant literature, has documented that democracy may intensify distributive conflicts (S. Huntington 1968; Kohli 2004; Collier and Rohmer 2008), or reinforce clientelist modes of interest intermediation, which may be associated with dismal socio-economic outcomes, including increasing inequality (Keefer and Vlaicu 2008; Weitz-Shapiro 2014).

Looking at context-conditionality could be a new way forward to clarify both the theoretical and empirical relationship between democracy and inequality. In this paper, we explore whether democracy's impact on inequality is conditioned by state capacity. It could be expected that pre-existing state capacity, in the form of functioning bureaucracies and territorial penetration, is necessary for redistributive policies under democratic rule (Ziblatt 2008). For example, Hillel Soifer (2013), focused on the effect of inequality on democratization and, argued that inequality-induced redistributive conflict only ensues in the context of considerable infrastructural power, which allows the implementation of redistributive taxation and transfer policies.

This study found no empirical support for these intuitive claims. Using error correction models with data from 184 industrial and developing countries from 1971-2016, along with a novel measure of state infrastructural power based on cumulative census administration data, it was shown that democratic rule combined with high state capacity leads to increasing income inequality over time. This study's theoretical argument centers on the idea that democracy and high state capacity provide the context of optimal property rights and contract security, which favors a high-quality investment climate through lower risk. Democracy offers protection of private property rights from arbitrary government involvement, mostly benefiting economic elites and the business sector. High levels of state infrastructural power, in turn, provide the preconditions for the functioning of a capitalist market economy through supporting legal and administrative institutions, which enhances private contracting among economic agents (Williamson 1985; Chaudhry 1993). When property rights are protected from arbitrary government involvement and state institutions provide a well-oiled administration and legal system throughout national territory, the quality of the investment climate is likely to reach to its zenith.

This study argues that the high-quality investment environment backed by democratic and high-capacity state institutions increases income inequality through two transmission channels: the higher inflows of foreign direct investment (FDI) and the development of sophisticated financial sectors. Property rights and contract security, backed by high-capacity democratic institutions, are both major determinants of FDI inflows and financial development in the existing literature. Both of these variables have been associated in the recent literature with increasing inequality.[1] FDI inflows increase the demand for skilled workers, leading to a larger wage gap between skilled and unskilled works, which is likely to increase labor income inequality (**Feenstra:1997aa**; **Jaumotte:2013aa**). In addition, multinational corporations and transnational elites become more relevant actors in national politics with increasing FDI flows, likely exerting downward pressures to labor protecting regulations, redistributive taxation, and transfers. We also suggest that financial development is likely to happen in an "intensive margin," benefiting the economic fortunes of those who already enjoy access to capital (Greenwood and Jovanovic 1990). For example, highly developed financial instruments are likely to provide higher rates of returns to pre-existing levels of capital, providing a basis for capital concentration Piketty (2014).

The theory and empirical approach here focus on the change in within-country inequality since 1970, a period which has largely coincided with an increase in inequality for many, if not most, high- and middle-income countries. Despite the fact that high-capacity nations with the longest

[1] See **Jaumotte:2013aa** for an overview on that literature.

democratic experience are likely to have the lowest levels of inequality and the most far-reaching taxation and transfers systems, the growth of these institutions occurred largely before the 1970s. We remain agnostic on the reason behind both the development of these institutions and the dynamics of change in inequality before the 1970s,[2] as well as its relationship with state capacity and democratic rule.[3] In other words, this work provides no arguments about the *levels* of inequality, only the determinants of the within-country change over time since 1970.

The crucial factors of our theory that increase inequality—the FDI and financial development—has spread since the 1970s, when the current wave of economic globalization related to cross-border capital flows and financial growth accelerated. Given the previous literature, it is plausible to believe that the within-country variation in these two variables is associated with within-country inequality changes. To be clear, our argument does not imply that nations that lack strong property rights protection and contract security would have lower inequality, rather, they are less likely to experience the trend of increasing inequality in the post-1970 period, given their limited capacity to attract FDI and develop sophisticated financial sectors. Our main testable prediction concerning the post-1970 period, therefore, is that inequality increases in the contexts of when democratic rule and high levels of state capacity coincide.

This paper makes several contributions to the existing literature. First, we contribute to the understanding of institutional underpinnings of increasing within-country inequality in the last four decades in many parts of the world.[4] The trend of increasing income inequality has been amply documented (Piketty 2014; Atkinson 2015), however, we still lack a systematic understanding of the determinants of the relative salience of this trend within different countries. Second, we contribute to the broader literature on regime type and redistribution. In contrast with the previous literature, we focus less on the political determinants of redistributive capacity, such as taxation and redistributive transfers,[5] and more on the changes in labor and capital markets, determining income distribution through the wage shares of high- and low-skilled workers and the degree of capital income concentration to the top. These changes are directly shaped by financial development

[2] Recent literature has vigorously explored the dynamics between historical change in inequality within nations making use of new historical datasets (Piketty 2014; Scheve and Stasavage 2012).

[3] Recent works employing historical datasets stemming back from the early 19th century haves casted serious doubts on the idea that democratic rule expanded progressive income taxation (Scheve and Stasavage 2012) or education spending (**Pagalyan:2018aa**).

[4] There have been major exceptions to that trend, especially in Latin America, where inequality has declined since the end of 1990s, albeit very slowly (**Lopez-Calva:2010aa**).

[5] See (**Pagalyan:2018aa**; Albertus and Menaldo 2018; Scheve and Stasavage 2012) for recent contributions to that literature.

and FDI flows, which operate as causal mechanisms in our theory.

The paper is structured as follows. In section II we present the literature review. In section III, we present our theoretical argument on the interactive relationship between democratic rule, state capacity and inequality. Then, in section IV, we address issues of the measurement of inequality, democracy, and state infrastructural power. We also explain and justify our control variables. In section V we present our empirical design, results from error correction models, and the corresponding robustness checks. Our empirical analysis demonstrates both the interactive effect of democracy and state infrastructural power on income inequality and tests the transmission channels behind this relationship: the combined effects of state capacity and regime type on investor confidence, financial development, and inequality, as well as the effects of the latter variables on income distribution. In section VI we conclude.

II. LITERATURE REVIEW

Democratic institutions have been conceptualized as a major source of responsiveness and accountability in the political economy literature, providing electoral incentives to redistribute income. Leaders in democratic nations need widespread support to achieve and sustain power, and are, therefore, more likely to move beyond their narrow set of personal interests by appealing to a wider public through public policies (Meltzer and Richard 1981). Compared to authoritarian polities, widespread enfranchisement in democracies is likely to result in higher public goods provision, which may help the poor to benefit from economic growth via investments in human capital (Baum and Lake 2003; Lindert 2004; Morgan and Kelly 2013). These policies are expected to produce more equal income distribution over time. According to Bueno de Mesquita et al. (2003), authoritarian rulers find it more efficient to provide targeted private goods to their "winning coalition," a narrower group of supporters, which often excludes the poor. In contrast, rulers in democratic systems have to satisfy larger constituencies and find it cheaper to rely on broadly distributed and equalizing public goods.

Democracy's equalizing effects are also conditioned on and work through the political power of organized groups. Electoral institutions allow underprivileged groups to enter the political realm via political parties, unions, and social mobilization (Korpi 1983; Esping-Andersen 1990; Huber and Stephens 2012). According to power resource arguments, political organization and collective action capacity are conditioning factors in the democracy-redistribution nexus. Rodrik (1999) found that democracies have higher real wages and labor share in national income, attributing these to a greater freedom of labor association. Despite these plausible theoretical mechanisms, empirical evidence has not offered solid support for inequality-reducing effects of democracy. Several empirical studies incorporating various regions of the developing world find that democracy does not induce lower income inequality (Gradstein and Milanovic 2004; Timmons 2010; Acemoglu, Naidu, et al. 2015; Wong 2016), more progressive taxation (Scheve and Stasavage 2014) or pro-poor social policies (**Pagalyan:2018aa**; Mulligan, Gil, and Sala-i-Martin 2004; Ross 2006). The causes of this "democratic unresponsiveness" have constituted a major puzzle for the literature. At the same time, some democracies might be more redistributive than others, and the focus on the social and institutional contexts in which democracies operate could be a new way forward for fruitful theorizing.

In this paper, we concentrate on the question of whether democracy's effect on inequality is conditioned on state capacity. In particular, we study the conditional effect of state infrastructural power, which has received important recent attention as an explanatory variable in determining development outcomes (Knutsen 2013; Hanson 2015). Infrastructural power refers to the institutional capacity of the state to "penetrate its territories and logistically implement decisions" (Mann 1984, p. 113). The quality, or "Weberiness," of state bureaucracy—often used as measure of state capacity—is necessary, however, is by no means sufficient for high infrastructural power. As Hilliel Soifer (2008, pp. 231–232) argued, infrastructural power is conceptually distinct from Weberian bureaucratic professionalism, in that it is focused on the state's ability to enforce and implement policies, rather than on the autonomy or quality of the bureaucracy itself. Bureaucratic professionalism contributes to infrastructural power, yet must be complemented by the ability of state agents to implement policies and regulations throughout the national territory.

The previous literature has hinted that redistributive policies are more likely in the context where both the political-electoral incentives stemming from regime characteristics and the state capacity to redistribute exist. In low capacity states, democratization should not matter for redistributive outcomes given their inability to collect taxes and implement social policy. Revenue extraction and policy implementation—both crucial for income redistribution—are dependent on the state's ability to penetrate its territory and implement decisions (Ziblatt 2008). In states with lower state capacity, elites are able to escape taxation, lowering the state ability to provide public goods and transfers. For example, income taxation requires identifying individual incomes within both the national territory and offshore, assessing value and collecting payments. It is no wonder that weak capacity states have relied on easily-collectible trade and consumption taxes, which tend to be less progressive than taxes on income and wealth (Lieberman 2003; Scott 1988).

Implementation of redistributive policies, such as basic education, health-care, social assistance, and insurance policies are also likely to be dependent on the infrastructural power of the state (Ziblatt 2008). At the same time, under authoritarianism, rulers have little incentive to supply equalizing public goods, regardless state capacity. In these regimes, the capacity—if any—to deliver these benefits, goes unused (Bueno de Mesquita et al. 2003). Hillel Soifer (2013) contributes to this line of reasoning, arguing that state capacity affects the credibility of the threat of redistribution under democratic regimes.

III. DEMOCRACY, STATE CAPACITY, AND INVESTOR CONFIDENCE

In contrast to that intuitive account, we present a more nuanced understanding of the relationship between democracy, state capacity, and income inequality. Our theory focuses on changes in inequality since the 1970s, a period which has largely coincided with an increase in within-country inequality in most high- and middle- income countries. Counterintuitively, we argue that the combination of high state capacity and democracy is associated with increases in income inequality. We do not deny that the context of high infrastructural power democracy establishes preconditions for progressive taxation or redistributive policy. However, we contend that other inequality-increasing mechanisms have dominated over the growth of inequality-reducing taxation and government spending patterns in these contexts since the 1970s, given the global trend in the expansion of FDI and financial development during this period.[6] We argue that democracy and high state capacity provide the context for optimal property rights and contract security, which favors investor confidence through lower risk for capitalist investors. The high-quality investment climate in democratic high capacity setting increases inequality through financial development and larger FDI flows.

Democratic regimes have been widely portrayed to be more likely to respect private property rights and provide greater rule of law, incentivizing capitalist investor confidence (North and Weingast 1989; Olson 2000). An influential argument has connected democracy with higher FDI inflows

[6] See **Beck:2010aa** for growth of financial sector, and **UNCTAD:2012aa** for spread of FDI in recent decades.

precisely because of greater investment security (Jensen 2003). **Jensen:2008aa** further argues that democratic regimes reduce investment risks by providing investors—most commonly multinational corporations—formal avenues of influencing policy through the legal system, allowing firms to both observe the legislative process and anticipate changes in policy through greater transparency in the decision-making process and through the potential suffering of larger "audience costs" by reneging on commitments with foreign investors. **Jensen:2008aa**; **Busse:2007aa**; Jensen (2003) have provided empirical evidence for the positive association between democratic rule and FDI.

At the same time, democracy alone is not enough to secure investor confidence. In the absence of the state's infrastructural and coercive power, protection of property rights is hardly possible. Infrastructural capacity of state institutions—conceptually distinct from regime type—is likely to be another major determinant of FDI (Li and Resnick 2003). Contract enforcement—based on state capacity to enforce the rule of law among private agents—is likely to be crucial for business confidence and attracting foreign investors, along with the protection of private property from arbitrary government involvement. A long line of literature in contract theory links the economic realities of organizations and societies to the type and quality of contracts that can be written and enforced (Coase 1960; Williamson 1985). The state's infrastructural power clearly underlies this positive contractual environment. The "watchman" capacities of the state Weberian-like central and local level bureaucracies, impartial courts, uniform weights and measures, and effective law enforcement institutions are crucial for reducing uncertainty and transaction costs.

Contract security is greatly enhanced by smoothly functioning national level markets, which, in turn, require a considerable state infrastructural power. As Chaudhry (1993, p. 252) notes, "creating and regulating markets requires myriad financial, legal, and civil institutions, with stable and form long-term commitments to regulate the actions of actors." Besley and Persson (2009) argue that state extractive capacity crucially supports the development of "legal" institutions supporting a contractual environment. By contrast, weak states with absent territorial control are not able to provide these market-enhancing public goods, resulting in below-average investor confidence. In addition, weak states with a low ability to penetrate territories with national bureaucracies may be incapable of dealing with the existence of pre-capitalist monopolies, obstructing the development of national markets (Polanyi 1944). Given that, it is likely that the highest level of investor confidence exists, on average, where democracy and high state capacity coincide. In the FDI literature, Li and Resnick (2003) have argued that FDI inflows tend to be highest in societies that combine both democratic rule and high bureaucratic capacity.

In addition to fomenting FDI inflows, the democratic high-capacity contexts offer an especially nurturing context for financial development. As Haber, North, and Weingast (2008, p. 4) note, political rulers have "a strong incentive to govern financial systems so as to facilitate their own political survival,"—for example, limiting competition through higher barriers of entry, which allows the appropriation or distribution of rents among supporters stemming from banks and financial services. This rent-seeking behavior is likely to hinder the development of competitive banking systems and securities markets. At the same time, the checks and balances inherent to a democratic system reduce the leverage of governments to expropriate assets and threaten property rights in the financial sector (Haber, North, and Weingast 2008). Democratic politicians also have incentives to promote competitive banking sectors and thriving securities markets when they perceive that the majority of the population benefits from increased access to banking services and cheaper private credit, promoting the electoral fortunes of politicians (Menaldo and Yoo 2015).

State infrastructural power is also likely to support financial development in capitalist economies along with democratic rule, reducing important market failures stemming from information asymmetries obstructing contract writing and enforcement. For example, the creation of accurate property registers by the state allows the banks to know who owns which assets, which facilitates the creation of contracts. The enforcement of modern bankruptcy and the diffusion of modern accounting standards underlying credit expansion may depend on the state's ability to penetrate the reaches of its territory. The latter have a crucial role in mitigating information asymmetries, allowing banks and investors to better assess their risks, which leads to a greater expansion of credit markets. Stock market expansion is likely to depend on stronger corporate governance and the capacity to enforce bankruptcy laws, which reduces informational asymmetries and transaction costs.[7]

There is an additional reason why low infrastructural power may obstruct the growth of a financial system. Low state capacity might not only to contribute to market failure, but also to political failure. Limited capacity to tax populations and gather revenue, accompanying low infrastructural power, might increase the likelihood of the state to turn to the financial system for revenues needed for the political survival of incumbents (Becerra, Cavallo, and Scartascini 2012; Menaldo 2016). As Menaldo (2016, p. 458) argues, "in weak states, a ruler's fiscal imperative drives the political and market failures that have been putatively fingered as independent causes of financial

[7]This section is based on Haber, North, and Weingast (2008) and Menaldo and Yoo (2015).

underdevelopment.” In weak capacity states, the rulers are especially likely to limit competition and create concentrated banking sectors for rent-extraction purposes, while demanding a share of those rents from the financial sector to finance their expenses (Menaldo 2016, p. 458).

Thus far, we have argued that democratic and high-capacity institutions are more likely to have a high-quality investment climate that attracts more FDI and develops sophisticated financial sectors. The second step of our argument connects these two variables with the trend in increasing income inequality. First, considerable recent evidence has pointed out that FDI flows may increase income inequality in both developed and developing worlds (**Jaumotte:2013aa**; **Basu:2007aa**; Reuveny and Li 2003). FDI inflows lead to an increased demand for skilled workers, associated with growing wage differentials between skilled and unskilled jobs, which is likely to increase income inequality (**Feenstra:1997aa**). For example, the investment of MNC in some sectors is likely to create a small sector of high wage earners and a large backward sector of low wages (**Nafziger:1997aa**). With increasing FDI flows, multinational corporations and transnational elites become more relevant actors in national politics and are likely to exert downward pressure to labor protecting regulations, redistributive taxation, and transfers (Wong 2016).

The development of a sophisticated financial system is another transmission channel how investor confidence in high-capacity democracies produces higher income inequality. While scholars have long recognized the growth-promoting and poverty-reducing effects of financial development through incentivizing and channeling savings (**Beck:2008aa**), recent literature has connected financial development with higher inequality. At least six recent papers find a positive association between financial sector size—usually proxied by private credit as a percentage of GDP—and an increase in income inequality, both in cross-national and subnational context (**Jaumotte:2013aa**; **Li:2014aa**; **Dabla-Norris:2015aa**; Denk and Cournède 2015; Jauch and Watzka 2016; Haan and Sturm 2017).

According to this view, financial development is likely to happen in the “intensive margin” through improvements in the quality and range of financial services for those who already enjoy access to the financial system, which has an important potential to widen inequality and perpetuate intergenerational differences in economic opportunity (Greenwood and Jovanovic 1990). Highly developed financial instruments, such as bonds and stocks, are likely to provide higher rates of returns to pre-existing capital, providing a basis for the concentration of financial assets (Piketty 2014). Cheaper credit from banks and access to investment instruments may also disproportionately reward those with the most skills and initiative, leading to the widening of the distribution of income.

In addition, the un-equalizing effects of the financial system could work through a labor income channel. Financial sector employees are strongly concentrated at the top of the income distribution, and their earnings exceed those of employees with similar profiles (such as age, gender or education) in other sectors. Asymmetric compensation schemes for bank managers may especially contribute to this un-equalizing dynamic (Denk and Cournède 2015). In addition, large financial sectors contribute to moral hazard problems. Given bailout expectations by the government in the financial sector, sophisticated financial instruments encourage high returns through risk-taking behaviors, benefiting members of the financial elite compared to other sectors of the economy (Korinek and Kreamer 2014). Similarly, financial liberalization, while aimed at facilitating access to financial services, might increase inequality due to the regulatory capture of financial elites (Claessens and Perotti 2007).

To summarize, our theoretical propositions have the following empirical implications. Our main hypothesis is that democratic rule under high state infrastructural power increases income inequality over time. We also posit that a democratic high infrastructural power context is associated with a high-quality investment environment, larger annual FDI inflows, and faster growth of the financial sector. Finally, we also expect to see a positive relationship of investor confidence, FDI inflows, and the size of the financial sector with income inequality.

IV. VARIABLES AND MEASUREMENT

Inequality Our outcome variable is income inequality measured by the Gini coefficient. The Gini coefficient ranges from 0 (perfect equality) to 1 (one person has all the income). Previous analyses of determinants of income inequality have generally been plagued by data comparability problems of the existing data sources (Solt 2016). Welfare definitions and income scales vary between household surveys administered in various countries and at different times, thus, harmonizing measurement across time and space is an important task for any analysis of inequality (Morgan and Kelly 2013, p. 676).[8] The Luxembourg Income Study (LIS) offers a gold standard for the comparability of different income concepts of surveys, however, only offers data for a limited number of nations, mostly in the developed world.

To mitigate these concerns, we use the Standardized World Income Inequality Database (SWIID)

[8]Comparability problems abound: data on inequality are based on different definitions such as expenditures; market (gross) income, which consists mainly of salaries; or net income, which is gross income plus government redistribution in terms of tax and transfers (Wong 2016).

(Solt 2016), for our inequality measure, which allows the maximization of both comparability and coverage. Using the LIS as the methodological standard for comparability, the SWIID incorporates data from various data sources, such as OECD's Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean, generated by CEDLAS, the World Bank, Eurostat, PovcalNet of the World Bank, national statistical offices around the world, and several academic sources. SWIID uses these sources to calculate a "model-based multiple imputation estimates of the many missing observations in the LIS series" (Solt 2016, p. 1271), maximizing both comparability and sample size.

SWIID is composed of four indicators—disposable income inequality (post-tax and transfer), market income inequality (pre-tax and transfer), absolute redistribution (the difference between the market income and disposable income Gini indexes), and relative redistribution (the percentage by which market income inequality is reduced). We use disposable income inequality as our main dependent variable, as measures of market inequality and redistribution do not exist for most countries in the developing world. For example, the data for disposable income inequality exists for 31.2% of country years in the developing world since 1970, while only 7.2% of country years for market inequality.

Democracy We adopt Polity IV and the Electoral Democracy (Polyarchy) from the V-Dem dataset as our democracy measures. Both of these measures offer almost universal country coverage over time. The Polity IV dataset provides an ordinal ranking of political regimes on a scale of 10 to −10 (democracy to authoritarian regimes), based on the following five dimensions: competitiveness and the regulation of political participation, competitiveness and openness of executive recruitment, and constraints on the chief executive. The Electoral Democracy Index of V-Dem intends to capture Dahl (1971)'s concept of *polyarchy* and is formed by an aggregate index of capturing the presence of the following institutions and policies: (1) elected officials; (2) free, fair, and frequent elections; (3) freedom of expression and alternative sources of information; (4) associational autonomy; and (5) inclusive citizenship (universal suffrage, as in Coppedge et al. 2016).[9]

[9] Electoral Democracy Index is formed by taking the average of, on the one hand, the weighted average of the indices measuring freedom of association, clean elections (v2xel_frefair), freedom of expression (`v2x_freexp_thick`), elected officials (`v2x_elecoff`), and suffrage (`v2x_suffr`) and, on the other, the five-way multiplicative interaction between those indices. This is halfway between a straight average and strict multiplication, meaning the average of the two. It is thus a compromise between the two most well-known aggregation formulas in the literature, both allowing (partial) "compensation" in one subcomponent for lack of polyarchy in the others, but also punishing countries not strong in one sub-component according to the "weakest link" argument. The aggregation is done at the level of Dahl's

State capacity Operationalizing state capacity is a complicated task. The chosen measurement should not reflect the policy preferences of governments, which could be affected by regime type. Taxation rates—a commonly used measure—are likely to be directly affected by these preferences. As Fukuyama (2013, p. 353) notes, there "is a difference between extractive potential and actual extraction rates." For example, although the US collects less income taxes compared to Scandinavian Social democracies, it is not possible to argue that it is a weak state. Similarly, higher taxation levels do not imply higher state capacity. In late imperial China, "high taxes on peasants [...] were the result of rulers' lack of power. Chinese rulers consistently attempted to limit official's excessive extractions from the masses, but were unable to do so" (Kiser and Tong 1992, p. 301).

Other measures, most notably expert survey-based indicators, are likely to be affected by coding bias. For example, Kurtz and Schrank (2012, p. 542) explain that measurements that rely on surveys, particularly, of foreign investors or domestic firms, wrongly assume that "the interests of investors [...] and the interest of the nation are essentially coterminous." In instances where the state is strong, and able to levy taxes and impose regulations, for example, the state will most likely "be judged 'burdensome' and 'growth-inhibiting' by many businesspersons" (Kurtz and Schrank 2007, p. 542).

Recent literature has proposed a number of alternatives for measuring the levels of state capacity. For example, Luna and Toro (2014) and Luna and Hillel Soifer (2017) employ a survey-based design to measure contemporary subnational state capacity.[10] Unfortunately, part of our challenge also consists of being able to capture levels of state capacity *overtime*.[11] Others have employed investment levels of public goods, such as infrastructure, roads, electrification (measured as light intensity per pixel), and railroads (Mann 1984; Enriquez, Sybblis, and Centeno 2017; Acemoglu 2005; Saylor 2012; Thies 2009; Besley and Persson 2009; H. Huntington and Wibbels 2014; Coatsworth 1974). However, it is possible that these infrastructure investments reflect—similarly to taxation rates—government's policy preferences, or have been implemented by private companies, not the state (Hillel Soifer 2012, p. 593).

Following Hillel Soifer (2013), using data from the United Nations database on national censuses, we measure the infrastructural power of the state to penetrate its territory by observing whether

sub-components (with the one exception of the non-electoral component; Coppedge et al. 2016, p. 49).

[10]Concretely, they ask residents questions about their experiences with the state. For instance, how long it takes the police to arrive at their home if called to respond to a burglary.

[11]See for example Bahamonde (2017) where he uses an earthquake approach to capture levels of state capacity overtime in Chile.

the state is able to conduct regular censuses.[12] The major advantage of that measure relies in the fact that census implementation is free of subjectivity in coding decisions, and does not respond to "policy preferences." We construct a continuous indicator that counts the cumulative number of censuses in every country in our sample that we were able to conduct, beginning in 1946. We opted for a cumulative measure instead of a level measure—such as the presence or absence of a census in a country in the past 10 years—because it is likely to reflect better the long-term historical development of state institutions and their ability to implement decisions throughout national territory.

We believe the cumulative measure we use in this paper proxies both the "redistributive potential" through taxation and transfers, and the state's "watchman capacities," such as functioning bureaucracies and legal institutions. The cumulative census indicator captures the ability of the central state to gather information about its subjects, which is crucial for collecting taxes, while its continuous implementation needs functioning central (and often, local) bureaucracies and effective law enforcement institutions.

For example, our cumulative measurement captures the learning effects associated with state consolidation. Particularly, performing continuous censuses overtime will have year-by-year decreasing marginal costs. Pierson (2000, p. 254) explains that "New social initiatives—such as the creation of organizations or institutions—usually entail considerable start-up costs [and] learn by doing." In contrast to "strong" states, "weak" states will not be able to bear these costs overtime. The ideal "strong state" will be able to use the accumulated stock of knowledge, being capable of fielding technologies like census-taking bureaucracies not only once, but multiple times, reproducing the infrastructural power of the state throughout the territory and overtime. By contrast, the contemporaneous (e.g., level) census measures of state capacity, such as the one employed in Hillel Soifer (2013) and Hanson (2015), should be less efficient for capturing the long-term development of state's infrastructural power.

In our empirical analysis, we complement and check the robustness of our cumulative census measure with several other proxies for state development. Our results are robust to the State Antiquity Index proposed by Bockstette (2002) and updated by Hanson (2015), and other, less ideal, measurements based on fiscal capacity.[13]

[12] See this link.

[13] The Index measures the roots of the state in its territory using three components: (1) the amount time from year 0 (C.E.) to 1950 that a government existed above the tribal level, (2) whether that government was foreign-based or

Control Variables We add a series of control variables to our main analysis to account for alternative factors outlined in the previous literature that might be associated with inequality changes. We add GDP per capita to control for level of economic development, and a first differenced GDP variable to account for growth dynamics. We include trade openness as an indicator of economic openness, measured as imports and exports as a percent of GDP (Reuveny and Li 2003). We also control for inflation, measured by the Consumer Price Index. Finally, we include two demographic controls: the share of population above the age of 65, and the share of urban population. Our control variables come from the World Development Indicators (WDI, The World Bank (n.d.)). In the Mechanisms section, we discuss more details about our control variables regarding investor confidence, FDI, and financial development.

V. RESEARCH DESIGN AND RESULTS

Estimation Procedures used to test our hypothesis, were a series of error correction models (ECM) with country and year fixed effects. The ECMs, which are especially suitable for dealing with issues of non-stationarity, serial correlation, and unobserved country-level heterogeneity, could be used for both integrated and non-integrated time-series data (Box-Steffensmeier et al. 2014, pp. 169–170). However, we maintain that our data exhibits important signs of non-stationarity. Given that we have panels (i.e. countries), standard unit root tests are not advisable. Thus, we implemented the Fisher-type test developed in (Choi 2001).[14] We find evidence that generally points to non-stationarity in both the dependent and independent variables. Test results are available upon request.

The ECM allows to estimate the effects of independent variables in both accumulated levels and year-to-year changes, which are both relevant for a slow-moving variable such as income inequality. By differencing both the dependent variable and the independent variables, ECMs provide a flexible way for dealing with non-stationary in the data. In the case of ECMs, the first difference of the dependent variable is regressed on the lagged-dependent variable in levels, plus the lagged levels and first differences of every independent variable (Franzese 2002; Blaydes and Kayser 2011). We add only the lagged level of our state capacity variable since this variable is highly time-invariant. Our

locally based, and (3) the extent of the modern-day territory that was ruled by that government.

[14] The null hypothesis is that all panels have a unit root. The routine used was `xtunitroot fisher`, which was implemented in `Stata` 15.

main theoretical interest is the interaction term between the lagged values of democracy and the lagged values of cumulative state capacity (both in levels), although we also add differences of all independent variables to variables in our models. More formally, our main covariate of interest is ρ:

$$\begin{aligned}
\Delta\text{Inequality}_{i,t} = \alpha_0 + \\
& \alpha_1 \text{Inequality}_{i,t-1} + \\
& \rho(\text{Democracy}_{i,t-1} \times \text{State Capacity}_{i,t-1}) + \\
& \beta_1(\Delta\text{Democracy}_{i,t} \times \text{State Capacity}_{i,t-1}) + \\
& \beta_n \text{Control Variables}_n + \\
& \gamma_i + \lambda_t + \mu_{i,t}
\end{aligned} \tag{1}$$

where γ_i and λ_t are the country and year fixed effects, respectively, $\mu_{i,t}$ the estimated residuals, and *Control Variables* a matrix of length $n_{i,t}$ relevant control variables.

Equation 1 β_2 captures the immediate effects, estimated by the yearly change in the dependent variable produced in the short-term shock to the explanatory variable. This effect occurs wholly at one point of time. The coefficients ρ and α_1 are used to account for long-term effects, also called the error correction component of the model (Morgan and Kelly 2013, p. 678). The long-term effect is the portion that connects `X` and `Y`, which does not occur at one particular point in time, but is distributed temporally (Morgan and Kelly 2013, p. 678). The magnitude of this effect is determined by $\frac{\rho}{\alpha_1}$ (De Boef and Keele 2008, p. 191). Given that the effects of political variables, such as regime type and state capacity are likely to be distributed over many years, the ECMs are especially useful strategies for testing our hypothesis.

The inclusion of a lagged-dependent variable, in turn, controls for autocorrelation. To account for "country-specific omitted factors that are either relatively stable over time or evolve smoothly over time" (Herzer and Vollmer 2012, p. 492), we also include country fixed effects. We used fixed effects because we are particularly interested in changes within individual countries over time. By contrast, the cross-national differences in inequality do not change much over time, as inequality is a slow-moving variable (and hence, the small coefficients in the regression output tables). At the same time, we admit that including country fixed effects comes with the cost of controlling for all cross-country variation and solely relying on estimates from within-country dynamics.

Results We start the presentation of our results with a model without the interaction term (without ρ in Equation 1). Our results directly replicate previous studies about inequality (Gradstein and Milanovic 2004; Timmons 2010; Wong 2016). Model 0 shows null results between democracy (measured both in levels and yearly changes) and inequality, while controlling for covariates typically used in the literature. This is considering country and year fixed effects.

Equation 1 (the benchmark model, including ρ) is presented in the second column of Table 1, along with other five other specifications. Our main theoretical interest is the interaction term between the lagged values of polity, and the lagged values of cumulative state capacity. The results directly support our counterintuitive theoretical contentions: inequality increases when state capacity and democracy are high. Acknowledging that neither constitutive terms nor interaction terms are directly interpretable (Brambor, Clark, and Golder 2006), we still note that the interaction term is positive and significant ($\alpha < 0.05$).

We follow the advice of Berry, Golder, and Milton (2012) and estimate *both* the conditional effect of democracy at different levels of state capacity, *and* the conditional effect of state capacity at different levels of democracy, including 95% confidence intervals (Figure 1).[15] The left panel of Figure 1 shows that the average levels of democracy have a positive effect on income inequality when state capacity is high, while it has a negative effect Gini in lower values of cumulative census variable. The right panel also supports our hypothesis. Average levels of state capacity have a positive effect on income inequality contingent on high values of democracy, which directly aligns with our hypothesis.

Following De Boef and Keele (2008, p. 191), we compute the long-run effect, which is the product of the long-run multiplier (LRM) and the short-run effects (Blaydes and Kayser 2011, p. 898). The short-run effect is also called the error correction rate (ECR) De Boef and Keele (2008, p. 191). More specifically, the LRM "is the cumulative effect of a covariate on the outcome" that spreads over future time periods (Keele, Linn, and Webb 2016, p. 292). In turn, the ECR is the "speed of adjustment" (Keele, Linn, and Webb 2016, p. 295). In our case, the LRM is $\frac{\rho}{\alpha_1} = \frac{0.00007}{-0.02055} = -0.0034$, while the ECR is $\rho = -0.02055$. Consequently, the long-run effect is $\text{LRM} \times \text{ECR} = 0.00007$. Substantively that means that if state capacity and democracy levels jointly increase,

[15] Figure made using **R** package `DAMisc` (Armstrong 2016).

	(0)	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Polity}_{t-1} \times \text{Census}_{t-1}$		0.00007^{***}		0.00007^{***}		0.00008^{***}	
		(0.00001)		(0.00001)		(0.00001)	
$\text{Census}_{t-1} \times \text{Polity}_{\Delta}$		0.00006^{**}		0.00005		0.00005	
		(0.00003)		(0.00003)		(0.00003)	
$\text{Polyarchy}_{t-1} \times \text{Census}_{t-1}$			0.00164^{***}		0.00187^{***}		0.00202^{***}
			(0.00029)		(0.00037)		(0.00032)
$\text{Census}_{t-1} \times \text{Polyarchy}_{\Delta}$			0.00159		0.00115		0.00137
			(0.00102)		(0.00114)		(0.00109)
Polity_{t-1}	-0.00001	-0.00028^{***}		-0.00029^{***}		-0.00032^{***}	
	(0.00003)	(0.00005)		(0.00006)		(0.00006)	
Polity_{Δ}	-0.00007	-0.00028^{**}		-0.00027^{**}		-0.00027^{**}	
	(0.00005)	(0.00012)		(0.00014)		(0.00013)	
Polyarchy_{t-1}			-0.00666^{***}		-0.00786^{***}		-0.00824^{***}
			(0.00146)		(0.00187)		(0.00158)
$\text{Polyarchy}_{\Delta}$			-0.00713		-0.00539		-0.00639
			(0.00461)		(0.00509)		(0.00491)
Cesus_{t-1}	0.00033^{*}	-0.00028	-0.00092^{***}	-0.00019	-0.00092^{***}	-0.00023	-0.00106^{***}
	(0.00017)	(0.00020)	(0.00028)	(0.00024)	(0.00032)	(0.00022)	(0.00029)
GDP_{t-1}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
GDP_{Δ}	-0.00000^{*}	-0.00000^{*}	-0.00000	-0.00000^{*}	-0.00000^{*}	-0.00000	-0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Inflation_{t-1}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}	0.00000^{***}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
$\text{Inflation}_{\Delta}$	0.00000^{**}	0.00000^{**}	0.00000^{**}	0.00000^{**}	0.00000^{**}	0.00000^{**}	0.00000^{**}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
FDI_{t-1}	-0.00000	-0.00000	0.00001	-0.00001	-0.00001	-0.00001	0.00000
	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)
FDI_{Δ}	-0.00000	0.00000	0.00000	-0.00001	-0.00001	-0.00000	0.00000
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Trade_{t-1}	0.00001^{*}	0.00001	0.00001^{*}	-0.00000	0.00000	0.00000	0.00000
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Trade_{Δ}	0.00000	0.00000	0.00000	-0.00000	-0.00000	-0.00000	-0.00000
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Agriculture_{t-1}	-0.00013^{***}	-0.00013^{***}	-0.00014^{***}	-0.00013^{***}	-0.00014^{***}	-0.00013^{***}	-0.00014^{***}
	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)
$\text{Agriculture}_{\Delta}$	-0.00014^{***}	-0.00014^{***}	-0.00014^{***}	-0.00015^{***}	-0.00014^{***}	-0.00014^{***}	-0.00014^{***}
	(0.00004)	(0.00004)	(0.00003)	(0.00004)	(0.00004)	(0.00004)	(0.00004)
Pop. Age_{t-1}	0.00006	0.00008^{*}	0.00005	0.00003	0.00001	0.00009^{**}	0.00005
	(0.00004)	(0.00004)	(0.00004)	(0.00005)	(0.00005)	(0.00005)	(0.00005)
Pop. Age_{Δ}	0.00048	0.00062^{*}	0.00063^{*}	0.00082^{*}	0.00077^{*}	0.00109^{***}	0.00104^{***}
	(0.00037)	(0.00036)	(0.00035)	(0.00042)	(0.00041)	(0.00039)	(0.00038)
Urban Pop._{t-1}	0.00003	0.00004	0.00004	0.00007^{**}	0.00006^{*}	0.00006^{*}	0.00006^{*}
	(0.00003)	(0.00003)	(0.00003)	(0.00003)	(0.00003)	(0.00003)	(0.00003)
Urban Pop._{Δ}	0.00073^{**}	0.00078^{**}	0.00077^{**}	0.00109^{***}	0.00104^{***}	0.00094^{***}	0.00090^{***}
	(0.00033)	(0.00033)	(0.00032)	(0.00038)	(0.00038)	(0.00035)	(0.00035)
Lagged Dependent Variable							
Gini_{t-1}	-0.01765^{***}	-0.02055^{***}	-0.02057^{***}	-0.02234^{***}	-0.02184^{***}	-0.02022^{***}	-0.02051^{***}
	(0.00340)	(0.00341)	(0.00335)	(0.00385)	(0.00377)	(0.00361)	(0.00354)
R^2	0.31698	0.32583	0.32826	0.34821	0.35098	0.33371	0.33747
Adj. R^2	0.27085	0.27976	0.28183	0.29814	0.30061	0.28556	0.28911
Num. obs.	2846	2846	2940	2244	2320	2553	2647
RMSE	0.00363	0.00361	0.00358	0.00380	0.00376	0.00368	0.00364

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Year and country fixed effects in all models (not shown). Intercept was excluded from the table. All models are OLS.

Table 1: *Error Correction Models: Long-term Effects of State Capacity and Regime Type on Economic Inequality.*

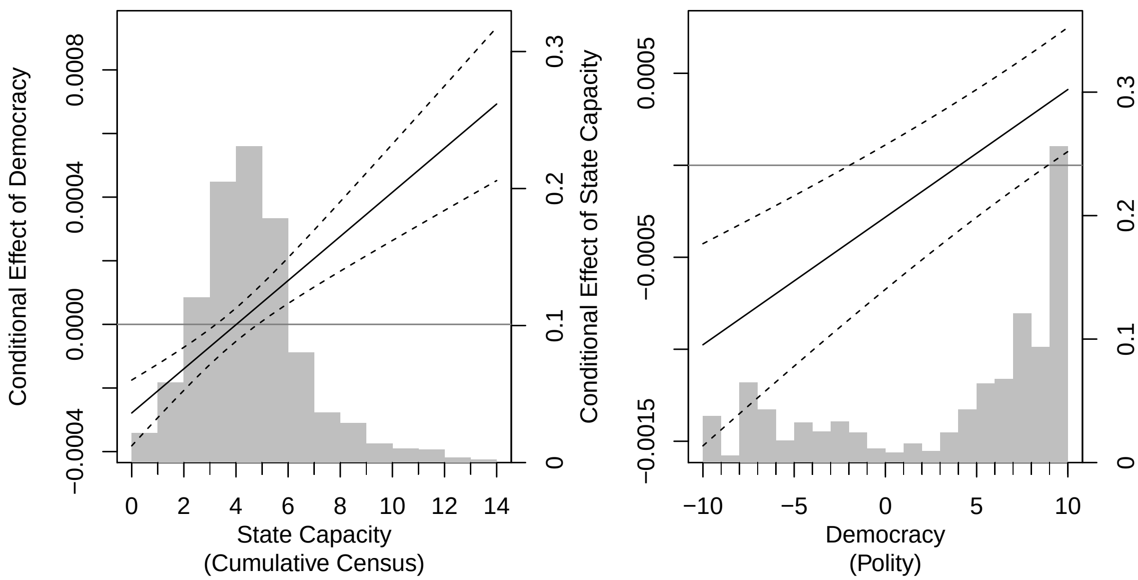

Figure 1: Conditional Effect of State Capacity and Democracy on Inequality.
Note: *Following the advice of Brambor, Clark, and Golder (2006) and Berry, Golder, and Milton (2012), the estimations of model 1 in Table 1 were used to compute the conditional effects of the constitutive variables of the interaction term. The figure shows that as state capacity increases, the conditional effect of democracy on inequality is positive and significant (left panel). The figure also shows that, as countries become more democratic, the conditional effect of state capacity on inequality is positive and significant too (right panel).*

inequality increases in the long run at a rate dictated by this long-run effect, dissipating after a number of periods. Using the already mentioned LRM along with the ECR, we observe that Gini points increase immediately in $t+1 = 0.00007$, continue increasing 0.00003 the next period, when both democracy and state capacity increase one unit each.

To put these results in context, a country with the highest levels of democracy and state capacity, like Ireland from 2013 to 2015, is expected to *increase* its annual inequality levels by an order of 0.0007 immediately (short-time effect).[16] This is a small, but still a substantively significant effect, given the slow-moving nature of income inequality. The estimated cross-country long-term effects

[16] These quantities of interests were obtained by computing, as per Equation 1, $\beta_2 + (\rho \times \text{State Capacity}_{i,t-1}) = \frac{\partial \Delta \text{Gini}_{it}}{\partial \text{Polity}_{i,t-1}}$. See Brambor, Clark, and Golder 2006, p. 73, equation 13.

are shown in Figure 2.

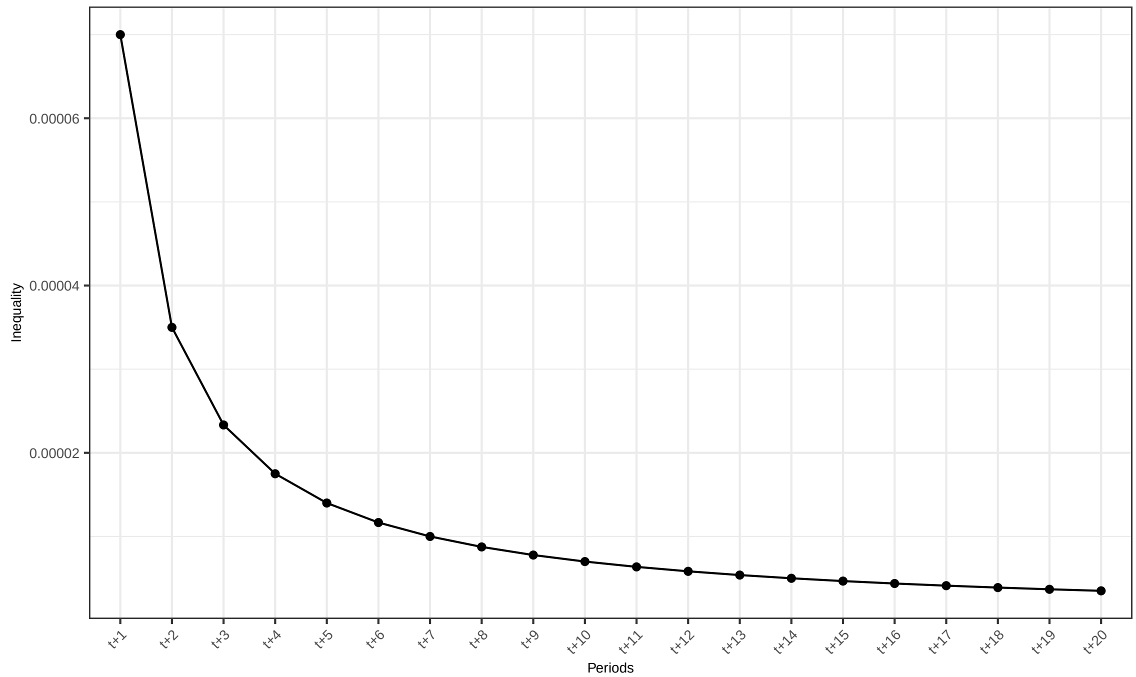

Figure 2: Overtime Effect of Increases in State Capacity and Democracy on Inequality (Gini Points).
Note: *The figure shows that the long-run effect of higher state capacity and democracy levels, increases inequality overtime, dissipating at a rate dictated by the error correction rate* $\beta_1 = -0.02055$. *Note that given the long run multiplier, defined by* $\frac{\rho}{\beta_1} = \frac{0.00007}{-0.02055}$, *inequality increases during the first periods, reequilibrating over future time periods.*

Model 2 produces identical results to Model 1 using the V-Dem Polyarchy democracy measure. The interaction plots also suggest a significant interaction between polyarchy and cumulative census variable (not shown).[17] In Model 3, we replicate our main results, however, excluding industrial countries from the sample, using the polity variable as our democracy measure. Therefore, we have certainty that our results are not driven by an increasing inequality trend in the industrial world since the 1970s, but can be generalized more widely to other regions (Piketty 2014; Atkinson 2015). Identical results were produced using V-Dem Polyarchy (Model 4).

Further models include a series of robustness tests. Fist possible concern raises with the particular choice of measurement of state capacity, captured via cumulative census variable. Most nations

[17] Plots available upon request.

celebrate censuses in 10-year cycles. However, a small number of both developed and developing world nations have celebrated censuses in 5-year cycles.[18] Reasons behind these dynamics vary, and are only partially associated with state ability to implement censuses. For example, Brazil and México started to celebratea 5-year census cycle due to a significant need to better understand the dynamics around poverty and inequality in the 1990s (Ferreira 2000). At the same time, major industrial nations—such as the US and the UK—have not diverged from the 10-year census cycle. To avoid potential bias stemming from some unobserved factors related to the different cycle lengths, we excluded countries with 5-year cycles from our analysis in Models 5 and 6, testing each model with the two different democracy measures. The results are identical to the full sample.

In Models 7-9, we control for different government spending items to account for the idea that government spending may possibly offset inequality increases posited by our theoretical framework. Given that the redistributive effects of democracy have widely been portrayed to work through education, and health care spending, as well as welfare transfers, we would expect that adding these controls reduces the statistical and substantive importance of the democracy variable to the models (Huber and Stephens 2012; Morgan and Kelly 2013). In Model 7, we add government education spending as a percentage of GDP on the right side of the equation. It has been widely posited that democracy might lead to lower inequality through investment in human capital, especially in education (Huber and Stephens 2012; Morgan and Kelly 2013). In Model 8, government health spending is included, while Model 9 controls for Income Tax revenue as a percentage of GDP—a measure of the size of progressive taxation. We replicate our significant results after adding these control variables. Data for all of these control variables comes from WDI.

Other models introduce further robustness checks. In Model 10, we control for democracy's duration to control for possible long-lasting effects of democratic regimes leading to higher levels of inequality, as suggested by Wong (2016). Our results are also robust to various other measurements of state capacity and infrastructural power. In Model 11, we replicate our results using State Antiquity Index developed by Bockstette (2002) as conditioning variable. Model 12 tests the robustness of the results with another, albeit imperfect, proxy invoked to measure state capacity in the previous literature—income tax as a percentage of GDP. Our results remain unaltered.

[18] Among the countries that have data on inequality, these countries are Australia, Canada, Denmark, Germany, Ireland, Japan and New Zealand in the industrial world, and Brazil, México, South Korea and Turkey among developing nations.

Mechanisms In this section we empirically test the causal mechanisms portrayed by our theory. We have posited that democratic high infrastructural power contexts increase inequality through high-quality investment climate, FDI inflows and financial development. First, we expect to see a positive interaction effect of democratic rule and state capacity on three outcomes: investment climate, FDI inflows and the size of the financial sector. Lastly, we also test if our three mechanism variables are statistically associated with inequality increases in the post-1970 period.

We proxy investment climate quality with a widely used indicator in previous literature: credit ratings published by the institutional investor (II) magazine (**Arias:2018aa**; **DiGiuseppe:2012aa**). This indicator is based on semiannual credit surveys, which collect expert opinions to rank country creditworthiness, ranging on a scale from 0 to 100. Higher values represent more credit-worthy states. We use the yearly average, which spans 1980 to 2013 and covers up to 110 developing countries. The major advantage of this indicator compared to main alternatives, such as Heritage Foundation or Fraser Foundation economic freedom indexes, relies on the fact that it is available for longer time-frames, a similar period to our main analysis, allowing comparability of the results. FDI is measured by annual FDI inflows to a country, as a percentage of GDP. The data are retrieved from WDI. We measure financial development with an indicator commonly used in studies of financial development—Private Credit by Deposit Money Banks and Other Financial Institutions to GDP. This measure captures the ratio of claims on the private sector by deposit money banks and other financial institutions to GDP (**Beck:2010aa**).

We test these relationships using similar ECMs as in the main analysis. For the analysis of investment climate, FDI inflows and financial sector size, we add a series of control variables portrayed as determinants of business confidence, FDI inflows, and a financial depth model in addition to democracy and state capacity, such as GDP per capita, GDP annual change, trade openness and inflation.

First, we find—rather intuitively—considerable evidence that democratic high state capacity context provides an environment that favors positive investment climate, FDI inflows and financial sophistication. Models 14-16 use nstitutional investor credit ratings, FDI, and financial development as dependent variables, respectively. In Model 14, we estimate the interaction effect of polity and cumulative census on institutional investor credit ratings. The sign of the interaction term is positive, while it slightly misses significance at conventional levels. In Model 16, we document a positive and significant interaction effect of polity and cumulative state capacity variable on private credit to

	(7)	(8)	(9)	(10)	(11)	(12)	(13)
$\text{Polity}_{t-1} \times \text{Census}_{t-1}$	0.00008^{***}	0.00005^{*}	$0.00003^{\cdot}$	0.00007^{***}			
	(0.00002)	(0.00002)	(0.00002)	(0.00001)			
$\text{Census}_{t-1} \times \text{Polity}_{\Delta}$	0.00004	0.00001	−0.00000	$0.00006^{\cdot}$			
	(0.00004)	(0.00004)	(0.00003)	(0.00003)			
$\text{Polity}_{t-1} \times \text{State History (5)}_{t-1}$					0.00039^{**}		
					(0.00013)		
$\text{State History (5)}_{t-1} \times \text{Polity}_{\Delta}$					−0.00029		
					(0.00023)		
$\text{Polity}_{t-1} \times \text{Income Tax}_{t-1}$						0.00001^{***}	
						(0.00000)	
$\text{Income Tax}_{t-1} \times \text{Polity}_{\Delta}$						0.00001	
						(0.00000)	
$\text{Polity}_{t-1} \times \text{Tax Revenue}_{t-1}$							-0.00001^{*}
							(0.00000)
$\text{Tax Revenue}_{t-1} \times \text{Polity}_{\Delta}$							0.00000
							(0.00001)
State History (5)					−0.00705		
					(0.00601)		
Tax Revenue_{t-1}							0.00004^{*}
							(0.00002)
Census_{t-1}	-0.00060^{*}	−0.00034	−0.00024	−0.00040			
	(0.00029)	(0.00029)	(0.00024)	(0.00025)			
Polity_{t-1}	-0.00032^{***}	−0.00013	$-0.00014^{\cdot}$	-0.00033^{***}	-0.00012^{*}	-0.00024^{***}	0.00006
	(0.00008)	(0.00011)	(0.00007)	(0.00006)	(0.00006)	(0.00006)	(0.00005)
Polity_{Δ}	−0.00026	−0.00014	−0.00007	-0.00031^{*}	0.00010	$-0.00022^{\cdot}$	−0.00005
	(0.00019)	(0.00019)	(0.00015)	(0.00014)	(0.00011)	(0.00012)	(0.00016)
GDP_{t-1}	0.00000^{***}	0.00000	0.00000	0.00000^{***}	0.00000^{***}	0.00000	0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
GDP_{Δ}	−0.00000	−0.00000	$-0.00000^{\cdot}$	0.00000	$-0.00000^{\cdot}$	-0.00000^{*}	-0.00000^{**}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Inflation_{t-1}	$0.00000^{\cdot}$	−0.00000	0.00000	0.00000^{***}	0.00000	0.00000	0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
$\text{Inflation}_{\Delta}$	0.00001	−0.00000	0.00000	0.00000^{*}	0.00000	0.00000	0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
FDI_{t-1}	−0.00002	0.00001	0.00001	0.00001	0.00005^{*}	0.00001	0.00001
	(0.00002)	(0.00002)	(0.00002)	(0.00003)	(0.00002)	(0.00002)	(0.00002)
FDI_{Δ}	$-0.00004^{\cdot}$	0.00000	0.00000	−0.00000	0.00003^{*}	0.00001	0.00001
	(0.00002)	(0.00001)	(0.00001)	(0.00003)	(0.00001)	(0.00001)	(0.00001)
Trade_{t-1}	$0.00001^{\cdot}$	0.00000	$0.00001^{\cdot}$	0.00000	−0.00001	0.00001^{*}	0.00000
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Trade_{Δ}	0.00000	−0.00001	−0.00000	−0.00000	−0.00001	0.00000	−0.00000
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Agriculture_{t-1}	-0.00015^{***}	0.00000	0.00000	-0.00017^{***}	-0.00013^{***}	−0.00001	
	(0.00004)	(0.00003)	(0.00003)	(0.00003)	(0.00003)	(0.00003)	
$\text{Agriculture}_{\Delta}$	-0.00018^{**}	$-0.00008^{\cdot}$	-0.00011^{*}	-0.00013^{***}	-0.00015^{**}	-0.00012^{*}	
	(0.00006)	(0.00005)	(0.00005)	(0.00004)	(0.00005)	(0.00005)	
Pop. Age_{t-1}	0.00015^{*}	0.00032^{***}	0.00022^{***}	0.00001	0.00005	0.00024^{***}	0.00021^{***}
	(0.00006)	(0.00007)	(0.00006)	(0.00005)	(0.00005)	(0.00005)	(0.00005)
Pop. Age_{Δ}	0.00112^{*}	0.00135^{**}	0.00025	0.00035	0.00066	0.00040	$0.00064^{\cdot}$
	(0.00049)	(0.00046)	(0.00039)	(0.00047)	(0.00049)	(0.00038)	(0.00035)
$\text{Govt. Expenditure}_{t-1}$	-0.00049^{**}						
	(0.00015)						
$\text{Govt. Expenditure}_{\Delta}$	-0.00051^{*}						
	(0.00021)						
Urban Pop_{t-1}	−0.00002	-0.00011^{*}	0.00004	0.00013^{**}	−0.00001	0.00001	0.00000
	(0.00004)	(0.00005)	(0.00003)	(0.00004)	(0.00003)	(0.00004)	(0.00003)
$\text{Urban Pop}_{\Delta}$	0.00018	0.00216^{***}		0.00110^{**}	0.00092^{*}	0.00035	0.00040
	(0.00055)	(0.00059)		(0.00036)	(0.00037)	(0.00040)	(0.00035)
$\text{Health Expenditure}_{t-1}$		0.00074^{***}					
		(0.00011)					
$\text{Health Expenditure}_{\Delta}$		0.00021					
		(0.00016)					
Income Tax_{t-1}			-0.00004^{**}			-0.00007^{***}	
			(0.00001)			(0.00001)	
$\text{Income Tax}_{\Delta}$			$-0.00003^{\cdot}$				
			(0.00002)				
$\text{Democracy Duration}_{t-1}$				-0.00001^{*}			
				(0.00001)			
$\text{Democracy Duration}_{\Delta}$				−0.00001			
				(0.00001)			
Lagged Dependent Variable							
Gini_{t-1}	-0.02685^{***}	-0.03887^{***}	-0.03775^{***}	-0.01997^{***}	-0.01619^{***}	-0.03799^{***}	-0.03330^{***}
	(0.00527)	(0.00544)	(0.00515)	(0.00446)	(0.00376)	(0.00514)	(0.00427)
R^2	0.39665	0.40920	0.38019	0.35539	0.28769	0.37547	0.33683
Adj. R^2	0.31570	0.35496	0.32062	0.29911	0.23765	0.31722	0.28480
Num. obs.	1455	1880	1894	2143	2210	1935	2255
RMSE	0.00323	0.00340	0.00301	0.00364	0.00368	0.00305	0.00310

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{cdot}p < 0.1$. Year and country fixed effects in all models. Intercepted was excluded from the table. All models OLS.

Table 2: *Error Correction Models (Robustness Checks): Long-term Effects of State Capacity and Regime Type on Economic Inequality.*

GDP. Although democracy and state capacity interaction effect are insignificant when explaining FDI inflows (Model 15), we find that the interaction of these variables might affect FDI through better investment climate. In Model 17, we document a positive and significant effect of institutional investor credit ratings on FDI. Similarly, investor confidence is highly significant predictor of finance sector size (Model 18).

Second, we also find evidence that better investment climate, FDI inflows and financial depth work as a mechanism between inequality increases in high-capacity democracies. Models 19-21 first used a differenced Gini coefficient as a dependent variable, and institutional investor credit ratings, FDI inflows, and financial development as dependent variables, respectively. The control variables are from our baseline model (Model 1). In Model 19, we document a positive relationship between institutional investor credit ratings, and change in income inequality, although this relationship is not robust to country fixed effects. The FDI remains insignificant, but positive, in Model 20, however. In Model 21 we document a positive and statistically significant effect of financial development variable on Gini coefficient. These effects are also substantively important. One unit increase of private credit as GDP, results in 0.00001 change in Gini points. These results point to a direction that the interactive effect of democratic rule and infrastructural power posited by our theory and tested in our main analysis might operate through investor confidence and financial development.

VI. CONCLUSION

In this paper we have explored whether the effect of democratic rule on income inequality could be conditional on state capacity. Counterintuitively, we argue that democratic rule combined with high state infrastructural power is associated with increasing income inequality, through the positive effect on investor confidence, which tends to produce larger financial sectors and attract larger FDI inflows in the post-1970 period. Both of these factors favor income concentration to the top. To test our hypothesis, we introduced a novel measure of state capacity based on cumulative census administration. Our empirical results are robust to various alternative measures of state infrastructural power and democracy, and apply beyond the context of industrial world, a high-capacity democratic context where inequality has increased sharply in recent decades. In addition, we also test the mechanisms of our theory, finding broadly consistent support of our claim that the interactive effect of democratic rule and infrastructural power posited in our main analysis might

	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
$\text{Polity}_{t-1} \times \text{Census}_{t-1}$	0.01516	−0.01032	0.03712^{**}					
	(0.00999)	(0.01073)	(0.01135)					
$\text{Census}_{t-1} \times \text{Polity}_{\Delta}$	0.03391	0.01624	0.04814					
	(0.02198)	(0.03012)	(0.03162)					
Institutional Investor Credit Ratings_{Δ}				0.08038^{*}	0.43325^{***}	0.00004		
				(0.03384)	(0.04541)	(0.00004)		
Institutional Investor Credit Ratings_{t-1}	-0.09127^{***}			$0.02386^{\cdot}$	0.15427^{***}	0.00002^{*}		
	(0.00817)			(0.01267)	(0.01743)	(0.00001)		
Private Credit_{t-1}			-0.06598^{***}		-0.06779^{***}			0.00001^{*}
			(0.00561)		(0.00849)			(0.00001)
Polity_{t-1}	−0.04264	0.07475	-0.16560^{***}					
	(0.04443)	(0.04665)	(0.04855)					
Polity_{Δ}	-0.21145^{*}	−0.02581	−0.18367					
	(0.09594)	(0.12234)	(0.12464)					
Census_{t-1}	0.05230	−0.22547	0.24740					
	(0.16391)	(0.19761)	(0.20631)					
FDI_{Δ}			0.03889^{*}				0.00000	0.00000
			(0.01573)				(0.00001)	(0.00001)
Private Credit_{Δ}								0.00003^{*}
								(0.00001)
GPD_{t-1}	0.00000	0.00011^{***}	0.00014^{***}	0.00018^{***}	0.00024^{***}	-0.00000^{*}	0.00000^{***}	0.00000^{***}
	(0.00002)	(0.00003)	(0.00003)	(0.00003)	(0.00004)	(0.00000)	(0.00000)	(0.00000)
GPD_{Δ}	0.00012	0.00073^{***}	-0.00076^{***}	0.00051^{**}	-0.00097^{***}	−0.00000	−0.00000	−0.00000
	(0.00011)	(0.00015)	(0.00015)	(0.00017)	(0.00021)	(0.00000)	(0.00000)	(0.00000)
Inflation_{t-1}	-0.00043^{**}	−0.00020	−0.00031	−0.00022	0.00019	$0.00000^{\cdot}$	0.00000^{***}	0.00000^{***}
	(0.00014)	(0.00030)	(0.00028)	(0.00024)	(0.00028)	(0.00000)	(0.00000)	(0.00000)
$\text{Inflation}_{\Delta}$	−0.00018	−0.00010	−0.00011	−0.00008	−0.00004	0.00000	0.00000^{*}	0.00000^{*}
	(0.00012)	(0.00026)	(0.00024)	(0.00020)	(0.00024)	(0.00000)	(0.00000)	(0.00000)
Trade_{t-1}	−0.00046	0.03309^{***}	−0.00858	0.01989^{**}	-0.01751^{*}	−0.00000	$0.00001^{\cdot}$	0.00001
	(0.00405)	(0.00545)	(0.00588)	(0.00614)	(0.00880)	(0.00000)	(0.00000)	(0.00001)
Trade_{Δ}	−0.00291	0.04149^{***}	0.00327	$0.01827^{\cdot}$	−0.00999	−0.00001	0.00000	0.00000
	(0.00577)	(0.00882)	(0.00929)	(0.00950)	(0.01314)	(0.00001)	(0.00001)	(0.00001)
Agriculture_{t-1}						-0.00005^{**}	-0.00013^{***}	-0.00014^{***}
						(0.00002)	(0.00002)	(0.00002)
$\text{Agriculture}_{\Delta}$						-0.00017^{**}	-0.00013^{***}	-0.00015^{***}
						(0.00005)	(0.00003)	(0.00004)
Urban Pop._{t-1}						−0.00001	0.00002	0.00000
						(0.00001)	(0.00003)	(0.00003)
Urban Pop._{Δ}						0.00078^{*}	$0.00056^{\cdot}$	0.00056
						(0.00031)	(0.00032)	(0.00034)
Pop. Age_{t-1}							0.00005	0.00005
							(0.00004)	(0.00005)
Pop. Age_{Δ}							0.00053	0.00049
							(0.00035)	(0.00039)
Lagged Dependent Variable								
FDI_{t-1}(only M15 y M17; covariate in M16)		-0.82270^{***}	0.07888^{***}	-0.54824^{***}			0.00001	0.00001
		(0.01528)	(0.02180)	(0.02234)			(0.00001)	(0.00001)
Gini_{t-1}						-0.00607^{***}	-0.01814^{***}	-0.01817^{***}
						(0.00152)	(0.00328)	(0.00367)
R^2	0.33895	0.41347	0.14077	0.26263	0.23457	0.07523	0.32120	0.31644
Adj. R^2	0.29036	0.38778	0.09784	0.21824	0.17618	0.05359	0.27541	0.26673
Num. obs.	2221	4457	3699	2220	2075	1663	2992	2597
RMSE	2.37832	5.40579	4.98555	4.05510	4.74794	0.00421	0.00359	0.00368

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{cdot}p < 0.1$. Year and country FE in all models. Intercept excluded. All models OLS.

Table 3: *Error Correction Models: Long-term Effects of Business Confidence on Economic Inequality.*

operate through high-quality investment climate, financial development and FDI.

We believe our conclusion speaks directly to recent literature on increasing inequality in the developed and many regions of the developing world, reflecting the natural tendency of well-functioning capitalism to produce higher income concentration (Piketty 2014). Institutionalist literature has implicitly assumed that "inclusive institutions" do not only promote development, but also more equal income distribution, at least in the long-term (Acemoglu, Johnson, and Robinson 2001). In this paper, we have provided evidence that this conclusion may not be warranted, and "inclusive" institutions-captured in the combination of democratic regime type and high-capacity state institutions-might well lead to a trend of steady increases in income inequality, which we argue happens through higher business confidence, financial development, and FDI inflows. These variables, generally associated with both democratic and well-functioning state institutions (**Jensen:2008aa**; Li and Resnick 2003), and high economic growth could well bring higher inequality as a side-effect. Further research should clarify the additional pathways through which the high-capacity state institutions and democratic regime type affect inequality.

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Recreating Market Conditions for Vote-Selling and Vote-Buying in the Lab: The Chilean Case

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Abstract

The literature asserts that Chilean parties no longer buy votes. While those are good news, the bad news are that we are rather ignorants 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.

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Keywords— clientelism; vote-buying; vote-selling; experimental economics; formal modeling.

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I. Introduction

Scholars mostly agree on the positive correlation between poverty and clientelism (Calvo and Murillo 2004; Weitz-Shapiro 2012; Kitschelt 2000; Kitschelt and Altamirano 2015).[1] 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 (Brusco, Nazareno, and Stokes (2004) and Stokes et al. (2013)). Indeed, Weitz-Shapiro (2014, p. 12) explained that "[a]lmost universally, scholars of clientelism treat and analyze [this] practice as an exchange between politicians and their poor clients."

This agreement has recently been challenged (Hicken 2007, p. 55). González-Ocantos et al. (2012) and Holland and Palmer-Rubin (2015) found that income had little or no effect on vote-buying. For instance, Szwarcberg (2013, p. 32) "challenges the assumption [that brokers] with access to material benefits will always distribute goods to low-income voters in exchange for electoral support." In fact, Bahamonde (2018) explains that non-poor individuals can be targeted when they are sufficiently noticeable, increasing compliance. He explains that wealthy houses in very poor neighborhoods in Brazil can be targeted too.

While there are important agreements, the literature has failed to provide a convincing answer to the following question: *Who do parties target? Swing or core voters? Why?* These questions have historically haunted the literature. In fact, Carlin and Moseley (2015, p. 14) states that "our knowledge of who parties target remains incomplete." On the one hand, Cox and Mccubbins (1986) explain that since constituencies are well-known, they allocate resources to core voters. On the other hand, Stokes (2005) argues that since allocating resources to individuals who *ex-ante*vote for the party is a waste, parties target swing voters (similarly, see Zarazaga (2016) and Gallego (2014)). Yet, Zarazaga (2016, p7) asserts that both "[q]ualitative and quantitative evidence mainly shows that party machines reward their own supporters," not swing voters.

Instead, the clientelism literature has seen a proliferation of tangential answers. While all of them are contributions, they do not really tackle the afore mentioned question. Dixit and Londregan (1996) explain that parties both swing and core voters, but that depends on a number of factors. . add something

Nichter (2008) (turnout-buying) is another very important contribution. Unfortunately, it deviates from the question by increasing the complexity on the varieties of clientelism. Similarly, Zarazaga

[1] Following Nichter (2014, p. 316), clientelist vote-buying is defined as "the distribution of rewards to individuals or small groups during elections in contingent exchange for vote choices."

(2016, p. 7) introduces yet another category (conditional supporters) who "will vote for the party machine only as long as unexpected events do not persuade them to do otherwise"

The paper seeks to contribute to this issue by incorporating both structural and individual factors that foster clientelism in the same theory.

II. The Model

We consider an electorate of n voters. Voters vote for a leader to implement a common policy γ from the set $\Gamma = \{1, 2, ..., 100\}$. Each citizen i has an ideal point x_i which is an *iid* draw from an uniform distribution Γ. When policy γ is implemented, payoffs of citizen i are given by $u(D, x_i, \gamma) = D - |x_i - \gamma|$, where D represents completar acá. This payoff can be incremented by transferences from both parties to voter i.

In this election, there are two candidates. One "left-wing" party and one "right-wing" party. The left-wing (right-wing) candidate represents a policy γ_L (γ_R) which is an *iid* draw from an uniform distribution over $\{1, ..., 50\}$ ($\{51, ..., 100\}$). The location of this policy give us the number of voters n_L leaning towards the left-wing candidate, while the number of voters leaning towards the right-wing party is given by $n_L + n_R = n$. While we consider that voters are attached to an ideological continuum, we do so with the sole purpose of modeling preferences—both formally and experimentally.[2]

Moving forward, both parties negotiate with only one of these n voters. That voter is randomly selected from the total population n. Observe that the higher the n, the lower the representation in the election of this voter. That is, a larger n necessarily implies that every individual electoral choice matters less. However, if n is small, negotiating with this voter may be more attractive to political parties. This is because negotiating with a large number of voters is costly. We assume that each party has a budget (B) that they can use to buy votes. If a party decides not to negotiate with the voter (or the voter does no accept the offer), the party keeps this budget. The profits of party i is given by,

[2] Ultimately, experimental subjects are not told anything about ideology. They only observe that there are a number of "points" associated with the victory of party A or party B. In this sense, voters lean ("ideologically") towards the party that gives them more points.

$$\pi_i(W, e_i, s_i) = W \cdot e_i + (1 - s_i \cdot a_j) \cdot B$$

where W ($W \geq B$) is a constant that represents how much each party values winning the election, $e_i = 1$ if party i wins the election, 0 otherwise, s_i is the fraction of B that the party offers to voter j who can accept the offer ($a_j = 1$) or not ($a_j = 0$). We study two versions of this party-voter interaction. One is where both parties make simultaneous offers to the voter, and she decides whether to accept the offer (vote-buying case). Another one is where the voter can make private offers to both parties, and then the party decides if to pay or not for that voter's vote (vote-selling case).

The timing of the game is as follows: at the beginning of the game n voters and two political parties are randomly located on their respective ideal points: voters along Γ, the "left-wing" candidate along $\{1, ..., 50\}$, and the "right-wing" candidate on $\{51, ..., 100\}$. All locations are public information, as well as every party's budget B, the total number of voters (n) and the number of supporters of each party (n_L and n_R). What follows then, depends on the specific game. On the vote-buying case, each party simultaneously decides if making an offer to the voter. If a party decides to negotiate with the voter, privately offers him to buy his vote (i.e. accept the offer and vote for the party). Then the voter decides if to take the offer, or which one accept if he receives two offers. If he accepts an offer, he should vote for that candidate.[3] On the vote-selling case, the voter may privately propose a certain amount to each party in exchange for her vote. Then the parties decide if to pay or not the offer. The voter then decides which one to accept, if any. In this case, the voter offers to one or both parties, and each proposed amount might be different.

I. Equilibrium in Vote-Buying Case

In this case, both parties can offer certain amount in exchange for electoral support. Note that parties only have incentives to negotiate with a voter if he is the pivotal voter. That means that $|n_L - n_R| \leq 1$, and that voter i supports the ex-ante winner of the election ($i \in max\{n_L, n_R\}$). The voter prefers the party closer to her ideal point. If both parties are located at the same distance, the

[3]It is important to consider that to simplify the game (and the experiment), accepting the offer necessarily implies compliance. That is, accepting the offer means voting for the party the voter accepted the offer from. We leave for future research the case where the voter may defect.

voter is indifferent. Denote by $i^* \in \{L, R\}$ the preferred party of the voter, and $-i^*$ the other party.

Note that, naturally, both parties want to make different offers. If the voter is pivotal, the less preferred party has incentives to offer him a certain amount m_{-i^*} such that the he perceives more utility voting for that party rather than voting for the opposite party, that is:

$$
\begin{aligned}
m_{-i^*} &\geq (D - |x_{i^*} - \gamma_{i^*}|) - (D - |x_{i^*} - \gamma_{-i^*}|) \\
&= |x_{i^*} - \gamma_{-i^*}| - |x_{i^*} - \gamma_{i^*}|.
\end{aligned}
$$

Parties expect winning the election but have limited budgets. Hence, they want to win the election at a minimum cost. If party $-i^*$ offers the voter $m_{-i^*} = |x_{i^*} - \gamma_{-i^*}| - |x_{i^*} - \gamma_{i^*}|$, he will be indifferent between voting for party i^* or party $-i^*$. Both offers $m_{i^*} = 0$ and $m_{-i^*} = |x_{i^*} - \gamma_{-i^*}| - |x_{i^*} - \gamma_{i^*}|$ are the minimum amount, but enough to make the pivotal voter indifferent between both political parties. Indifference gives the party some electoral advantage of winning of the election. Voter indifference gives two possible Nash equilibria. In one equilibrium the voter rejects the offer and votes for i^*. In the other equilibrium, the voter accepts the offer and the elected party is $-i^*$. If individuals are utility maximizers, they should be indifferent between these two equilibria.

II. Equilibrium in Vote-Selling Case

In the case that the voter can set the a price of his vote, he may negotiate with one or both parties setting the price that he is willing to accept in exchanging of voting for that party. In this setting, the voter has incentives to set the highest price each party can pay. In our model this is given by B (which is public knowledge). When the voter is pivotal, he may swing towards party $-i^*$ only if the budget is big enough to compensate what he looses when voting for his less prefer policy ($B > |x_{i^*} - \gamma_{-i^*}| - |x_{i^*} - \gamma_{i^*}|$). When the voter decides to negotiate with both parties, and both accept to pay the price set by him, he chooses one offer, voting for his preferred political party i^*.

Since the parties-voter negotiation does not change the electoral outcome, vote-selling is not efficient to parties. When a party wins the election due to vote-selling, the party's payoff is $\pi_i(W, 1, 1) = W$, while the loser party obtains $\pi_i(W, 0, 0) = B$. If the pivotal voter decides to negotiate with both political forces, parties i^* and $-i^*$ have to decide if accept to pay B to the voter. This strategic situation is represented as follows,[4]

		$-i^*$ Accept	$-i^*$ Reject
i^*	Accept	W , B	W , B
i^*	Reject	B , W	$W + B$, B

Thus, we can observe that there exists an unique equilibrium where both parties are willing to pay B to the voter.

III. Experimental Design

Following our theoretical formalizations, a lab economic experiment was performed. The experiment was conducted at O'Higgins University and Centre for Experimental Social Sciences (CESS) of *Universidad de Santiago*, Chile. Subjects received a minimum of $5,000 Chilean pesos. The maximum depended on the quality of individual decisions. summary statistics here. The basic flow is depicted in Figure 1.

The experiment has two parts, with four stages each. The first part is the vote-buying portion. During the first stage, participants are assigned a role at random. They can be either *party A*, *party B*, or *voter*. Voters are assigned at random an "ideological" position. That is, voters receive a certain amount of points (at random) depending on whether party A or B wins the election. For instance, if party A wins election, a voter might receive 2,400 points, whereas if party B wins the election, the voter might receive 200 points. It is in this sense that the voter is "ideologically" closer to party A. The substantive correlate is that voters perceive some utility when, for instance, their preferred fiscal policies are implemented. During the first stage, both parties receive different endowments too. The idea is to reflect the fact that some parties are wealthier than others. Note that voters receive zero endowments. The clientelism literature is consistent in that both poor and rich voters are prone to receive clientelist offerings (Bahamonde 2018).

[4]This situation is considering that, if both parties accept to pay the price set by the voter, he prefers the party i^*.

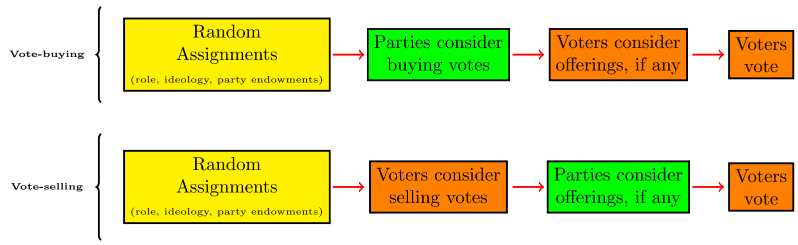

Figure 1: Experimental Flow.
Note*: Note here.*

During the second stage of the first part, parties decide whether to go out and buy votes by making clientelist offerings. Experimental subjects playing the party role enter an amount of points, which ranges from zero to the maximum assigned budget. They are told that offering zero means they do not want to buy votes. Importantly, both budgets (for party A and B) are the same. However, given that the voter-party distance is assigned at random, both parties have *relative* "different" budgets.

In the third stage voters evaluate whether to take that offer or not. If the party decided that it did not want to make an offer at that time, the voter is told that the party did not make an offer. Voters are told that accepting the offer necessarily implies voting for that party (no defecting in this experimental design). In this regard, the third and fourth stage are in reality one stage.

The second part is the vote-selling portion of the experiment. This part is run during the same experimental session, but loading a separate `Ztree` program. Right after the first part is completed, experimental subjects are then asked to continue with the study.

The second part is exactly the same, except that this time voters are first-players: they get to offer parties an amount of points, and then, parties get to decide whether to take or reject that offer. Note that the experimental currency are "points," which later translated into actual money.[5]

I. Expected Comparative Statics

This experiment randomizes the voter's and party's "ideological" positions, party endowments,[6], and whether the voter is pivotal or not (whether the voters represents $\frac{1}{3}$ or $\frac{1}{5}$ of the electorate). There is one static event, namely, the order of the experiment (the vote-buying part goes first, while the

[5]Particularly, Chilean pesos.
[6]As explained above, not directly, but by randomizing the ideological position of voters. By doing so, we are able to manipulate the *relative* purchasing power of every party.

vote-selling part goes second). This aspect is presented to all experimental subjects (both roles) before the second stage (both experimental parts). Exploiting this experimental data, we intend to shed light on the conditions that foster vote-buying/selling. Particularly, we are interested in analyzing the next aspects of a clientelist transaction.

Ideology. Since Downs (1957), spatial theorist have theorized for a long time about the role of political ideology on different electoral aspects (see Enelow and Hinich (1990) for a review). Unfortunately, one of the main criticisms of the Downsian paradigm, is its unidimensionality. That is, the big assumption of voters being concerned only about the spatial distance between their policy preferences and the ones of the available parties. Acknowledging this problem, Adams, III, and Grofman (2005, p. 20) introduce "non-policy" factors. Unfortunately, these factors are mainly socio-demographics traits, such as race, gender, income, among others. While it is true that these traits are not strictly policy-based, they are highly correlated with them. In this paper we try to advance the literature by incorporating clientelism, a non-policy issue (Kitschelt and Wilkinson 2006).

Our experimental design allows us to explore the tipping point at which voters stop caring about ideology. Since the voter-party spatial distance is randomized, our design sheds some light on the elasticity of ideology, clarifying *when* voters renounce to politics (and start selling their votes). Hence, by offering voters a non-policy choice (selling one's vote), we complement the spatial literature, ultimately, by focusing on the question of democratic values too.

Competitiveness. The degree in which elections are contested or not has an important role in explaining clientelism. Competitive authoritarian regimes (Levitsky and Way 2010) survive not due to electoral fraud, but because of the incumbent's capacity to mobilize a large mass of supporters, discouraging likely opposers (Magaloni 2008). Unfortunately, we still do not know at which point likely opposers feel discouraged, and abandon the electoral race. Since the experiment also randomizes the number of likely voters, we will be able to observe at which point is efficient to buy votes (when needed), and at which point is a waste.

Endowments. For the Brazilian case, Bahamonde (2018) explains that parties with access to more resources are also able to buy more expensive goods, even targeting the wealthy. However, Szwarcberg (2013, p. 32) finds that parties with access to material resources does not necessarily imply clientelist targeting. The literature then has not been really able to explain the relationship between having resources and vote-buying: *Do parties with more resources engage in vote-buying?*

Targeting. *Who do political parties target? Swing voters or core supporters?*

Voter's Bargaining Power. By manipulating the relative importance of a voter, we will be able to answer the following question: *Does block voting (i.e. when unions or other civic groups vote coordinately for the same candidate) increase the selling price?*

Sequence. By considering two sequences, one where the party gets to be the first player, and one where the voter does, *Does the order matter?*

IV. Statistical Analyses

pending.

V. Discussion

pending.

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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

Lewis (1965, 410)

The literature on the relationship between political and economic development is vast. Without surveying all of it, there is an agreement in that strong institutions cause better economic performance. Indeed, North (1990, 3) explains that the fact that "institutions affect the performance of economies is hardly controversial." Unfortunately, however, most explanations of economic success focus on property rights protection.[1] I find that a limitation. For instance, authoritarian regimes with little (or no) respect for property rights, grow at levels that sometimes even surpass democratic countries.[2] While I still think that institutions matter for economic growth, this paper seeks to contribute to this literature by emphasizing the positive effects of sectoral conflicts between the industrial and agricultural political elites, on 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.[3] 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.[4] 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,[5] 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

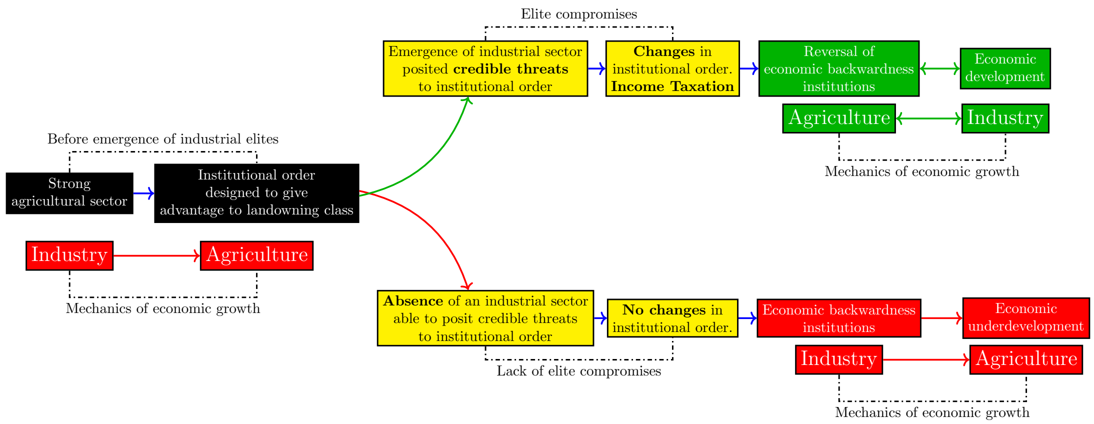

Figure 1: *Causal Mechanism*

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.[6] 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,[7] economic elites have systematically been divided on their preferences towards fiscal policy,[8] and consequently, state centralization. As land fixity increases the risk premium of their main asset, agriculturalists have typically resisted taxation.[9] In contrast, industrialists' preferences toward taxation have been more elastic, as capital can be reinvested in nontaxable sectors.[10] This sectoral cleavage was more likely to resolve in favor of direct taxation when income inequality among the elites was low,[11] 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.[12] 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,"[13] 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.[14] 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*
>
> Smith (1904, I.11.59)

The "dual sector" or "balanced growth model," explains the mechanics of modern economic growth,[15] 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."[16] 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."[17] 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."[18] 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."[19] 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.[20]

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

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."[25] Technologies such as "crop rotation, pest control, seed breeding [and] fertilizer use [represent] the major potential source of agricultural labor productivity,"[26] increasing also "non-agricultural value added per worker."[27] 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.[28]

Surplus of labor naturally leads to a reallocation of redundant workers into the industrial sector, which is the crux of economic development.[29] Nurkse (1953) in fact argues that development *means* to employ the surplus labor.[30] The literature coincides in that the "natural" role of the agricultural sector is to provide labor to the industrial sector.[31] 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."[32] 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*.[33] In fact, Nurske (1961, 225) points out that the concept "is commonly used to denote all types of rural unemployment."[34]

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.[35] "It is *self-evident* that without increasing food output, the capitalist sector must remain in a stationary state."[36] 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.[37] Collier and Collier (2002, 106) argue that the "national government was dominated by [...] owners of large agricultural holdings."[38] 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.[39]

Historians still debate whether agriculturalists and industrialists comprised two *different* elites. Some claim that this dualism is incorrect.[40] They argue that since landowners also invested in industry,[41] there was a blurry class division between the mining, banking, and agricultural sectors.[42] 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."[43] 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,"[44] 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."[45] 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.[46] 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,[47] 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*."[48] 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,[49] 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"[50] or "easy-to-collect source of revenues."[51] Given the relatively lower costs states have to incur to collect them, indirect taxes have a very low impact on state-building.[52] 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.[53] 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.[54]

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.[55] 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.[56] 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*
>
> Kuznets (1961, 41)

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

Granger-causality Tests 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 *un*balanced 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.[57]

I utilize the MOxLAD data, particularly the *agriculture value-added* and *manufacturing value-added* variables.[58] The dataset spans from as early as 1900 to as late as 2009.[59] 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).[60] 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.[61] 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).[62] 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

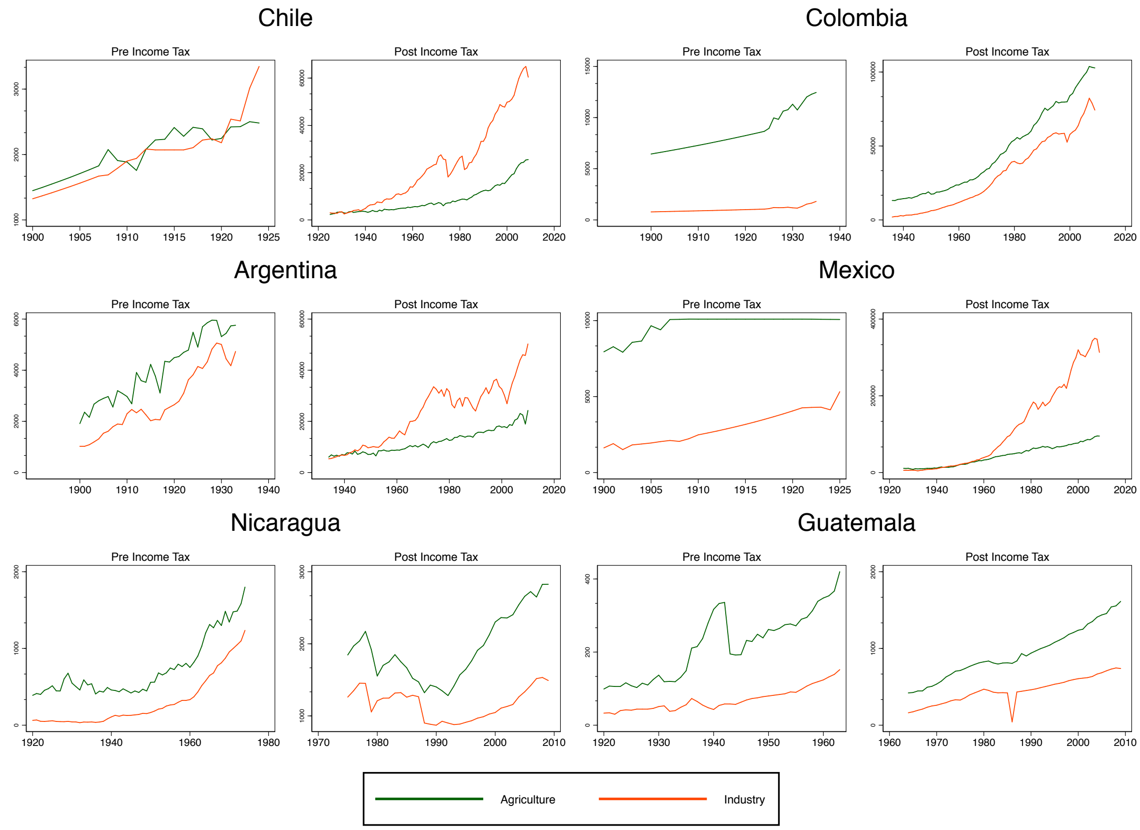

Figure 2: *Sectoral Outputs Before and After the Implementation of the Income Tax Law*

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).[63] In Nicaragua and Guatemala, however, the tests suggest the exact opposite (all p-values are significant at the .05 level).[64] 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.[65] 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.[66] 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.[67] 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).[68]

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,[69] 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).[70] Formally, I fit Equation 1 in differences, one per country, both before and after the income tax law was passed.[71]

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

Notice that in both lines, the different dependent variables are expressed as a function of the *same* set of lagged independent variables. Since the number of lags l varies by country *and* time-span (i.e. before/after the income tax law), Equation 1 is in standard form. Table A3 describes the optimal lag structure per each country regression.[72]

Given that "it is often difficult to draw any conclusions from the large number of coefficient estimates in a VAR system,"[73] econometricians usually turn to the analyses of *impulse response functions* (IRFs), which are derived from VAR analyses.[74] "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."[75] 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

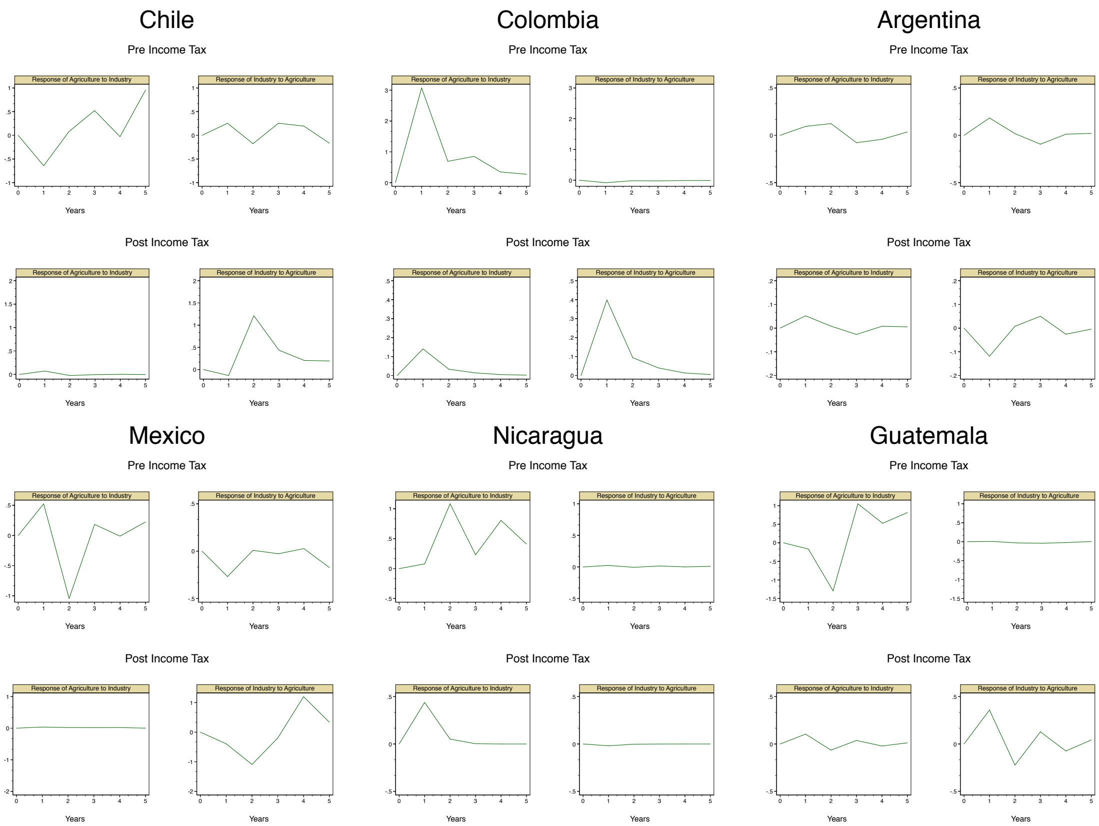

Figure 3: *VAR Impulse Response Functions: Sectoral Responses to Each Other's Growths*

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.[76]

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 agriculture. 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 inter-dependence, 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	*Ley* 3996	Mamalakis (1976, 20) and LeyChile.Cl (official)
Colombia	1900 - 2009	1935	*Ley* 78	Figueroa (2008, 9)
Argentina	1900 - 2010	1933	*Ley* 11682	Infoleg.Gob.Ar (official)
Mexico	1900 - 2009	1925	*Ley de Impuesto sobre la Renta*	Unda (2017, 8)
Nicaragua	1920 - 2009	1974	*Ley* 662	Legislacion.Asamblea.Gob.Ni (official)
Guatemala	1920 - 2009	1963	*Decreto* 1559	Instituto Centroamericano de Estudios Fiscales (2007, 165)

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

Country	Time Frame	Sector	Augmented Dickey-Fuller	Phillips-Perron	KPSS	Conclusion
Chile	Pre	Agriculture	-1.185 (0.68)	-1.241 (0.66)	.107†	I(1)
		Industry	2.310 (0.99)	2.556 (0.99)	.113†	I(1)
	Post	Agriculture	4.557 (1.00)	5.40 (1.00)	.289	I(1)
		Industry	0.908 (0.99)	1.458 (0.99)	.249	I(1)
	All	Agriculture	5.521 (1.00)	6.722 (1.00)	.31	I(1)
		Industry	1.582 (0.99)	2.305 (0.99)	.314	I(1)
Colombia	Pre	Agriculture	2.709 (0.99)	2.414 (0.99)	.204	I(1)
		Industry	2.103 (0.99)	3.257 (1.00)	.183	I(1)
	Post	Agriculture	2.392 (0.99)	3.156 (1.00)	.282	I(1)
		Industry	0.520 (0.98)	1.044 (0.99)	.241	I(1)
	All	Agriculture	4.256 (1.00)	5.893 (1.00)	.372	I(1)
		Industry	1.674 (0.99)	2.707 (0.99)	.374	I(1)
Argentina	Pre	Agriculture	-0.849 (0.80)	-1.201 (0.67)	.0801†	I(1)
		Industry	-0.495 (0.89)	-0.378 (0.91)	.115†	I(1)
	Post	Agriculture	1.197 (0.99)	1.093 (0.99)	.277	I(1)
		Industry	0.228 (0.97)	0.381 (0.98)	.0901†	I(1)
	All	Agriculture	1.484 (0.99)	1.401 (0.99)	.332	I(1)
		Industry	1.007 (0.99)	1.237 (0.99)	.183	I(1)
Mexico	Pre	Agriculture	-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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