Long-Run Effects of Radical Institutional Overhauls: Evidence from Mexican-American War^{*}

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Abstract

We examine the contribution of radical institutional reforms to long-term development of property rights and contracting institutions. The Mexican-American War (1846-1848) had a deep impact on the institutional development of Mexico. It partially removed the legal and economic barriers that protected the old oligarchic elites and paved the way for the modernization of legal and commercial codes. To this end, we exploit the within-country variation in the presence of US troops during Mexican-American war across Mexican states and cities as a source of variation in transaction costs. Using propensity score and nearest neighbor matching techniques with orthogonal covariates, we present evidence on the longrun institutional implications of the troops presence. Troops-controlled areas have less complex business registration procedures, better quality of land administration, broader access to property rights, markedly better quality of the judicial process and lower costs of enforcing contracts than the areas without troops presence. We show that US troops presence generated a positive and radical historical shock for institutional development that survived to the present day and made the return to status quo nearly impossible. The positive effects of troops presence are robust to a variety of specification checks and are particularly large for smaller cities.

JEL Classification: C31, D74, N16, N46, **Keywords**: institutional change, war, Mexico, United States

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1 Introduction

The importance of institutional changes for sustained and inclusive economic growth and human development can only hardly be neglected and has been recognized by a wide body of literature (North 1971, Knack and Keefer 1995, Henisz 2000, Rodrik et. al. 2004, Acemoglu et. al. 2005, Papaiouannou and Siorounis 2008, Rodriguez-Pose 2013, Acemoglu et. al. 2015, Campos et. al. 2019). Scholars argue that sustainable economic growth and development are seldom possible without the set of institutions that promulgate secure and broadly accessible property rights (Torstensson 1994, Leblang 1996, Clague et. al. 1999, Claessens and Laeven 2003), robust rule of law (Posner 1998, Haggard and Tiede 2011, Cooter and Schaefer 2011), participatory political institutions (Olson 1993, Weingast 1995, Haber 2000, Przeworski 2004, De Haan 2007, Spruk 2016, Acemoglu et. al. 2019), and low-cost enforcement of contracts (Greif 1993, Brunetti et. al. 1998, Levine 1999, Prados de la Escosura and Sanz-Villaroya 2009). The absence of these institutional blueprints has been related to economic stagnation (Kuran 2004), institutional sclerosis (Olson 1982), widespread corruption (Aidt 2009). North (1990) famously noted that the "inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the Third World (p. 54)." Even though scholars generally agree on which set of institutions is feasible and beneficial for improving a variety of economic and social outcomes (Acemoglu and Johnson 2005), much less is clear on why such institutions are absent somewhere and present elsewhere (Sokoloff and Engerman 2000, Besley and Persson 2009, Acemoglu and Robinson 2016). If some societies are prone to continuous institutional sclerosis that promulgates ineffective government administration, market uncertainty, reliance on informality, and volatile policy making, the question that remains is whether a radical institutional reform through an external intervention can possibly break the vicious cycle of institutional and policy sclerosis and provide the set of feasible institutions that survive a variety of both external and internal shocks.

The empirical tools used to unravel the causal effect of institutions on economic and social outcomes have undergone substantial scrutiny. The major problem arises from statistical identification. For instance, Glaeser et. al. (2004) argue that both the indicators and sophisticated cause-and-effect analyses like instrumental variables approach used to establish the proposition that institutions cause economic growth are conceptually unsuitable for such purpose. Helland and Klick (2011) show that identifying the effect of specific legal or economic institutions on economic and financial development is prone to mistake the notion of correlation for causation. Given that the estimated relationships can be tainted by omitted variable bias, policy conclusions concerning institutions are likely to be problematic.

Another problem arises from the lack of information on the effectiveness of government policy in crosscountry regressions where factors other than policies or institutions change simultaneously (Rodrik 2012). By contrast, subnational comparisons where institutional arrangements vary and can be isolated but many of the confounding factors can be held fixed at the same time have been pointed out as a more reliable source of inference and conclusions on the effectiveness of policies and institutions for economic and social outcomes.

Scholars disagree as to whether radical and externally imposed institutional blueprints are effective. One strand of literature argues that such externally imposed blueprints are seldom effective unless the politicians and local populace coordinate and support the institutional change and is likely to fail if informal institutions are incompatible with the ideas and beliefs behind the deep institutional overhauls (Boettke et. al. 2015). Another strand of literature argues that transplanting the institutional blueprints has a strong indirect effect on economic development provided that the population is already familiar with transplanted law and institutions (Berkowitz et. al. 2003, Seidler 2014). Others emphasize the importance of experimentation, attention to local conditions and willingness to deviate from orthodox institutional blueprints in the emergence of growth-supporting institutions (Rodrik 2000, Dunning and Pop-Eleches 2004). To date, the impact of deep historical shocks on the rise and sustainment of such institutions is less clear and warrants further investigation.

In this paper, we examine the contribution of radical institutional reforms on the choice of economic institutions. To this end, we estimate the impact of the large-scale presence of US troops during Mexican American war on long-term institutional development of Mexican states. Large-scale presence of US troops across Mexican states has been associated with far-reaching institutional and policy changes in the territories occupied by the US army. Not all Mexican states were affected by the presence of US troops. In some states, the presence of the troops was widespread whilst elsewhere the presence has been more isolated. The presence of troops led to fundamental administrative and institutional changes both in the United States and Mexico. After the Treaty of Guadalupe Hidalgo in 1848, The United States admitted the newly conquered territories such as Texas, California and New Mexico as states to the union. In Mexico, the war led to widespread losses of the territory and subsequent rampant domestic political instability promulgating deep constitutional changes. To address the endogeneity of troops presence, we use a variety of propensity scores and nearest-neighbor matching techniques to estimate the effect of US army presence on transaction costs. Our analysis consists of two steps. In the first step, we estimate the propensity of state-level and local-level troops presence based on the set of plausibly orthogonal historical characteristics such as ethnic fractionalization during the colonial period and geographic characteristics such as the severity of droughts. In the second step, we estimate the impact of the propensity of having US army presence on a series of transaction costs related to costs of business registration, licences, permits, property registration and contract enforcement. Our analysis encompasses 32 Mexican states and more than 2,000 Mexican cities. By matching city-level data on troops presence with the data on transaction costs, we are able to recover the effect of US army presence by comparing the states and cities with similar characteristics that differ only in terms of whether the troops were present or not, and determine whether the effect persists down to the present day. Our state-level and city-level evidence indicates that large and pervasive positive impact of US army presence on the present-day property rights- and contracting institutions. States and cities that were under US army control tend to have lower costs of business registration, better quality of the building code, lower costs of acquiring construction permits and licences, fewer barriers to entry, less complex and more accessible property registration procedures, better land administration, lower costs of enforcing contracts and markedly better quality of the judicial process. We tackle some of the transmission channels and show that the positive influence of US troops on property rights- and contracting institutions can be explained by lower ethnic fractionalization, widespread urbanization, lower infant mortality and increased investment in human capital in troops-controlled states and cities.

Several papers are related to ours. First, Accmoglu et. al. (2011) examine long-term consequences of French Revolution in 1789 that unfolded a series of radical and large-scale designed political, legal and economic reforms on the city-level development of German cities. They show that German cities under the control of French troops underwent radical institutional reforms and a more growth of urbanization and uncover large-scale benefits of removing the institutions of *ancien regime* such as feudal land and labor relations, urban oligarchies, guilds and lack of equality before the law that posed as barrier to entry and likely inhibited the path of industrialization and economic growth. Second, Guiso et. al. (2016) examine long-term persistence of positive historical shock by drawing on the contrasting experience in self-government between the Northern and Southern Italian cities dating back to the Middle Age. They show that Italian cities that achieved some degree of self-government in the medieval period, have greater civic virtues and social capital than similar cities in the same that had not achieved self-government. The effect of such positive historical shock persists through the set of beliefs that emphasizing ability to complete task and positive attitude that is transmitted across generations that reinforces a more rigorous civic capital down to the present day. And third, Dell et. al. (2018) examine how historical state conditions influence long-run development. By using Vietnam as an institutional laboratory, they exploit the integration of northern Vietnamese localities into Dai Viet kingdom ruled by a strong centralized state. They compare the localities under Dai Viet rule with those under the Khmer Empire which consisted of peripheral and tributary organization dominated by patron-client power relations with greater reliance on informality. The areas exposed to Dai Viet institutions have experienced better economic outcomes that persist over 150 years, better organized public goods and a more vibrant civil society as well as more effective local government. The authors argue that institutionalized village-level governance fostered a culture of local cooperation whose norms and beliefs persisted even when original institutions disappeared.

Our paper adds three novelties to the existing body of literature. First, by exploiting withincountry variation in the presence of US army during Mexican-American war, our approach allows us to address the potential endogeneity of troops presence using propensity scores obtained by exploiting differences in the colonial ethnic composition and physical geographic characteristics that are not tainted by the troops presence. By matching either on propensity scores on the nearest neighbour indices, we are able to obtain a representation of the state and locality without the presence of troops that has very similar characteristics than the occupied counterparts except for the absence of the underlying troopsrelated shock. Instead of relying the questionable exclusion restrictions that can be correlated with contracting and property rights institutions themselves, our matching strategy based on calibrated propensity scores and nearest-neighbor comparisons allows us to parse out the average treatment effect of US troops on the level of transaction costs at the state- and city level while holding the effects of current economic, demographic and cultural conditions constant. This allows us to partially overcome the standard problem of omitted variable bias that is prevalent in cross-country or subnational regressions. And third, our works contributes to the ongoing scholarly debate on the effectiveness of externally designed institutional blueprints (Berkowitz et. al. 2001, Boettke et. al. 2015, Seidler 2014) and shows that radical institutional reforms can be effective for adoption of growth-enhancing institutions by generating a positive historical shock that helps remove barriers to entry, fosters the adoption of better technologies through the lower the costs of contract enforcement and property rights that pre-reform political and institutional equilibrium fails to dismantle or even keeps it intact to preserve the economic payoffs for the elites.

The rest of the article is organized as follows. Section 2 presents the historical background. Section 3 discusses the identification strategy. Section 4 presents the data and samples. Section 5 proceeds with the results and several extensions. Section 6 concludes.

2 Background

The Mexican American War and the US intervention in Mexico was an armed conflict between the United States and Mexico from 1846 to 1848. The conflict arose after the US annexation of Texas in 1845. In 1844 presidential election, James K. Polk was elected after emphasizing the platform of expanding US territory in Oregon and Texas either by peaceful means or by armed force. Prior to 1845, the Republic of Texas was de jure under the administrative control of the Mexican government. Even though the conflict between Mexico and United States was short-lived, the institutional consequences of the conflict were far-reaching (Winders 1997, Foos 2002). Before the secession of Texas, Mexico comprised almost 1,700,000 square miles but by 1849, the size of the territory was below 800,000 square miles. After the Gadsen Purchase in 1853, where another 30,000 square miles were relinquished to the US control, Mexican territory was reduced by more than 55 percent. The total size of the lost territory was comparable with the size of Western Europe although it was very sparsely populated. The US settlers arrived in the newly conquered territories of Alta California, Texas and New Mexico and overhauled the civil law system based on Castillian law by replacing it with reception statutes although several scholars agree that several aspects of the Mexican law remained in place, especially community property law, marital property system and water law.

In Mexico, the defeat in the war had several far-reaching consequences for its institutional and political development (Smith 1919, Bauer 1974). In 1824, Mexico adopted the Constitution of the First Republic which espoused a liberal characteristics based on decentralized federal form of government with significant powers vested in the states. The 1824 Constitution was influenced both by US Constitution and by the 1812 Constitution of Cadiz. It adopted the US model of bicameral legislature and separation of powers between executive, legislative and judicial branch of government. Although the de jure characteristics of the 1824 Constitutions resembled the US and, to a lesser extent, Spanish constitution, de facto constitutional reforms were plagued by repeated failures leading to persistent political turmoil. The turmoil and institutional instability of the First Mexican Republic promulgated repeated failures to build viable political and legal institutions. The de facto political power remained in the hands of the military and Roman Catholic church which retained special privileges despite the de jure constitutional reform. The domination by local political bosses became a norm. The central government in Mexico City lacked significant taxation power which prolonged the weakness behind its capacity to provide for key public goods whereas individuals states imposed burdensome regulations on trade and commerce. Between 1824 and 1857, the president of Mexico was changed thirty-three times. The presence of caudillodominated politics with constantly changing political beliefs prolonged pervasive institutional instability that led to the abrogation of the federal constitution and caused insurgencies in some states such as Yucatán and Coahuila and Texas which began to seek independence from central government.

The abrogation of the 1824 Constitution caused deep political instability behind the presidency of Antonio López de Santa Anna, driven by the persistence of colonial elites who sought to preserve the rents and privileges vested during the colonial regime. In 1836, the conservative elites imposed centralized control by annulling the constitution. By adopting Siete Leyes Constitutionales, centralist unitary government was established, states were abolished and replaced by *juntas departamentales* with circumscribed powers. The northern states and other peripheral areas became increasingly isolated and staged the rebellion by wishing to join the United States. In 1820s, Mexican government encouraged the colonization and settlement in sparsely populated territories in Alta California, New Mexico and Texas whereupon English-speaking settlers received large-scale land concessions to cultivate rice and cotton but had to become Mexican citizens, profess Catholic faith and were allowed to import Negro slaves to work in rice field and cotton plantations. In 1830, around nine thousand former US citizens migrated to Texas, outnumbering Spanish-speaking population by three-to-one ratio. At the same time, central government in Mexico City began to curtail the autonomy of Texas. Repeated calls for independence from Mexican led to the war of separation in 1835 when Santa Anna's troops were defeated first in Los Alamos and ultimately in San Jacinto where Santa Anna was taken prisoner which eventually led to the Texas' declaration of independence (Levinson 2005)

In 1845, an armed conflict arose after Texas became the twenty eighth US states. The US army's capacity was superior to that of Mexican army. The US forces quickly occupied Santa Fe along Rio Grande and the territories of Alta and Baja California. In 1847, the Mexican government surrendered after General Winfield Scott conquered Mexico City and after the fall of Veracruz. The presence of US troops was not uniform across the Mexican Territory. We classify the US occupation forces' presence in the Mexican states depending on whether the US military defeated the Mexican army in each military campaign, and conquered the cities. We review a large strand of historical bibliography on the US occupation of Mexico primarily relying on Carney (2006), and code the presence of the US troops in 1848 across the full set of US military campaigns². Figure 1 presents the presence of US troops across Mexican states in 1848.

² Our coding of US troops presence is based on a simple binary indicator. Thus, the value of the underlying US troops variable takes 1 for the states Baja California, Baja California Sur, Chihuahua, Coahuilla de Zaragoza, México, Mexico City, Nuevo Leon, Puebla, Sinaloa, Tamaulipas, and Veracruz, and 0 for the states without the US presence in 1848.



Figure 1: The presence of US troops in Mexico during Mexican-American war

One of the most powerful and recognized sources of US influence on the beliefs and institutional reforms in troops-controlled territories emanates from Kearny Code. The code was promulgated in Santa Fe upon the seizure of power by US troops on September 22, 1846. The code was used in the territory of New Mexico and four days later it was applied in Alta California after the conquest by Kearny's forces. The code consisted of three parts. First, Bill of Rights for the Territory of New Mexico granted political, civil and economic rights to all persons and did not distinguish between citizens and non-citizens. The Bill of Rights established political freedom, access to justice, ensured the right of trial by jury, protection against unreasonable search and seizure, freedom of thought and opinion, and banned priests and vicars from bearing arms, jury services and performing military duties. These rights overhauled the Mexican version of *ancien régime* institutions and did not exist during the Spanish colonial rule and First Mexican Republic.

By formally dismantling the political and economic oligarchies, Kearny code served as an important blueprint in the state-level institutional development of Mexico (Zamora et. al. 2005). In the aftermath of the war, *Siete Leyes Constitucionales* never became an effective constitutional instrument. In 1847, the political power of the conservative elites diminished after the constitutional congress dominated by the liberals convened to adopt *Acta de Reformas* aimed at restoring the 1834 Constitution with significant improvements that laid the pathway toward liberal reforms that were incorporated in the 1857 Constitution. The new constitution was drafted by the liberals who rebelled against the rule of Santa Anna in the Revolution of Ayutla. The new constitution drastically reduced the discretionary power of the executive, eliminated the privileges of the Catholic Church including its ability to own property and control the education after granting substantial religious freedom. The 1857 Constitutional provoked the civil war. Both at state and federal level, the adherence to the Spanish colonial precepts of private law was abandoned. The privileges of special interest groups that formed the backbone of oligarchic elites were eliminated including the abolition of special immunities of clerics and military officers from civil and

criminal process. The ascend of the liberal constitution in 1857 promulgated freedom of association, anticlericalism, federalism and a subordination of executive branch to the legislature. Numerous scholars agree that the 1857 Constitution provided an important model for the 1917 Constitution adopted in the aftermath of Mexican Revolution. One of the most prominent features of the 1857 Constitution concerns a rapid modernization of the judicial process. Namely, the constitution enshrined the *amparo* procedure in the judicial process.³

After president Juarez decreed a moratorium on the payment of Mexican debts, the government in England, Spain and France signed a pact to recover the debt. After the negotiation with Spain and England, debts were settled whereas France exploited this opportunity as an attempt to re-establish its influence in the Americas and convinced the Habsburg Archduke Maximilian to assume the role of Frenchsupported Emperor of Mexico. Supported by the conservative elites, the rule of Maximilian was marked by a three-year civil war between the conservatives and liberals who fought to uphold the 1857 Constitution. Several institutional reforms were implemented to the dismay of the conservative elites and upheld from Juarez administration, especially the land reform, religious freedom and the franchise extension beyond the landholding class. After the downfall of the French intervention, Mexican states underwent substantial institutional modernization such as the adoption of the first federal civil code and the civil code for the Mexico City and Baja California. In 1871. A new commercial code was promulgated in 1889 which further curtailed the commercial privileges of the landholding class. Hence, the lasting influence of Kearny code both at the state and federal levels can only scarcely be disputed.

3 Identification Strategy

3.1 Matching on Nearest Neighbors

Our empirical strategy is to isolate the effect of the presence of US troops on the level of transaction costs based on the observational comparison using the nearest neighbour matching strategy (Abadie and Imbens 2006, 2011). Our approach is to construct a simple weighing matrix and compare the level of transaction costs by matching the states and localities where the US troops were present during Mexican-American war to those without their presence. The full set of transaction cost covariates is used to match the affected states with the control group of states without the US troops presence. This strategy

³ The origin of *amparo* dates back to the early 19th century when the state of Yucatán adopted a procedure to improve the judicial enforcement of individual rights in the state constitution of 1841. The *amparo* procedure became known at the national level as Fórmula Otero and crucially abrogated the *Siete Leyes*.

allows us to compare the outcomes in response to the US troops presence between states based on the weighing matrix that captures the similarities and allows for finding a nearest counterpart with similar covariate-implied characteristics that is not tainted by the presence of troops during the war.

Suppose that effect of US troops on the level of transaction costs can be best described by a simple model that ignores non-linearities:

$$\eta_1 = E(y_1 - y_0) \tag{1}$$

where η_1 denotes the average treatment effect of US troops presence on the level of transaction costs with y_1 representing the transaction costs in the presence of US troops and y_0 denoting the level of transaction costs without the troops' presence. Notice that matching state-level exogenous characteristics based on the presence of US troops typically requires the specification of the covariate vector and its respective weighing matrix used to recover the average treatment effect from Eq. (1) through the nearest-neighbor comparison. Let $\mathbf{x}_i = \{x_{i1}, x_{i2}, ..., x_{ip}\}$ denote the full vector of covariates and let $\mathbf{w}_i = \{w_{i1}, w_{i2}, ..., w_{ip}\}$ describe the vector of weights used to construct the weighing matrix. By letting i = 1, 2, ..., N describe the set of states where US troops were present and j = 1, 2, ..., J denoting the control group where US troops were not present, we estimate the covariate-level distance between the treated states and their control group using the level of transaction costs as the outcome of interest through a simple parametric vector space norm:

$$\|x_{i} - x_{j}\|_{S \in \Re} = \left\{ \left(x_{i} - x_{j}\right)^{*} \mathbf{S}^{-1} \left(x_{i} - x_{j}\right) \right\}^{-1/2}$$
(2)

where \mathbf{S} denotes the positive semi-definite symmetric matrix. By making use of the implied distance in covariates between the *i*-th state or locality and its nearest *j*-th counterpart, transaction cost differences in response to the US troops presence are approximated by making use of the set of nearest-neighbor indices for *i*-th state or locality from the treatment sample. Using the covariate-level distance from Eq. (2), we estimate the set of covariate-implied nearest neighbor indices between the states or localities with the presence of US troops and the states without the presence through the following matrix:

$$\boldsymbol{\Phi}_{\mathbf{m}}^{\mathbf{x}}(\mathbf{i}) = \begin{cases} j_1, j_2, \dots j_m \mid US \ Troops_{j_k} = 1 - US \ Troops_i, \ \left\| \mathbf{x}_i - \mathbf{x}_{j_k} \right\|_{S} < \left\| \mathbf{x}_i - \mathbf{x}_{l} \right\|_{S} \\ US \ Troops_l = 1 - US \ Troops_i \end{cases}$$
(3)

where $\Phi_{\mathbf{m}}^{\mathbf{x}}(\mathbf{i})$ denotes the set of nearest-neighbor indices and m denotes the number of matched used to estimate the effect of troops presence on transaction costs. The match count allows us to parse out the underlying effect by matching the covariates between the affected states with those without the troops presence. Even though the exact number of matches is subject to sample size limitation, we set m = 5. Notice that m is the smallest number of state-level covariate elements in each set such that $m_i = |\Phi_{\mathbf{m}}^{\mathbf{x}}(\mathbf{i})| = \sum_{j \in \Phi_{\mathbf{m}}^{\mathbf{x}}(i)} w_j$ represents the desired match count within the caliper limit range $||\mathbf{x}_i - \mathbf{x}_j||_s \leq c$. It is noteworthy to underline that the match count for i-th observation may not be equal because of the possible cross-observation ties and potentially insufficient degrees of freedom within the caliper limit. The key question behind the match count concerns the choice of scaling matrix (S) from Eq. (2). To weigh the covariate-level distance between i-th state or locality and its j-th nearest counterpart, we construct a simple Mahalanobis scaling matrix:

$$S = \frac{\left(\mathbf{X} - \overline{\mathbf{x}}' \mathbf{1}_{\mathbf{n}}\right)' \mathbf{W} \left(\mathbf{X} - \overline{\mathbf{x}}' \mathbf{1}_{\mathbf{n}}\right)}{\sum_{i=1}^{n} w_{i} - 1}$$
(4)

where $\mathbf{1}_{\mathbf{n}}$ is an $n \times 1$ numeraire vector, $\overline{\mathbf{x}} = \left(\sum_{i=1}^{n} w_i x_i\right) / \left(\sum_{i=1}^{n} w_i\right)$ and \mathbf{W} is an $n \times n$ diagonal matrix containing frequency weights determined by the *m* number of matches. By combining the Mahalanobis scaling matrix with the set of nearest neighbour indices in Eq. (2), we predict the potential level of transaction costs for i-th observation as a function of observed transaction costs:

$$y_{t\in\tau,i} = \begin{cases} y_i & \text{if } US \ Troops_i = t \in \tau \\ \frac{\sum_{j\in\Phi(i)} w_j y_j}{\sum_{j\in\Phi(i)} w_j} & \text{otherwise} \end{cases}$$
(5)

for $t_i \in \{0,1\}$ which denotes i-th state- and locality-level treatment status. Regardless of the error variance distribution, the full treatment effect of the US troops presence on transaction can be computed as a weighted distance between the observed level of transaction costs and their potential level captured by the absence of US troops using the covariate-level element set. This implies that the full treatment effect of US troops on transaction costs and the effect on the affected states and localities is:

$$\hat{\tau}_{1} = \frac{\sum_{i=1}^{n} w_{i} (y_{1i} - y_{0i})}{\sum_{i=1}^{n} w_{i}} = \frac{\sum_{i=1}^{n} w_{i} (2t_{i} - 1) \{1 + K_{m}(1)\} y_{i}}{\sum_{i=1}^{n} w_{i}}$$
(6)

$$\hat{\delta}_{1} = \frac{\sum_{i=1}^{n} t_{i} w_{i} (\hat{y}_{1i} - \hat{y}_{0i})}{\sum_{i=1}^{n} t_{i} w_{i}} = \frac{\sum_{i=1}^{n} \{t_{i} - (1 - t_{i}) K_{m}(1)\} y_{i}}{\sum_{i=1}^{n} t_{i} w_{i}}$$
(7)

where $K_m(1) = \sum_{j=1}^n I\{i \in \Phi(j)w_j\} / \sum_{k \in \Phi(j)} w_k$ is the covariate element set ensuring that matched covariate characteristics between the occupied and non-occupied territories are similar and sufficiently plausible to obtain the full effect of US troops on transaction costs. By using the matched element set, the variance of the full effect of US troops and the effect on the treated is estimated as follows:

$$\hat{\sigma}_{\tau}^{2} = \frac{\sum_{i=1}^{n} w_{i} \left[\left(\hat{y}_{1i} - \hat{y}_{0i} - \hat{\tau}_{1} \right)^{2} + \zeta_{i}^{2} \left\{ K_{m}^{2}(i) + 2K_{m}(i) - K_{m}^{'}(i) \right\} \right]}{\left(\sum_{i=1}^{n} w_{i} \right)^{2}}$$

$$\tag{8}$$

$$\hat{\sigma}_{\delta}^{2} = \frac{\sum_{i=1}^{n} t_{i} w_{i} \left[\left(\hat{y}_{1i} - \hat{y}_{0i} - \hat{\delta}_{1} \right)^{2} + \hat{\zeta}_{i}^{2} \left\{ K_{m}^{2}(i) - K_{m}^{'}(i) \right\} \right]}{\left(\sum_{i=1}^{n} t_{i} w_{i} \right)^{2}}$$
(9)

where $\hat{\zeta}_i^2$ denotes the conditional transaction cost variance such that $\hat{\zeta}_i^2 = \operatorname{var}(y_i \mid x_i)$. By assuming that $\hat{\zeta}_i^2$ does not vary with treatment-related covariates, the mean effect of the US troops correspons to the distance between *i*-th and *j*-th territories transaction costs weighted by the elements of the covariate set. Our strategy is to use a nested model specification with the full covariate set to estimate the fullsample variance of transaction costs that is driven by the presence of US troops for the treatment and control samples which yields:

$$\hat{\zeta}_{\tau}^{2} = \frac{1}{2\sum_{i}^{n} w_{i}} \sum_{i=1}^{n} w_{i} \left[\frac{\sum_{j \in \Phi(i)} w_{j} \{y_{i} - y_{i} (1 - t_{i}) - \hat{\tau}_{1}\}^{2}}{\sum_{j \in \Phi(i)} w_{j}} \right]$$
(10)

$$\hat{\zeta}_{\delta}^{2} = \frac{1}{2\sum_{i}^{n} t_{i} w_{i}} \sum_{i=1}^{n} t_{i} w_{i} \left[\frac{\sum_{j \in \Phi(i)} t_{i} w_{j} \left\{ y_{i} - y_{i} \left(1 - t_{i} \right) - \hat{\tau}_{1} \right\}^{2}}{\sum_{j \in \Phi(i)} t_{i} w_{j}} \right]$$
(11)

where the standard moment restrictions on w apply. Since it is likely that the conditional variance of transaction costs depends on the covariates or the presence of US troops itself, an estimate of $\hat{\zeta}_i^2$ may be feasible for each observation. Under such circumstances, the US troops may or may not be present within the same territory. Hence, an alternative matching strategy is required where the observations within the same treatment group are matched is feasible to address the within-cluster treatment sensitivity. Define the within-treatment matching set:

$$\Theta_{h}^{p}(i) = \left\{ j_{1}, j_{2}, ..., j_{h_{i}} \mid t_{j_{k}} = t_{i} \parallel x_{i} - x_{j_{k}} \parallel_{S} < \mid x_{i} - x_{j_{k}} \parallel_{S}, t_{l} = t_{i}, l \neq j_{k} \right\}$$
(12)

where *h* is the desired set size, and where the number of elements in each set, $h_i = |\Theta_h^x(i)|$ may vary the value the caliper depending on ties and of which implies that $\zeta_{t_i}^2(x_i) = \sum_{j \in \Theta(i)} w_j \left(y_j - \overline{y}_{\Theta i} \right)^2 / \sum_{j \in \Theta(i)} w_j - 1 \quad \text{where} \quad \overline{y}_{\Theta i} = \sum_{j \in \Theta(i)} w_j y_j / \sum_{j \in \Theta(i)} w_j - 1 \quad \text{denotes the}$ treatment-control weighted matched level of transaction costs induced by the presence of the US troops in the treatment group.

3.2 Matching on Propensity Scores

The main concern arising from matching state- and locality-level observations based on the presence of US troops by the nearest neighbor approach concerns the exogeneity assumption behind the troops' presence. If the presence of troops is concentrated around a particular covariate or has predictable spatial characteristics such as the disproportionate presence in coastal areas, the internal validity of matching on the nearest neighbour can be brought into question given that a pre-determined channel implies that the presence of troops may be endogenous rather than orthogonal to the level of transaction costs. The failure to address the endogeneity may render any attempt to isolate the effect of the US troops presence on transaction costs questionable. Our strategy to address the potential failure of the exogeneity assumption behind the presence of US troops is to use the propensity score matching estimator (Rosenbaum and Rubin 1983, Abadie and Imbens 2006, 2016) to overcome the potential identification concerns arising from the endogeneity of troops' presence. Suppose $I_i^{US Troops} = 1 \cdot [i \in \{0,1\} \in \Re]$ denotes the state- and locality-level indicator of the presence of US troops and assume that the probability of troops' presence depends on the full covariate set, namely, $p(\mathbf{X}_i, I_i^{US Troops}, \gamma)$ which is our measure of the propensity score used to match state- and locality-level observations within the finite dichotomous interval.

Our propensity score matching strategy proceeds in several steps. The first step is to select a criteria used to match the outcome observations on the treatment model of the US troops' presence propensity score. We construct the set of nearest-neighbor indices of i-th observation where the US troops were present. This effectivel implies that the nearest neighbour indices should, by default, correspond to the differences in the estimated propensity score between i-th treated state or locality and its j-th control counterpart:

$$\Phi_{m}^{P}(i) = \left\{ I_{jk}^{US\,Troops} = 1 - I_{i}^{US\,Troops} \mid \hat{p}_{i}(t) - \hat{p}_{j_{k}}(t) \mid < \hat{p}_{i}(t) - \hat{p}_{l}(t) \mid, t_{l} = 1 - t_{i}, l \neq j_{k} \right\}$$
(13)

where $\Phi_m^P(i)$ denotes the matrix of nearest-neighbor indices for i-th observation, $\hat{p}_i(t) = p(\mathbf{X}_i, I_i^{US\,Troops}, \gamma)$ is the estimated propensity scores of US troops presence using either probit or logit estimator, and m is the number of elements within each set $m_i = \left| \Phi_m^P(i) = \sum_{j \in \Phi_m^P(i)} w_j \right|$, which denotes the total number of matches for each propensity score. In a similar vein, define the withintreatment covariate-level matching set:

$$\Phi_{h}^{P}(i) = \left\{ j_{1}, j_{2}, \dots, j_{h_{i}} \mid t_{j_{k}} = t_{i}, \mid p_{i}(t) - p_{j_{k}}(t) \mid < |p_{i}(t) - p_{j_{k}}(t)|, t_{l} = 1 - I_{i}^{US \, Troops}, l \neq j \right\}$$
(14)

which allows us to estimate the difference in transaction costs that depends on whether the US troops were present in \dot{F} th state or locality, and where h is the desired number of matches that may varying with the caliper limit, the density of cross-observation ties, and the value of the caliper where $h_i = \left|\Theta_h^p(i)\right|$. By computing the matching set using Eq. (14), we estimate the potential transaction cost in the absence of US troops using a simple potential outcome framework from Eq. (5).

In the next step of our matching strategy, the adjustment of the transaction cost variance that could exhibit persistent non-zero stochastic disturbances and unequal random error variance across space. By following Abadie and Imbens (2006), we use the treatment model's variance-covariance matrix to compute the standard errors robust against unequal random error variance distribution and serially correlated stochastic disturbances. This implies that the variance of both the effect of US troops presence both population-wise and on the treated should be appropriately adjusted to allow heteroscedasticity-consistent parameter inference using a simple adjustment mechanism:

$$\hat{\sigma}_{\lambda}^{2} = \hat{\sigma}_{\tau}^{2} + \hat{\mathbf{c}}_{\tau}' \hat{\mathbf{V}}_{\gamma} \hat{\mathbf{c}}_{\tau}'$$
(15)

$$\hat{\sigma}_{\delta}^{2} = \hat{\sigma}_{\tau}^{2} + \hat{\mathbf{c}}_{\tau}' \hat{\mathbf{V}}_{\gamma} \hat{\mathbf{c}}_{\tau}' + \frac{\partial \delta_{1}}{\partial \gamma'} \hat{V}_{\gamma} \frac{\partial \delta_{1}}{\partial \gamma'}$$
(16)

where $\hat{\sigma}_{\eta_1}^2$ is the adjusted variance of η_1 which captures the matched full effect of US troops presence, and $\hat{\sigma}_{\delta}^2$ is the adjusted variance of δ which captures the effect of US troops presence on the treated states and localities only. Notice that the variance adjustment depends on the matched variancecovariance matrix from the treatment model, denoted by \hat{V} , and on the adjustment term for η_1 . By using the paired covariance matrices between the full set of covariates, the two outcome realizations, \hat{y}_{i1} and \hat{y}_{i0} are weighted with the sequence of weights evenly distributed between the estimated propensity scores, $\hat{p}_i(0)$ and $\hat{p}_i(1)$ using a Gaussian probability distribution function $f(\mathbf{x}'\hat{\gamma}) = dp(\mathbf{x}', 1, \hat{\gamma})/d(\mathbf{x}'\hat{\gamma})$ which leads to a more parsimonious computation of the adjustment term:

$$\hat{\mathbf{c}}_{\tau} = \frac{1}{\sum_{i=1}^{n} w_{i}} \sum_{i=1}^{n} w_{i} \cdot f\left(\mathbf{x}_{i}' \hat{\gamma} \left(\frac{\operatorname{cov}(\mathbf{x}_{i}, \hat{y}_{i1})}{\hat{p}_{i}(1)} + \frac{\operatorname{cov}(\mathbf{x}_{i}, \hat{y}_{i0})}{\hat{p}_{i}(0)} \right)$$
(17)

For a given treatment status, the presence of US troops, we assume a non-zero covariance between the transaction costs and the full set of covariates, $\operatorname{cov}(\mathbf{x}_i, \hat{y}_{i0}) \neq 0$ which allows us to generate the potential outcomes in the presence and absence of the US troops as the underlying treatment. This implies that covariances in the adjustment term should vary with the state- and locality-level treatment status:

$$\operatorname{cov}(\mathbf{x}_{i}, \hat{y}_{ti}) = \begin{cases} \frac{\sum_{j \in \Theta_{h}(i)} w_{j} \left(\mathbf{x}_{j} - \overline{\mathbf{x}}_{\Theta_{i}} \right) \left(\mathbf{y}_{j} - \overline{\mathbf{y}}_{\Theta_{i}} \right)}{\sum_{j \in \Theta_{h}(i)} w_{j} - 1} & \text{if } t_{i=t} \\ \frac{\sum_{j \in \Phi_{h}(i)} w_{j} \left(\mathbf{x}_{j} - \overline{\mathbf{x}}_{\Phi_{i}} \right) \left(\mathbf{y}_{j} - \overline{\mathbf{y}}_{\Phi_{i}} \right)}{\sum_{j \in \Phi_{h}(i)} w_{j} - 1} & \text{otherwise} \end{cases}$$
(18)

where $\operatorname{cov}(\mathbf{x}_i, \hat{\mathbf{y}}_{ti})$ is a $p \times 1$ vector with $\overline{\mathbf{x}}_{\Theta_i} = \sum_{j \in \Theta_h(i)} w_j \mathbf{x}_j / \sum_{j \in \Theta_h(i)} w_j \mathbf{x}_j / \sum_{j \in \Phi_h(i)} w_j$ marking the weighted set of covariates from the nearest neighbour indices, and $\overline{\mathbf{x}}_{\Phi i} = \sum_{j \in \Phi_h(i)} w_j \mathbf{x}_j / \sum_{j \in \Phi_h(i)} w_j$ is the weighted set of covariates predicting the presence of US troops through the calibrated propensity score, and $\overline{\mathbf{y}}_{\Phi i} = \sum_{j \in \Phi_h(i)} w_j \mathbf{y}_j / \sum_{j \in \Phi_h(i)} w_j$ denotes the potential level of transaction costs in the absence of US troops. The reliance on the propensity scores to estimate the potential level of transaction costs may lead to disproportionately large within-state and paired-control clusters used to adjust the variances of the US troops effect, $\hat{\sigma}_{\eta_1}^2$ and $\hat{\sigma}_{\delta}^2$. These may be driven by the arbitrary number of treatment-related matches instead of the cluster $\Phi_m^{\rho}(i)$ used to compute the respective $\hat{\eta}_1$ and $\hat{\delta}_1$. To address the discrepancy between treatment-control cluster and the match out, we use both the Mahalnobis and Euclidean scaling matrices and use h = 5 as the number of matches for the given caliper limit to ensure that the potential outcomes are matched with the sufficient number of cross-observation ties. This ensures that cross-covariate matching between i-th state or locality and its j-th counterpart on the observable characteristics for the given set of estimated propensity scores $\hat{p}_i(t_i)$ where $t \in \{0,1\}$ is given by:

$$\mathbf{c}_{\delta,1} = \frac{1}{\sum_{i=1}^{n} t_{i} w_{i}} \sum_{i=1}^{n} w_{i} \mathbf{x}_{i} f\left(\mathbf{x}_{i} \hat{\boldsymbol{\gamma}}\right) \times \left(\widetilde{\boldsymbol{y}}_{1i} - \widetilde{\boldsymbol{y}}_{0i} - \hat{\boldsymbol{\delta}}_{1}\right)$$
(19)

$$\mathbf{c}_{\delta,2} = \frac{1}{\sum_{i=1}^{n} t_{i} w_{i}} \sum_{i=1}^{n} w_{i} \mathbf{x}_{i} f\left(\mathbf{x}_{i}' \hat{\boldsymbol{\gamma}}\right) \times \left(\operatorname{cov}\left[\mathbf{x}_{i}, \hat{\boldsymbol{y}}_{1,i}\right] + \frac{p_{i}(1)}{p_{i}(0)} \operatorname{cov}\left[\mathbf{x}_{i}, \hat{\boldsymbol{y}}_{0,i}\right]\right)$$
(20)

where the within-treatment matching sets $\Phi_h(-i) = \Phi_h^p(-i)$ are similar to $\Phi_h^p(i)$ but exclude i-th treated observation:

$$\Phi_{h}^{p}(-i) = \left\{ j_{1}, j_{2}, \dots j_{h_{i}} \mid j_{k} \neq i, t_{j_{k}} = t_{i}, \left\| \hat{p}_{i} - \hat{p}_{j_{k}} \right\| < \left\| \hat{p}_{i} - \hat{p}_{l} \right\|, t_{l} = t_{i}, l \notin \left\{ i, j_{k} \right\} \right\}$$
(21)

and compute the partial derivative in the variance adjustment term by matching on the inverse treatment status using the covariate set $\mathbf{x}_i = (x_{i,1}, x_{i,2}, ..., x_{i,p})$. By letting $\Theta_m^X(i)$ denote the cluster set for i = 1, 2, ..., n, we estimate $p \times 1$ vector of $(\partial \delta_1)/(\partial \gamma')$ as follows:

$$\frac{\partial \delta_1}{\partial \gamma'} = \frac{1}{\sum_i^n t_i w_i} \sum_{i=1}^n \mathbf{x}_i f(\mathbf{x'}, \gamma) \Big((2t_i - 1) \Big(\mathbf{y}_i - \mathbf{y}_{\Phi_{m_i}^X} \Big) - \hat{\delta}_1 \Big)$$
(22)

where $y_{\Phi_{m_i}^X} = \sum_{j \in \Theta_m^X(1)} w_j y_j / \sum_{j \in \Theta_m^X(1)} w_j$ denotes the weighted level of transaction costs corresponding to the matched counterpart as predicted from $p_i(0)$ and $p_i(1)$ using $\mathbf{w}_i = \{w_{i1}, w_{i2}, ..., w_{ip}\}$ to establish the closest covariate-level counterpart based on the within-treatment cluster match-up set in Eq. (21) where Eq. (22) allows us to recover the potential transaction costs in the absence of US troops using the restricted covariate-level distance between the troops-controlled states and those without the troops' presence sharing similar covariate-level characteristics to compute the missing counterfactual in the presence of endogenous troops presence.

4 Data

4.1 Dependent Variables

Our dependent variable comprises a series of indicators of transaction costs. The data on statelevel transaction costs is from the series of sub-national Doing Business reports for Mexican states for the period 2006-2015 (World Bank 2006, 2007, 2009, 2012, 2014, 2016). The level of transaction costs is captured by the costs of business registration, cost of dealing with construction permits, cost of property registration and cost of contract enforcement. For each underlying indicator, we compute a standardized transaction cost variable using the Gaussian transformation, $C_{i,t} = (\tau_{i,t} - \mu_t^{\tau})/\sigma_t^{\tau}$ where C is the respective proxy for transaction costs in state i at time t, τ is the untransformed original indicator of transaction costs, μ is the mean value of τ -th indicator, and σ is its standard deviation.

4.1.1 Costs of Business Registration

For the costs of business registration, we consider (i) the number of incorporation procedures to legally start and formally operate the company, including pre-registration, registration, and postregistration procedures, (ii) time required to complete each procedure denoted in calendar days, (iii) and costs required to complete all procedures recorded in terms of percentage of state-level per capita income.

4.1.2 Costs of Dealing with Construction Permits

The costs of dealing with construction permits include the number of procedures to legally build a warehouse, time required to complete each procedure, the cost required to complete the procedures, and the latent index of state-level building quality. The number of procedures include the submission of all relevant documents and obtaining all necessary clearances, licenses, permits, and certifications, submission of all required notifications and receiving all necessary inspections, obtaining utility connections for water and sewerage, and the registration of the warehouse after completion. The time required to complete procedures does not include the time spent on gathering information, and each procedure is considered complete once the final document is received assuming no prior contact with the officials. The cost required to complete each procedure is denoted in terms of percentage of warehouse value. Bribes to the permit officials are excluded from the costs.

Quality of building index consists of six sub-indices and reflects the quality control and safety mechanisms in the construction regulatory system. The six sub-indices include (i) quality of building regulations (accessibility and clarity of requirements, 2 points), quality control before construction (whether licensed or technical experts approve the plan, 1 point), quality control during construction (types of inspections, de facto implementation of legally mandated inspections, 3 points), quality control after construction (whether the final inspection is legally mandated after construction and whether the legally mandated inspections are de facto implemented, 3 points), liability and insurance regimes (whether parties are held liable for structural flaws, and whether parties are legally mandated to obtain insurance cover structural flaws, 2 points), and professional certifications index (whether qualification requirements for the approval of building plans exist, and whether the qualification requirements for inspections and construction supervision exist, 4 points). The building quality control is the sum of six sub-indices with the maximum of 15 points.

4.1.3 Costs of Property Registration

The costs of property registration include (i) the number of procedures legally required to register a property, (ii) the total number of days required to register property indicated by as the median duration that property lawyers, notaries or registry officials indicate is necessary to complete the procedures, (iii) the cost of completing property registration procedures recorded in terms of percentage of property values, and (iv) the index of the quality of land administration. The procedures to legally transfer title on the immovable property includes pre-registration procedures (such as checking of liens, notarizing sales agreement, and paying property transfer taxes), registration procedures, and post-registration procedures such as filing with the municipality. The time required to complete each procedure does not include the time spent on gathering information. The cost of completing the procedures takes into account official costs only such as administrative fees, stamp duties, transfer taxes, and any other payment to the property registry, notaries, public agencies, and lawyers. For the sake of data limitations, bribes are not included.

The quality of land administration index consists of five sub-indices: (i) reliability of property infrastructure (8 points), (ii) transparency of information (6 points), (iii) geographic coverage (8 points), (iv) land dispute resolution (8 points), (v) equal access to property rights. Reliability of property infrastructure captures the type of system for archiving information on land ownership, availability of edatabase to check for encumbrances, types of system for archiving maps, availability of geographic information system, and the link between property ownership registry, and mapping system. The transparency of information index consists of the accessibility of information on land ownership, accessibility of maps of land plots, publication of fee schedules, lists of registration documents, service standards, availability of specific and separate complaint mechanisms, and the publication of statistics about the number of property transactions. Geographic coverage index reflects the coverage of land registry at the level of the largest business city in the state, and coverage of mapping agency at the level of the largest business city in the state. Land dispute resolution index reflects the quality of the legal framework for immovable property registration, and mechanisms to prevent and resolve land disputes. The quality of land administration index is a simple sum of the six sub-indices.

4.1.3 Costs of Contract Enforcement

The assessment of the costs of contract enforcement is based on the standardized commercial case dispute through a local first-instance court. The data is collected through the study of codes of civil procedure other court regulations as well as questionnaires completed by local litigation lawyers and judges. The cost measures include (i) the number of procedures necessary to resolve the dispute, (ii) time required to enforce a contract through the court recorded in calendar days, and (iii) cost required to enforce a contract through the court as a fraction of the claim value. The costs comprise the attorney fee, court fee, and enforcement fee. We also include the quality of the judicial process index, which consists of the four major indices and 17 sub-indices measuring the degree of state-level judicial efficiency. Table 1 presents the criteria used for the construction of the judicial quality index in greater detail. Higher values indicate a better and more efficient judicial process.

	Presence	Absence
Panel A: Court Structure and Proceedings		
Availability of specialized commercial court	1.5 points	0 points
Availability of small claims court and/or simplified procedure for small	1 point, additional	0 points
claims	0.5 points assigned if	
	parties can represent	
	themselves before	
	the court in the	
	specific procedure	
Availability of pre-trail attachment for plaintiffs	1 point	0 points
Random assignment of cases to judges	1 point	0 points
Panel B: Case Management		
Regulations setting time standards for service of process, first hearing,	1 point	0 points
filing of the statement of defense, completion of evidence period, filing		
of testimony by expert, and submission of the final judgement		
Regulations setting time standards on adjournments and continuances	$1~{\rm point},0.5~{\rm point}$ if	0 points
and whether these rules are respected in more than 50% of cases	only two out of	
	three criteria are	
	met	
Availability of performance measurement reports to monitor court	1 point	0 points
performance		
Availability of pretrial conference to discuss scheduling, case	1 point	0 points
complexity, possibility of settlement through alternative dispute		
resolution, evidence, jurisdiction and other procedural issues, and		
narrowing down of contentious issues		
Availability of electronic case management system for judges to access	1 point	0 points
laws, regulations, and case law, to automatically generate a hearing		
schedule for all cases on their docket, to send notifications to lawyers,		
to track the status of the case on their docket, to view and manage		
case documents, to assist in writing judgements, to semi-automatically		
generate court order, and to view court orders and judgements in a		
particular case		

Table 1: Measuring the Quality of the Judicial Process Across Mexican States

Availability of electronic case management for lawyers to access laws,	1 point	0 points
regulations, and case law, to track the status of the case, to view and		
manage case documents, to file briefs and documents with the court,		
and to view court orders and judgements in a particular case		
Panel C: Court Automation Index		
Ability to file initial complaint electronically through a dedicated	1 point	0 points
platform		
Ability to serve initial complaint electronically through a dedicated	1 point	0 points
system		
Ability to pay court fees electronically through a dedicated platform or	1 point	0 points
online banking		
Publication of judgements rendered by local courts to the general	$1~{\rm point},0.5~{\rm point}$ if	0 points
public in official gazettes, newspapers or on the internet	only judgements	
	rendered at the	
	appeal and supreme	
	court level are made	
	available to the	
	general public	
Panel D: Alternative Dispute Resolution	general public	
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or	general public 0.5 point	0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure	general public 0.5 point	0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects	general public 0.5 point	0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public	general public 0.5 point 0.5 point	0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration?	general public 0.5 point 0.5 point	0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in	general public 0.5 point 0.5 point 0.5 point	0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases	general public 0.5 point 0.5 point 0.5 point 0.5 point	0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of	general public 0.5 point 0.5 point 0.5 point 0.5 point 0.5 point	0 points 0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of resolving commercial disputes	general public 0.5 point 0.5 point 0.5 point 0.5 point 0.5 point	0 points 0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of resolving commercial disputes Are voluntary mediation, conciliation or both governed by a	general public 0.5 point	0 points 0 points 0 points 0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of resolving commercial disputes Are voluntary mediation, conciliation or both governed by a consolidated law or consolidated chapter or section of the applicable	general public 0.5 point 0.5 point 0.5 point 0.5 point 0.5 point 0.5 point	0 points 0 points 0 points 0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of resolving commercial disputes Are voluntary mediation, conciliation or both governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects	general public 0.5 point 0.5 point 0.5 point 0.5 point 0.5 point 0.5 point	0 points 0 points 0 points 0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of resolving commercial disputes Are voluntary mediation, conciliation or both governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are there financial incentives for parties to attempt mediation or	general public 0.5 point	0 points 0 points 0 points 0 points 0 points 0 points 0 points 0 points
Panel D: Alternative Dispute Resolution Is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are the commercial disputes other than those that deal with public order or public policy that cannot be submitted to arbitration? Are valid arbitration clauses or agreements enforced by local courts in more than 50% of the cases Are voluntary mediation, conciliation or both recognized ways of resolving commercial disputes Are voluntary mediation, conciliation or both governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing all its aspects Are there financial incentives for parties to attempt mediation or conciliation (such as refund of court filing fees) if it is successful?	general public 0.5 point	0 points 0 points 0 points 0 points 0 points 0 points 0 points

Source: World Bank Doing Business, Subnational Report on Mexico

Table 2 presents the comparison of transaction costs across the four respective categories between the Mexican states depending on the presence of US troops. By comparing the outcomes between states occupied by US troops and the states without their presence, we compare the variance of costs and determine if any discernible differences can be detected from a simple comparison. The descriptive evidence suggests marked differences in the level of both administrative and procedural transaction costs. In particular, troops-occupied states tend to have fewer procedures necessary to start business, lower duration of the procedures and higher overall cost of starting business. In all respective cases, the raw differences are statistically significant at 1%, respective. States where troops were not present have fewer procedures to deal with construction permits as well as shorter duration of these procedures and lower overall cost. By contrast, these states have a substantially lower quality of the construction permit regime (i.e. p-value = 0.000). Troops-occupied states are also characterized by less complex property registration procedures and shorter duration of these procedures but with a noticeably lower quality of land administration. With respect to the cost of contract enforcement, reasonably large differences can be found between the states. In particular, troops-occupied states have substantially shorter duration of contract enforcement procedures and less complexity behind it. Cost of contract enforcement is notably lower in troops-occupied states along with markedly higher quality of the judicial process in these states (i.e. p-value = 0.000).

	US Troops Presence Le		Levene's Robust
	Yes	No	Variance Equality Test
			(p-value)
Panel A: Administrative Transaction Costs			
# Procedures to start business	-0.287	0.151	0.001
# Days to start business	-0.219	0.115	0.000
Cost of starting business	0.537	-0.282	0.001
# Procedures to deal with construction permits	0.079	-0.042	0.385
# Days to deal with construction permits	0.219	-0.115	0.059
Quality of construction permits	0.147	-0.077	0.000
Cost of dealing with construction permits	0.371	-0.195	0.000
Panel B: Procedural Transaction Costs			
# Property registration procedures	0.041	-0.021	0.001
# Days to register property	0.172	-0.091	0.415
Cost of property registration	-0.029	0.015	0.002
Quality of land administration	-0.058	0.030	0.037
# Days to enforce contract	0.055	-0.029	0.000
# Procedures to enforce contract	0.238	-0.125	0.000
Cost of contract enforcement	0.316	-0.167	0.000
Quality of the judicial process	0.134	-0.070	0.000

Table 2: Outcome Comparison Between Occupied and Non-Occupied Areas

4.2 Treatment Variable

The Mexican-American War had a tremendous impact on the institutional development of Mexico. Besides thousands of military and civilian deaths, the war caused a severe disruption of internal and external trade with a substantial economic ruin (Sicotte and Vizcarra 2009). The war also provided a long-lasting institutional shock to the Mexican political economy (Tenenbaum 1986). After gaining independence from Spain in 1821, Mexico adopted the federal constitution in 1824. The constitution retained some of the pre-independence privileges to the military and the church. The central government levied high tariffs on imports as it relied heavily on customs revenue. The 1824 constitution also retained significant elements of Spanish law, mainly commercial law based on the *Ordenanzas de Bilbao* from 1737 (Carmagnani and Marichal 2001). By mid-1830s, the constitutional order collapsed in the light of the attempt to expropriate church holdings of the land. The conservative regime that followed in late 1830s

adopted strongly centralist measures to downgrade the autonomy of the states which precipitated numerous rebellions such as the 1835 Texas Rebellion. The Mexican-American War in 1846 came when Mexico was in the state of institutional chaos (Santoni 1996, Vazquez 1998). The disruption caused by the war encouraged a period of substantial institutional change which resulted in the liberal victory in 1855. The US intervention had a substantial influence on Mexican institutional development. It encouraged the abolition of military and clerical courts (*fueros*) over the civil matters. It had a strong impact on the new federal constitution based on liberal principles, and fostered liberal institutional building which resulted in a new civil code in 1871, a new commercial code in 1884 (Knowlton 1967, Ducey 1997, Negretto and Aguilar-Rivera 2000). While the war caused a severe disruption to trade and commerce, it also encouraged liberal institutional changes, and thus had prolonged and long-lasting implications for the path of Mexican institutional development. We exploit state-level spatial variation in the presence of US troops during the Mexican-American war in the period 1846-1848 as a plausibly exogenous source of variation in long-run growth rates of Mexican states. Since the US presence in 1848 held long-lasting implications for Mexican institutional development, its impact should be reflected in the levels of transaction costs of Mexican states down to the present day as the previously established institutional framework has a tendency to persist for a long period of time (Acemoglu and Robinson 2006).

We classify the US military forces' presence in the Mexican states depending on whether the US military defeated the Mexican army in each military campaign, and conquered the major cities in the state. To this end, we review a large strand of historical bibliography on the US occupation of Mexico, primarily relying on Carney (2006), and code the presence of US troops in 1848 across the full set of US military campaigns. In doing so, we match the state-level transaction costs with the presence of US troops in 1848. The value of the underlying US troops variables take 1 for the states Baja California, Baja California Sur, Chihuahua, Coahuila de Zaragoza, México, Mexico City, Nuevo Leon, Puebla, Sinaloa, Tamaulipas, Veracruz, and 0 for the states without the US presence in 1848.

4.3 Covariates

Our covariates used to match the occupied and non-occupied states comprise the size of the population in 1840 and 1850 (Mateos 1991). Using the population size before and after the war allows to match the states with similar size-related characteristics prior to the war as well as to capture any short-term negative demographic shock that could taint the effect of troops presence on present-day transaction costs. The second class of covariates consists of the variables proxying the historical diseases environment. Upon the colonization of Mexico, Spanish conquistadors encountered large, relatively advanced and

urbanized indigenous societies. Existing estimates by Gibson (1964) and Hassig (1985) indicate the size of the indigenous population at around 20 million. After the completion of the conquest by mid-16th century, the Spanish Crown instituted encomiendas in the attempt to extract tribute from the indigenous population. Alongside the rise of encomienda, a variety of disease, drought and famine precipitated a demographic collapse of the indigenous population that is estimated at about 90 percent (Newson 1993). The demographic collapses facilitated a reasonably straightforward and low-cost acquisition of land by the colonial elites (Sellars and Alix-Garcia 2018). The importance of the disease environment for the demographic collapse can be hardly overstated. We draw the data on the historical disease environment from Cook and Krusic (2004) and Garfias and Sellars (2018). Our proxies for the strength of the disease environment include indices of drought severity for the years 1600 and 1645 as the two major years linked with the onset of *cocolitzi* epidemics (Acuña Soto et. al. 2002).⁴

An increasing number of studies highlight the importance of ethnic divisions for institutional quality. (Easterly and Levine 1997, Montalvo and Reynal-Querol 2005). The general thrust of these studies is that high ethnic divisions are less likely to promulgate favorable conditions for economic exchange to take place and encourage rent-seeking along ethnic lines which should be reflected in varying levels of transaction costs. Many scholars argue and show empirically that ethnically fractionalized society is to blame for badly designed economic policies, inferior level of institutional quality (Alesina et. al. 2003, Campos et. al. 2011, Putterman and Weil 2010). We use the historical ethnic fractionalization across Mexican states as an additional covariate used to match the occupied and non-occupied states. Our measures of ethnic fractionalization are constructed from the first official census for the Viceroyalty of New Spain in 1793, cordially known as 1er *Censo de Poblacion de la Nueva España, Censo de Revillagigedo* (Lerner 1968). More specifically, we extract district-year ethnic group shares for three major groups, (i) European-born population, (b) indigenous Amerindian population and (iii) Mestizo population and match them with the current state-level administration division. A simple historical ethnic fractionalization index for i-th state is constructed as:

$$Ethnic_{1793,i,k} = 1 - \sum_{j=1}^{J} \left[f(n_j) / N_j \right]$$

⁴ Cocolitzi bacteria is a climate-related pathogen transmitted by rodents. The bacteria flourishes in the periods of disproportionate rainfall after the period of prolonged severe drought. Rodents of the bacteria transmit into water and food resources and spread the pathogen further among the rodent population. When climatic conditions improve, rodents dissipate into agricultural fields and homes causing rapid spread of infection among the populace by inhaling rodents' faces. The spread of the bacteria has been associated with the post-conquest demographic collapse (Garfias and Sellars 2018).

where $k \in \{1793\}$ denotes the census tract year, $f(n_j)$ denotes the size of j-th ethnic group and J indicates the number of ethnic groups in a given total population size denoted by N. Apart from the ethnic fractionalization index following Easterly and Levine (2016) we also consider the share of European population in 1793 as a separate matching variable to parse out the historical European presence and use it to match the occupied and non-occupied states. Our final matching covariate comprises the physical distance from the US border given that the proximity to the border likely determined the likelihood of each state being occupied by the US troops.

Table 3 lays out the covariate comparison between the states occupied by US troops and states without the troops' presence. The matched comparison reveals a marked drop in the standardized differences between the occupied and non-occupied states reinforcing the notion that the pre-war differences seem to be low between both groups and do not seem to be discernible and attributed to the other countervailing shocks. This implies that the estimated impact of troops presence should likely reflect the impact behind a radical institutional overhaul rather than the impact of the competing shocks. This notion is further reinforced by a marked drop in the matched variance ratio compared to the raw data on occupied and non-occupied states.

	Standardiz	ed differences	Variar	nce ratio
	Raw	Matched	Raw	Matched
Population Size in 1840	0.187	-0.028	2.535	1.628
Population Size in 1850	0.182	0.082	2.164	1.469
Disease Environment (latent)	-0.157	0.150	1.089	0.752
Distance from US Border	-1.173	-0.040	1.423	0.378
Ethnic Fractionalization in 1783	0.107	0.031	0.435	0.534
Share of Europeans in 1783	0.444	0.197	3.417	1.725
Drought Severity in 1600	-0.175	0.135	1.119	0.761
Drought Severity in 1645	-0.171	0.132	1.123	0.757

 Table 3: Covariate Balance Comparison

One of the assumptions behind the feasibility of using propensity scores matching estimator concerns the overlap. This assumption state that each treated unit has a positive non-zero probability of receiving each treatment level. That is, each state or locality in our sample should have the positive probability of the US troops presence. The treatment overlap assumption can be inspected by checking the estimated probability density of the troops presence. If the estimated densities of the predicted troops presence indicate too much probability mass near the lower and upper treatment threshold bound, then the respective density masses in the regions of troops presence and the regions without them where overlap is possible, then treatment overlap assumption is likely violated. If the concentration of the probability mass near both thresholds is low, then the overlap assumption is not violated (Busso et. al. 2014). Figure 2 exhibits the outcome-level balance plot between the occupied and non-occupied states. Notice that for each respective outcome, the plot does not indicate too much estimated probability mass near zero or unitary thresholds. This implies that the estimated probability densities have most of their respective mases in the spatial region in which they overlap each other. Hence, the treatment overlap assumption does not seem to be violated.



Figure 2: Transaction Cost Balance Plot between Occupied and Non-Occupied States



#Days to start business

Matched

Raw





Procedures to deal with construction permits

Raw

Matched

Density 5

-2 -1 0

1 2

-2 -1

- No US troops present ----- US troops present

0 1 2







5 Results

5.1 Baseline estimates

Table 3 reports the effects of US troops presence on state-level transaction costs using propensity score and nearest-neighbor matching estimators. Columns (1) through (3) report propensity score estimates using both probit and logit estimators. The results from column (1) reveal several noteworthy effects. Considering the cost of business registration, statistically significant differences are perceptible across states depending on weather US troops were present or not. The presence of US troops corresponds to significantly reduced procedural complexity behind business registration, shorter duration of the registration procedures and, yet, higher overall cost of business registration. Our estimates thus convey that the US troops presence led to substantially more streamlined and rational business registration procedures and higher overall cost of the registration. Given that both the count and duration of business registration procedure is markedly lower in the states where US troops were present, higher cost of these procedures reflects greater capacity of the state-level regulatory institutions in carrying out business registration procedures, thus lower instead of higher transaction costs. In quantitative terms, states where US troops were present have about 1 standard deviation lower number of the procedures necessary to start business (i.e. p-value = 0.000), half standard deviation lower duration of the procedures (i.e. p-value= 0.000), and about 0.8 standard deviation higher cost of starting business than states without US troops presence in 1848. Notice that the underlying point estimates are robust to the choice of first-stage estimator and do not vary much between logit and heteroscedasticity- and autocorrelation-consistent (HAC) estimators.

The impact of US troops presence on the costs of dealing with construction permits appears to be equally profound. The presence of US troops is associated with markedly lower costs of dealing with permits although not all impacts are equally large and important. Troops-controlled states tend to have considerably lower number of procedures necessary to deal with construction permits. The average treatment effect of US troops presence is about 0.4 standard deviation lower count of procedures compared to the states without troops. By contrast, the presence of US troops is associated with substantially longer duration of procedures. As indicated in columns (1) through (3), troops-controlled states also tend to have considerably higher quality of dealing with construction permits as well as higher cost of obtaining the permits. This implies that the troops-controlled states have less complex permit and licence procedures and higher quality of the permit regime which also implies that greater quality is associated with higher overall cost and markedly longer duration of the procedures.

Substantively similar results are found with respect to the impact of US troops presence on the costs of property registration. The states where US troops were present tend to have considerably less complex property registration procedures and yet considerably longer duration of the procedures, higher cost of property registration and substantially better quality of land administration. The impact of troops presence on the cost of contract enforcement is particularly interesting and informative given that the presence of troops resulted in significant overhauls of the pre-war contract enforcement regime. Based on the estimated propensity scores, our estimates arguably indicate significant improvements in the contract enforcement regime in response to the US troops presence. Troops-controlled states tend to have considerably lower duration of contract enforcement procedures. The average treatment effect of troops presence on the duration of contract enforcement procedures amounts to -0.18 standard deviation drop in the duration of procedures (i.e. p-value = 0.037).

		Propensity Scores		Nearest Neighbors		
	Logit	Probit	HAC Probit	Non-Exact Mate	ance Metrics:	
	(1)	(2)	(3)	(4)	(5)	(6)
Distance metric	None	None	None	Mahalanobis	Inverse Covariance	Euclidean
# Procedures to start	-1.119***	882***	775***	496***	440***	496***
business	(.125)	(.123)	(.128)	(.128)	(.127)	(.128)
# Days to start	521***	359***	316***	586***	281***	450***
business	(.086)	(.083)	(.093)	(.098)	(.085)	(.085)
Cost of starting	.884***	.994***	.995***	.588***	.563***	.546***
business	(.109)	(.104)	(.103)	(.115)	(.113)	(.094)
# Procedures to obtain	483***	339***	673***	496***	186**	.021
permits	(.133)	(.131)	(.117)	(.128)	(.103)	(.112)
# Days to obtain	.190**	.310***	005	.361***	.423***	.534***
permit	(.088)	(.093)	(.104)	(.093)	(.089)	(.098)
Quality of permit and	.774***	.687***	.339***	.529***	.421***	.584***
licences	(.069)	(.061)	(.057)	(.079)	(.068)	(.078)
Cost of dealing with	1.581***	1.307***	1.413***	1.496***	1.289***	.404***
permits	(.268)	(.230)	(.257)	(.190)	(.173)	(.097)
# Procedures to	310***	160*	341***	278**	152	172**
register property	(.093)	(.083)	(.084)	(.109)	(.103)	(.075)
# Days to register	.406***	.367***	.247***	.562***	.692***	002
property	(.112)	(.095)	(.099)	(.133)	(.106)	(.083)
Cost of property	.406***	.351***	.502***	.170***	.298***	279***
registration	(.112)	(.088)	(.094)	(.093)	(.085)	(.091)
Quality of land	.235***	016	.031	.271***	117	.031
administration	(.063)	(.056)	(.067)	(.062)	(.073)	(.047)
# Days to enforce	184**	087	241***	106	004	025
contract	(.076)	(.076)	(.085)	(.104)	(.079)	(.093)
# Procedures to enforce	.503***	.530***	120*	.270***	.478***	.229***
contract	(.067)	(.063)	(.069)	(.060)	(.077)	(.088)

Table 3: Nearest Neighbor and Propensity Score Estimated Effect of US Troops Presence on Transaction Costs

Cost of enforcing	193***	221***	086	.283***	.510***	.305***
contract	(.089)	(.067)	(.083)	(.099)	(.090)	(.071)
Quality of judicial	.450***	.304***	.369***	.342***	.234***	.081
process	(.054)	(.051)	(.063)	(.064)	(.058)	(.073)
# observations	300	300	300	300	300	300
# covariates	8	7	7	7	7	7
# match-ups	5	5	5	5	5	5

Notes: the table presents the treatment effect of the US troops presence on state-level transaction costs. The dependent variable is the state-level indicator of transaction costs as laid out in each column. The set of quasi-treatment effects is estimated using Rosenbaum and Rubin (1983) propensity matching framework and Abadie and Imbens (2006) nearest-neighbor matching estimator. Using both respective estimators, the level of transaction costs is compared based on whether or not the US troops were present in each state. Potential transaction costs are estimated using the neighbourhood-level covariate-specific mean values of the states without the presence of US troops using the full set of covariates from Table 2. The full treatment effect of US troops presence is computed using the Abadie and Imbens (2006) analytical asymptotic variance-covariance matrix estimator based on the Gaussian approximation of the matching estimator to its asymptotic distribution.

Contrary to the impact of troops presence on other categories of transaction costs, states undergoing troops presence in 1848 have substantially greater number of overall contract enforcement procedures but also lower overall cost of dealing with these procedures relative to the value of the claim. In the long run, the presence of US troops is associated with considerable improvement in the quality of the judicial process. By matching the states on pre-war characteristics and calculating the corresponding propensity scores, troops-controlled states tend to have between 0.30 and 0.45 standard deviation higher quality of the judicial process which appears to be statistically significant (i.e. p-value = 0.000).

The general notion of results highlights the noteworthy and substantial changes in the level and quality of contracting institutions in response to the US presence. Given that the states are matched on pre-war covariates rather than their post-war counterpart covariates; it is not substantially likely that the estimated average treatment effects reflect the impacts other than the change in the post-1848 equilibrium. On the substantive note, our results show that not all impacts are created equal. States where US troops were present tend to have considerably less complexity involved in business registration and construction permit procedures. These procedures seem to be somewhat more expensive compared to the states without US troops presence but higher cost is compensated by substantial and statistically significant quality improvements. Similarly, we find higher costs of property registration in troops-controlled states coupled with markedly better quality of land administration. This implies that the counterfactual scenario illustrates greater number of procedures, lower duration and cost but deteriorating quality of the land administration which implies that the presence of troops is associated with ex-ante uncertainty-reducing mechanisms which diminish the incentives for ex-post contractual opportunism. Higher monetary costs of starting business, construction permits and property registration thus indicate a source of improved regulatory capacity given that high-quality procedures are costly per se. Given that the importance of contract enforcement for economic outcomes is widely recognized in the extant literature, our results show that troops-controlled states have lower (instead of higher) costs of contract enforcement a significantly better quality of the judicial process than states without the troops presence. By default, higher quality of the judicial process may involve a somewhat greater number of judicial procedures and slightly longer duration than the ones found in fast but low-quality judiciaries. Given the disproportionate impact of Kearny code on the contract enforcement regimes in Mexico, the estimated effects of troops presence on contract enforcement indicators is both expected and theoretically plausible. Our notions are mutually reinforced both by propensity score and nearest neighbor estimates.

Does the estimated average treatment effect of US troops presence reflect the underlying effect of the external US intervention or is it tainted by other factors? To address this particular caveat, we ask whether the matched samples are balanced based on the propensity scores (Cattaneo 2010). In the eventual failure to achieve the balance, the estimated propensity scores should differ markedly when the samples are matched, hence rendering any notion of balance to recover the effect of US troops questionable. By contrast, when the matched samples are balanced, propensity scores in the box plot should be similar. The evidence from Figure 3 suggests that the matched sample is very similar. Compared to the raw data, the median propensity score is remarkably similar between troops-controlled states and their control group. Given a reasonably strong similarity of the median propensity scores in the matched sample, some difference in the upper and lower tails of the distribution come to no avail and fail to reject the assertion that the estimated propensity scores are balanced in the matched sample.⁵



Figure 3: Propensity Score Box Plot

The question that remains is whether the covariates used to match troops-controlled states with the control group of states without US troops presence is whether the covariates systematically vary over

⁵ For the sake of space limitation, Figure 3 reports the estimated propensity scores between treatment and control group in the matched sample only for a handful of transaction cost outcome variables whereas the matched propensity scores are similar for other outcome variables. A full and exhaustive list is available upon request.

the treatment level. If the distribution of covariates varies over the treatment level, the covariates may be prone to non-trival imbalance that would question the validity of our estimates given that the imbalance may pose a source of omitted variable bias and taint the average treatment effect with other sources of influence that can be either directly or indirectly distinguished from the presence of US troops. When the distribution of the covariate does not vary over the treatment level, the notion of balanced covariates becomes more plausible and the treatment effect of troops presence on transaction costs can be recovered and interpreted from our estimates. Figure 4 exhibits the covariate-specific box plot. The matched-sample box plots appear to be very similar over the treatment level. The plots show that the median level of the covariate is within the same threshold across the states where the US troops were present that the states without the troops presence. Compared to the raw data, the upper and lower tail of the covariate distribution appears to be very similar across the full treatment level, particularly with respect to the variables that capture the demographic structure before and after the war when the troops were present. Considering the box plot for the disease environment, we find that the median levels are very similar in the matched sample between both treatments. Even when non-latent covariates are considered, especially drought severity in the years 1600 and 1645, median similarity across the states with and without the troops presence quite clearly confirms that disease environment appears to be a balanced covariate in isolating the long-term impact of troops presence on transaction costs. Similar patterns are apparent in inspecting the covariate balances for the historical ethnic fractionalization variables. In the matched sample, states where US troops were present in 1848 do not seem to have markedly higher share of European-born population or substantially more stratified ethnic divisions than the states without the US presence. The similarity of the medians does not invoke notions of marked historical differences in the ethnic fractionalization that would otherwise contaminate the treatment effect of troops presence on transaction costs. Lastly, given the obvious importance of proximity to the US border, we compare the median distance from the US border between both sets of states, and find no covariate dissimilarity between the states where the troops were present and the states without their presence.













5.2 Transmission Mechanisms

An obvious question behind the impact of the US troops on transaction costs hinges on the transmission mechanisms that jointly shape the relationship between transaction costs and economic growth. Assessing the transmission mechanism variables allows us to determine the potential channels through which the estimated impact of US troops presence survived down to the present day. Our approach is to consider both historical transmission mechanism variables and contemporary ones. The former capture the transmission taking place in the years after the Mexican-American war whilst the latter permit a more nuanced investigation of a broader variety of channels such as human capital and development as well as costs of coordination.

Figure 5 exhibits some transmission mechanisms indicating the sources through which the impact of US troops presence may have survived down to the present. By replacing the transaction costs outcome in our model setup with the transmission mechanism variables, we partially disentangle the intricate web of relationships behind the long-term effect of troops presence. The evidence indicates several noteworthy channels through which the troops impact on transaction costs may operate. The magnitude of the broader historical factors appears to be small but statistically significant at conventional 5% level whereas the magnitude of the channels such as human capital, level of development and coordination costs seems to be both large and pervasive. One of the important channels is the urbanization rate prior to the Mexican Revolution which serves as a direct proxy for the level of development in the years after the Mexican-American war. Our evidence suggests that states with the troops presence tend to have about 7.5 percent higher rate of urbanization than states outside troops control (i.e. p-value = 0.000). This implies that states under troops control underwent a more rapid modernization than the states without troops presence as indicated by the increase in urbanization rate until the Mexican Revolution. The presence of US troops also led to a marked drop in the ethnic fractionalization. Our estimates show that the presence of troops is associated with about 7 percent drop in ethnic fractionalization in 1921 (i.e. p-value = 0.000). A markedly reduced ethnic fractionalization operates through 6 percent increase in the share of Mestizoborn population, 7.5 percent drop in the share of Amerindian population and marginally lower share of white population (i.e. p-value = 0.115). Given that ethnically less stratified social structure has been highlighted as a source of institutional quality (Casey and Owen 2011), the estimated changes in ethnic fractionalization seem to be far from trivial in accounting for the present-day disparities in transaction costs across Mexican states. Considering some present-day transmission mechanisms, the states where US troops were present tend to have 0.7 years longer duration of schooling which points out to a quantitatively

small but statistically significant (i.e. p-value = 0.000) effect of troops presence on human capital investment. By improving human capital investment and access to education, it is plausible to assume that states were better able to afford lower transaction costs than states without troops presence. In a similar vein, troops-controlled states have about 1 percentage point lower infant mortality (i.e. p-value = 0.000) than states without troops presence indicating reasonably large health and development effects emanating from the institutional change influence by US troops. In addition, states under the control of US troops have substantially higher population density than states without the troops' presence. An increasing population density coupled with other transmission channels indicates a source of reduced costs of coordination which have been related to greater economic specialization, trade and commerce that could take place more easily and posited an endogenous shock leading to lower transaction costs that could be difficult to materialize in the presence of sparsely populated localities.



Figure 5: US Troops Channels of Persistence

5.3 City-level evidence

The evidence so far arguably implies that the long-lasting influence of US troops on transaction costs can hardly be neglected. The states where US troops were present tend to have less procedural complexity behind the cost of starting business and costs of obtaining construction permits, shorter duration of procedures but higher overall cost of dealing with these procedures. Troops-controlled states also have markedly better administration of land register, faster, less complex but costly property registration procedures, lower costs of contract enforcement and substantially better quality of the judicial process. The empirical analysis based on a class of propensity scores and nearest neighbor matching estimator is carried out at the state level and neglects the local-level differences in the impact of US troops. To address this particular caveat, we estimate the impact of troops presence at the level of Mexican cities. The sample consists of 2,006 Mexican cities which comprises essentially all major and minor cities. For the full sample of cities, we collect the data on the physical geographic characteristics such as latitude and longitude and the auxiliary data on population size. In the next step, we rebuild the indicators of administrative and procedural transaction costs from Table 2 to reflect the local-level variation. Our empirical strategy is simple and consists of two steps. First, we regress state-level transaction cost indicators on city-level geographic and demographic characteristics. And second, we recover the residual component of transaction costs from these specifications. These components uncover the discrepancies in transaction costs between the states given their population size and physical geographic location. These discrepancies informatively indicate whether the level of transaction costs is either higher or lower between than one should plausibly expect in a city with similar population size and similar geographic location when the set of contracting institutions is determined at the state level.

Table 1 presents key city-level descriptive statistics on transaction costs. A mere descriptive evidence from the raw data indicates arguably large differences in the residual component of state-level transaction costs. For instance, the lowest cost of starting business is found in the city of Cananea in the state of Sonora where the highest level is found in San Pedro Lagunillas in the state of Nayarit. The differences in the residual component of administrative transaction costs seem to be particularly large. The underlying differences in the costs of contract enforcement and property registration appear to be somewhat smaller but are markedly more dispersed. For instance, the lowest fitted residual for the quality of land administration is found in Melchor Ocampo in the state of Zacatecas whereas the highest residual is found in Amealco in the state of Queretaro. The estimated city-level quality of the judicial process varies from -2.35 in Ciudad Juarez in the state of Chihuahua to 1.898 in Tlatlaya in the state of Mexico. The general thrust of these comparison is that the residual component of transaction costs varies substantially across Mexican localities.

Panel A: Administrative Transaction C	Costs		
	Min	Max	S.D
# Procedures to start business	-2.596	3.007	0.617
	(San Ignacio, Sonora)	(Kantunilkín, Quintana Roo)	
# Days to start business	-1.810	4.189	0.825
	(Puebla Nuevo,	(José María Morelos, Quintana	
	Guanajuato)	Roo)	
Cost of starting business	-1.648	3.885	0.591
	(Cananea, Sonora)	(San Pedro Lagunillas, Nayarit)	

 Table 4: City-Level Descriptive Statistics of Transaction Costs

# Procedures to deal with	-2.183	2.774	0.949
construction permits	(Moris, Chihuahua)	(Ciudad de Armería, Colima)	
# Days to deal with construction	-2.293	3.903	1.005
permits	(Tapeixtles, Colima)	(Jungapeo de Juárez, Michoacan)	
Quality of construction permits	-3.787		0.827
	(Mezquital del Oro,	1.199	
	Zacatecas)	(Cosío, Aguascalientes)	
Cost of dealing with construction	-1.844	4.245	0.996
permits	(Ixtlahuacán, Colima)	(El Fuerte, Sinaola)	
Panel B: Procedural Transaction Cos	ts		
# Property registration procedures	-1.698	2.723	0.779
	(Villa de Álvarez, Colima)	(Uman, Yucatan)	
# Days to register property	-2.345		1.477
	(Ciudad de Armería,	3.284	
	Colima)	(Isla Mujeres, Quintana Roo)	
Cost of property registration	-2.258	3.055	0.913
	(Tepezalá, Aguascalientes)	(Almoloya del Río, Morelos)	
Quality of land administration	-2.288		1.021
	(Melchor Ocampo,	2.278	
	Zacatecas)	(Amealco, Queretaro)	
# Days to enforce contract	-1.705	3.111	0.866
	(Florencia, Zacatecas)	(Cozumel, Quintana Roo)	
# Procedures to enforce contract	-1.813	2.366	0.887
	(Sergio Butrón Casas,	(Playas de Rosarito, Baja	
	Quintana Roo)	California)	
Cost of contract enforcement	-2.114	2.023	1.054
	(Ario de Rosales,	(Ciudad Sabinas Hidalgo, Nuevo	
	Michoacan)	Leon)	
Quality of the judicial process	-2.351		1.029
	(Ciudad Juarez,	1.898	
	Chihuahua)	(Tlatlaya, Estado de Mexico)	

Table 5 presents city-level propensity score and nearest-neighbor estimated impact of the US troops presence on the level of transaction costs. Our estimates are broken down into two sets of specifications. In the first set, all cities are considered whereas only the major cities are included in the second set of specification to check for potential discrepancies in the overall effect that could vary depending on city size. Columns (1) through (4) report the propensity score estimated effect of troops presence for the full sample of cities and major cities only. The evidence from city-estimate estimates confirms reasonably large impact of troops presence on transaction costs. Cities where US troops were present in 1848 tend to have considerably lower number of procedures necessary to start business, shorter duration of procedures and higher cost of starting business. The estimated impacts seem to be somewhat larger for major cities, suggesting that these cities were disproportionately more affected than smaller cities by the presence of troops. However, major cities tend to have considerably longer duration of business registration procedures given that the average treatment effect of troops presence is about twice the size of the magnitude for major cities only. This suggests that smaller cities may be somewhat more effective than larger cities in providing reasonably fast registration procedures. We find similar evidence with respect to the impact of troops presence on the costs of dealing with construction permits. In particular, troops-controlled cities have a considerably improved quality of licences and permits, less complex procedures and somewhat higher costs of dealing with these procedures. In a similar vein, the estimated propensity score coefficient of the duration of procedures is substantially smaller for major cities which

implies that size matters for the duration of procedures since smaller cities appear to be more effective in reducing the duration of procedures than larger cities.

An interesting pattern behind the impact of US troops is perceptible for the costs of property registration. Regardless of their size, the cities have a comparable estimated propensity score for the number of procedures, duration of procedures and cost of dealing with procedures in the acquisition of property rights. The impact of troops presence is somewhat more ambiguous with respect to the quality of land administration. As indicated in columns (1) and (2), full-sample propensity score for the quality of land administration is positive and significant (i.e. p-value = 0.000). The cities where the troops were present are characterized by about 0.3 standard deviation improvement in the quality of land administration. By contrast, columns (3) and (4) indicate statistically insignificant impact of troops presence on the quality of land administration. The presence of the troops thereby seems to have led to a marked improvement in the quality of land administration in smaller cities whilst promulgating no such improvement in major cities. Columns (5) through (8) exhibit the nearest-neighbor matching estimates and indicate that the estimated impact of troops presence on the quality of land administration in major cities only appears to be negative whilst the impact in a full-city sample is both positive and significant with the underlying average treatment effect having p-value =0.000. We also find that troops-controlled cities have a substantially better quality of the judicial process, significantly lower cost as well as shorter and less complex procedures behind contract enforcement. The estimated propensity scores and nearestneighbor coefficients are noticeably smaller for major cities which implies that smaller cities benefitted somewhat more from US troops and have arguably much lower residual component of transaction costs than large cities.

Table 5: City-Level Effect of US Troops on Transaction Costs

		Propensit	y Scores			Nearest Neighbor			
	Full City	Full City-Sample Major Cities Only Full City-Sample		-Sample	Major Cities Only				
-	Logit	Probit	Logit	Probit	Mahalanobis	Euclidean	Mahalanobis	Euclidean	
-	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
# Procedures to start business	248***	255***	356***	350***	245***	208***	403***	343***	
	(.031)	(.032)	(.022)	(.051)	(.034)	(.032)	(.052)	(.038)	
# Days to start business	624***	616***	350***	350***	660***	639***	316***	370***	
	(.034)	(.037)	(.052)	(.054)	(.032)	(.030)	(.054)	(.050)	
Cost of starting business	.272***	.271***	.508***	.522***	.230***	.283***	.446***	.485***	
	(.028)	(.029)	(.039)	(.039)	(.018)	(.017)	(.032)	(.030)	
# Procedures to obtain permits	704***	686***	502***	516^{***}	-1.103***	-1.059^{***}	568***	610***	
	(.037)	(.057)	(.064)	(.065)	(.047)	(.094)	(.069)	(.070)	
# Days to obtain permit	541***	531***	183***	181***	833***	759***	193***	246***	
	(.033)	(.040)	(.061)	(.061)	(.036)	(.052)	(.070)	(.058)	
Quality of permit and licences	.759***	.756***	.755***	.771***	.765***	.722***	.622***	.661***	
	(.033)	(.035)	(.049)	(.052)	(.029)	(.081)	(.047)	(.040)	
Cost of dealing with permits	266***	265***	.074*	.073*	177***	320***	.041	022	
	(.034)	(.034)	(.047)	(.047)	(.035)	(.047)	(.052)	(.051)	
# Procedures to register property	462***	458***	692***	702***	462***	427***	576***	579***	
	(.029)	(.044)	(.050)	(.048)	(.042)	(.035)	(.052)	(.049)	
# Days to register property	550***	528***	057	050	922***	989***	091	174***	
	(.057)	(.075)	(.069)	(.068)	(.056)	(.073)	(.082)	(.070)	
Cost of property registration	695***	696***	413***	398***	842***	891***	510***	624***	
	(.039)	(.041)	(.067)	(.065)	(.029)	(.056)	(.068)	(.056)	
Quality of land administration	.355***	.325***	087	078	.674***	.565***	176***	142***	
	(.041)	(.057)	(.062)	(.062)	(.036)	(.057)	(.058)	(.045)	
# Days to enforce contract	261***	256***	384***	403***	628***	508***	550***	543***	
	(.040)	(.076)	(.057)	(.059)	(.041)	(.055)	(.076)	(.054)	
# Procedures to enforce contract	.338***	.339***	.616***	.618***	007	.067	.505***	.376***	
	(.038)	(.042)	(.059)	(.059)	(.034)	(.056)	(.062)	(.048)	
Cost of enforcing contract	237***	218***	320***	328***	418***	586***	459***	571***	
	(.040)	(.060)	(.056)	(.054)	(.042)	(.035)	(.060)	(.058)	

Quality of judicial process	.497*** (.044)	.489*** (.063)	.339*** (.082)	.329*** (.080)	.751*** (.032)	.682*** (.036)	.545*** (.079)	.501*** (.067)
# match-ups	5	5	5	5	5	5	5	5
# cities	2,006	2,006	801	801	2,006	2,006	801	801
# covariates	2	2	3	3	2	2	3	3

Notes: the table presents the treatment effect of the US troops presence on state-level transaction costs. The dependent variable is the city-level estimated residual component of transaction costs as laid out in each column. The set of quasi-treatment effects is estimated using Rosenbaum and Rubin (1983) propensity matching framework and Abadie and Imbens (2006) nearest-neighbor matching estimator. Using both respective estimators, the level of transaction costs is compared based on whether or not the US troops were present in each state. Potential transaction costs are estimated using the neighbourhood-level covariate-specific mean values of the cities without the presence of US troops using the full set of covariates from Table 2. The full treatment effect of US troops presence is computed using the Abadie and Imbens (2006) analytical asymptotic variance-covariance matrix estimator based on the Gaussian approximation of the matching estimator to its asymptotic distribution.

One of the key assumptions concerning the feasibility of propensity scores estimates hinges on the overlap of the treatment which implies that each city should have a positive probability of US troops presence. The estimated densities of the probability of troops presences can be used to check whether the overlap assumption is violated. The violation of the overlap assumption would imply that the propensity score and nearest neighbor estimates do not permit the chance of city-level observations being found in both the treatment and control group at each combination of covariates. When the overlap assumption is violated, the unobserved outcomes can neither be predicted nor accounted for. This would imply that the estimated density has a disproportionate amount of mass around the lower and upper treatment threshold (Busso et. al. 2014). Figure 6 exhibits the estimated densities of the predicted probabilities of the US troops being present and the corresponding probabilities of the US troops not being present for full-city sample and for a subsample without major cities. Neither plot indicates a disproportionate amount of the probability mass near the lower and upper bound of the troops presence. The two estimated probability densities tend to have most of their masses in the regions in which they overlap each other. This holds for the full sample of cities and a sample without major cities alike. The estimated probabilities have a tendency of a rapid increase around the 10th percentile of the propensity score and a notable drop toward zero at the upper levels of the estimated propensity score. This implies that the violation of the overlap assumption at the city level is highly unlikely.



Figure 6: Testing Treatment Overlap Assumption

6 Conclusion

In this paper, we examine the impact of the radical external intervention on the long-term evolution of transaction costs. To this end, we exploit the presence of US troops during the Mexican-American War between 1846 and 1848 as a source of variation in transaction costs. By making use of propensity scores and nearest neighbour matching estimators, we match the states and cities based on the set of orthogonal physical geographic and historical characteristics such as ethnic fractionalization in colonial times, drought severity after the Spanish conquest, disease environment and distance from US border, to estimate the impact of US troops on present-day transaction cost. The Mexican-American War initiated an intricate process that involved several radical institutional changes across Mexican states, especially the adoption of modern civil and commercial codes. The US troops invaded a handful of Mexican states where they influenced both the ideas and beliefs for the necessity of liberal institutional changes that promulgated several far-reaching political, legal, social and economic reforms that were critically shaped by the legal codes that US adopted in the newly conquered territories after the Mexican cession. The most pivotal legal document influencing the beliefs and ideas was the Kearny Code which had been promulgated in present-day Santa Fe, New Mexico and later in the territory of Alta California. The code laid out the Bill of Rights and introduced several far-reaching reforms in the conquered territories such as trial by jury, protection against unreasonable search and seizure, and freedom of thought and opinion among several others. The war in Mexico also inflicted institutional chaos and political instability. This paper considers the radical institutional reforms in neighboring countries as a quasi-natural experiment given that the institutional reforms carried out at the state level were radical.

Our propensity score and nearest-neighbor estimates uncover the evidence that the states and localities under the occupation of US troops experienced greater institutional modernization and have substantially lower transaction costs. All of our evidence shows that the states and cities under US troops generally have less complex procedures for starting business, faster and more reliable procedures for dealing with construction permits, markedly better land administration, substantially lower costs of contract enforcement, shorter duration of the contract enforcement procedures and significantly improved quality of the judicial process. The areas under US troops occupation have both better quality of the procedures and a higher cost relative to state-level per capita income. We also uncover some evidence on the likely channels of transmission. We show that the channels of US troops influence are multi-faceted. The occupation of the territories by US troops improved reduced transaction costs primarily through a more rapid urbanization of troops-controlled areas and noticeably lower ethnic fractionalization. Another important channel of influence were large-scale investment into access to health and education in troopscontrolled areas. We show that the areas under troops control tend to have disproportionately lower infant mortality, better educated population, greater ability to cooperate and lower coordination costs. These findings reappraise the historical impact of the Mexican-American war as they highlight some of the consequences of radical externally-imposed institutional reforms.

On the normative note, our paper adds to the discussion on the feasibility and effectiveness of externally-imposed sharp institutional reforms. The Mexican-American War is not only a clear example of large-scale foreign intervention of the US in a neighboring country but is also an exemplary shock promulgating a sharp change in the ideas and beliefs that later led to some of the most revolutionary changes in Mexico. Our results are favorable for the view that such large-scale externally-imposed institutional reforms can be effective in reducing the costs of contract enforcement and improving access to property rights that would otherwise not take place in a domestic political economy equilibrium. Our evidence supports the notion that the institutions of the First Mexican Republic that were designed to isolate Mexico from the current of economic and political liberalization of 1812 Cádiz Constitution (Coatsworth 2008) such as feudalist labor market, exclusionary land regime favouring a small elite, gilded urban oligarchies and guilds, lack of trial by jury, and a nearly complete absence of equality before the law, were detrimental and impeded the institutional modernization necessary for industrialization and sustained long-term economic growth. The presence of the US troops after Mexico's defeat paved the way for the necessary overhaul of these institutions leading to the liberal triumph and institutional modernization with the promulgation of new civil and commercial codes as the exemplars of these changes.

Several caveats should be stated to interpret our results with caution. First, our analysis is limited to the historical data that is available. Second, it is nearly impossible to extrapolate the results from one historical shock to other areas even though we show that radical institutional reforms can be beneficial in the long run and persist long after the shock disappears. The sharpness of the institutional reforms imposed by the US intervention possibly explains why the presence of the troops led to successful overhauls of the archaic institutions of the First Republic. These institutions typically protected the vested interest of local elites and that were essentially demolished when the troops occupied the Mexican territories, making the gradual return to the pre-existing institutional equilibrium of status quo almost impossible. Sweeping changes in the political institutions after the departure of the US troops may explain why the costs of contract enforcement, property rights and administrative barriers to entry never reversed back to the pre-1848 equilibrium and had permanent implications for the institutional modernization in Mexico. Since our investigation is exploratory and casts no conclusive quantification, better understanding the context behind successful radical institutional reforms and unsuccessful ones why some reforms are effective and others are not presents a fruitful avenue of future research.

References

Abadie, A., & Imbens, G. W. (2006). Large sample properties of matching estimators for average treatment effects. *Econometrica*, 74(1), 235-267.

Abadie, A., & Imbens, G. W. (2016). Matching on the estimated propensity score. *Econometrica*, 84(2), 781-807.

Abadie, A., & Imbens, G. W. (2011). Bias-corrected matching estimators for average treatment effects. *Journal of Business & Economic Statistics*, 29(1), 1-11.

Acemoglu, D., & Johnson, S. (2005). Unbundling institutions. *Journal of Political Economy*, 113(5), 949-995.

Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a fundamental cause of longrun growth. In: Aghion, P. & S. Durlauf (eds.) *Handbook of Economic Growth* (Vol. 1, pp. 385-472), Amsterdam, North Holland: Elsevier.

Acemoglu, D., Cantoni, D., Johnson, S., & Robinson, J. A. (2011). The consequences of radical reform: The French Revolution. *American Economic Review*, 101(7), 3286-3307.

Acemoglu, D., & Robinson, J. A. (2006). De facto political power and institutional persistence. American Economic Review, 96(2), 325-330.

Acemoglu, D., & Robinson, J. A. (2016). Paths to inclusive political institutions. In: Eloranta, J., Golson, E., Markevich, A. & N. Wolf (eds.) *Economic History of Warfare and State Formation* (pp. 3-50). Singapore, Springer.

Acemoglu, D., García-Jimeno, C., & Robinson, J. A. (2015). State capacity and economic development: A network approach. *American Economic Review*, 105(8), 2364-2409.

Acemoglu, D., Naidu, S., Restrepo, P., & Robinson, J. A. (2019). Democracy does cause growth. Journal of Political Economy, 127(1), 47-100.

Acuña-Soto, R., Romero, L. C., & Maguire, J. H. (2000). Large epidemics of hemorrhagic fevers in Mexico 1545-1815. *The American Journal of Tropical Medicine and Hygiene*, 62(6), 733-739.

Aidt, T. S. (2009). Corruption, institutions, and economic development. Oxford Review of Economic Policy, 25(2), 271-291.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., & Wacziarg, R. (2003). Fractionalization. *Journal of Economic Growth*, 8(2), 155-194.

Bauer, K.J. (1974). The Mexican War, 1846-1848. New York, NY: Macmillan.

Berkowitz, D., Pistor, K., & Richard, J. F. (2003). Economic development, legality, and the transplant effect. *European Economic Review*, 47(1), 165-195.

Besley, T., & Persson, T. (2009). The origins of state capacity: Property rights, taxation, and politics. *American Economic Review*, 99(4), 1218-44.

Boettke, P. J., Coyne, C. J., & Leeson, P. T. (2015). Institutional stickiness and the new development economics. In: Grube, L.E. & V.H. Storr (eds.). *Culture and Economic Action*. London, UK: Edward Elgar Publishing.

Brunetti, A., Kisunko, G., & Weder, B. (1998). Credibility of rules and economic growth: Evidence from a worldwide survey of the private sector. *The World Bank Economic Review*, 12(3), 353-384.

Busso, M., DiNardo, J., & McCrary, J. (2014). New evidence on the finite sample properties of propensity score reweighting and matching estimators. *Review of Economics and Statistics*, 96(5), 885-897.

Campos, N. F., Saleh, A., & Kuzeyev, V. (2011). Dynamic ethnic fractionalization and economic growth. *The Journal of International Trade & Economic Development*, 20(2), 129-152.

Campos, N. F., Coricelli, F., & Moretti, L. (2019). Institutional integration and economic growth in Europe. *Journal of Monetary Economics*, 103, 88-104.

Carney, S.A. (2006). *The Occupation of Mexico, May 1846-July 1848*. Washington DC: United States Army Center of Military History.

Cattaneo, M. D. (2010). Efficient semiparametric estimation of multi-valued treatment effects under ignorability. *Journal of Econometrics*, 155(2), 138-154.

Claessens, S., & Laeven, L. (2003). Financial development, property rights, and growth. *Journal of Finance*, 58(6), 2401-2436.

Clague, C., Keefer, P., Knack, S., & Olson, M. (1999). Contract-intensive money: contract enforcement, property rights, and economic performance. *Journal of Economic Growth*, 4(2), 185-211.

Coatsworth, J. H. (2008). Inequality, institutions and economic growth in Latin America. *Journal of Latin American Studies*, 40(3), 545-569.

Cook, E.R., & Krusic, P.J. (2004). *The North American Drought Atlas.* New York, NY: National Science Foundation.

Cooter, R. D., & Schäfer, H. B. (2011). Solomon's Knot. Princeton University Press.

De Haan, J. (2007). Political institutions and economic growth reconsidered. *Public Choice* 131(3-4), 281-292.

Dell, M., Lane, N., & Querubin, P. (2018). The historical state, local collective action, and economic development in Vietnam. *Econometrica*, 86(6), 2083-2121.

de la Escosura, L. P., & Sanz-Villarroya, I. (2009). Contract enforcement, capital accumulation, and Argentina's long-run decline. *Cliometrica*, 3(1), 1-26.

Ducey, M. (1997). Liberal Theory and Peasant Practice: Land and Power in Northern Veracruz, Mexico, 1826-1900. In: Jackson, R.H. (ed.) *Liberals, The Church and Indian Peasants. Corporate Lands and the Challenge of Reform in Nineteenth-Century Spanish America* (pp. 65-93). Washington DC: Smithsonian

Dunning, T., & Pop-Eleches, G. (2004). From transplants to hybrids: exploring institutional pathways to growth. *Studies in Comparative International Development*, 38(4), 3-29.

Easterly, W., & Levine, R. (2016). The European origins of economic development. *Journal of Economic Growth*, 21(3), 225-257.

Easterly, W., & Levine, R. (1997). Africa's growth tragedy: policies and ethnic divisions. *The Quarterly Journal of Economics*, 112(4), 1203-1250.

Foos, P. (2002). A Short, Offhand, Killing Affair: Soldiers and Social Conflict During the Mexican-American War. Chapel Hill, NC: University of North Carolina Press.

Garfias, F., & Sellars, E. A. (2018). From Conquest to Centralization: Domestic Conflict and the Transition to Direct Rule. Forthcoming in: *Journal of Politics*.

Gibson, C. (1964). The Aztecs under Spanish Rule: A History of the Indians of the Valley of Mexico, 1519-1810. Stanford, CA: Stanford University Press.

Glaeser, E. L., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2004). Do institutions cause growth?. *Journal of Economic Growth*, 9(3), 271-303.

Greif, A. (1993). Contract enforceability and economic institutions in early trade: The Maghribi traders' coalition. *The American Economic Review*, 83(3): 525-548.

Guiso, L., Sapienza, P., & Zingales, L. (2016). Long-term persistence. *Journal of the European Economic Association*, 14(6), 1401-1436.

Haber, S. (2000). *Political institutions and economic growth in Latin America: Essays in Policy, History, and Political Economy.* Stanford, CA: Hoover Institution Press.

Haggard, S., & Tiede, L. (2011). The rule of law and economic growth: where are we? World Development, 39(5), 673-685.

Hassig, R. (1985). Trade, Tribute, and Transportation: The Sixteenth-Century Political Economy of the Valley of Mexico. Norman, OK: University of Oklahoma Press.

Helland, E. & Klick, J. (2011). Legal origins and empirical credibility. In: Faure, M., & J. Smits (eds.) *Does Law Matter* (pp. 99-114). Antwerpen, Belgium: Intersentia.

Henisz, W. J. (2000). The institutional environment for economic growth. *Economics & Politics*, 12(1), 1-31.

Knack, S., & Keefer, P. (1995). Institutions and economic performance: cross-country tests using alternative institutional measures. *Economics & Politics*, 7(3), 207-227.

Knowlton, C.S. (1967). Land grants problems among the state's Spanish Americans. *New Mexico Business*, 20 (June), 1-13.

Kuran, T. (2004). Why the Middle East is economically underdeveloped: historical mechanisms of institutional stagnation. *Journal of Economic Perspectives*, 18(3), 71-90.

Leblang, D. A. (1996). Property rights, democracy and economic growth. *Political Research Quarterly*, 49(1), 5-26.

Lerner, V. (1968). Consideraciones sobre la población de la Nueva España (1793-1810): Según Humboldt y Navarro y Noriega. *Historia Mexicana*, 17(3), 327-348

Levine, R. (1999). Law, finance, and economic growth. *Journal of Financial Intermediation*, 8(1-2), 8-35.

Levinson, I. (2005). Wars within Wars: Mexican Guerillas, Domestic Elites and the United States of America, 1846-1848. Fort Worth, TX: Texas Christian University Press.

Marichal, C., & Carmagnani, M. (2001). From colonial fiscal regime to liberal financial order, 1750-1912 In: Bordo, M.D. & Cortés-Conde, R. (eds.) *Monetary and Fiscal Institutions in the 17th through* 19th Century (pp. 284-326). New York, NY: Cambridge University Press.

Mateos, C. (1991). La población de México (1810–1880), elementos para su estudío. *Temas de Población*, 1(3), 10-14.

Montalvo, J. G., & Reynal-Querol, M. (2005). Ethnic diversity and economic development. *Journal of Development Economics*, 76(2), 293-323.

Negretto, G. L., & Aguilar-Rivera, J. A. (2000). Rethinking the Legacy of the Liberal State in Latin America: The Cases of Argentina (1853-1916) and Mexico (1857-1910). *Journal of Latin American Studies*, 32(2): 361-397.

Newson, L. A. (1993). The demographic collapse of native peoples of the Americas, 1492-1650. In: *Proceedings of the British Academy* (Vol. 81, pp. 247-288). Oxford University Press.

North, D. C. (1971). Institutional change and economic growth. *The Journal of Economic History*, 31(1): 118-125.

North, D. C. (1990). *Institutions, institutional change and economic performance*. New York, NY: Cambridge University Press.

Olson, M. (1989). Collective action. In: Eatwell, J., Milgate, M. & P. Newman (eds.), *The Invisible Hand* (pp. 61-69). Palgrave Macmillan, London.

Olson, M. (1993). Dictatorship, democracy, and development. *American Political Science Review*, 87(3): 567-576.

Papaioannou, E., & Siourounis, G. (2008). Democratisation and growth. *The Economic Journal*, 118(532), 1520-1551.

Posner, R. A. (1998). Creating a legal framework for economic development. *The World Bank Research Observer*, 13(1), 1-11.

Przeworski, A. (2004). Democracy and economic development. In: Mansfield, E.D. & R. Sisson (Eds.), *The Evolution of Political Knowledge. Democracy, Autonomy, and Conflict in Comparative and International Politics* (pp. 300-324). Columbus, OH: Ohio State University Press.

Putterman, L., & Weil, D. N. (2010). Post-1500 population flows and the long-run determinants of economic growth and inequality. *The Quarterly Journal of Economics*, 125(4), 1627-1682.

Rodríguez-Pose, A. (2013). Do institutions matter for regional development?. *Regional Studies*, 47(7), 1034-1047.

Rodrik, D. (2000). Institutions for high-quality growth: what they are and how to acquire them. *Studies in Comparative International Development*, 35(3), 3-31.

Rodrik, D., Subramanian, A., & Trebbi, F. (2004). Institutions rule: the primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, 9(2), 131-165.

Rodrik, D. (2012). Why we learn nothing from regressing economic growth on policies. *Seoul Journal of Economics*, 25(2): 137-151.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.

Santoni, P. (1996). *Mexicans at Arms: Puro Federalists and the Politics of War, 1845-1848.* Fort Worth, TX: Texas Christian University Press.

Seidler, V. (2014). When do institutional transfers work? The relation between institutions, culture and the transplant effect: the case of Borno in north-eastern Nigeria. *Journal of Institutional Economics*, 10(3), 371-397.

Sellars, E. A., & Alix-Garcia, J. (2018). Labor scarcity, land tenure, and historical legacy: Evidence from Mexico. *Journal of Development Economics*, 135, 504-516.

Sicotte, R., & Vizcarra, C. (2009). War and Foreign Debt Settlement in Early Republican Spanish America. *Revista de Historia Económica*, 27(2), 247-289.

Smith, J.H. (1919). The War with Mexico. New York, NY: Macmillan.

Sokoloff, K. L., & Engerman, S. L. (2000). Institutions, factor endowments, and paths of development in the new world. *Journal of Economic Perspectives*, 14(3), 217-232.

Spruk, R. (2016). Institutional transformation and the origins of world income distribution. *Journal of Comparative Economics*, 44(4): 936-960.

Tenenbaum, B. A. (1986). The Return of the "Lumpen": Reflections on the Mexican Bourgeoisie, 1760-1867. *Estudios Mexicanos*, 2(1): 153-166.

Torstensson, J. (1994). Property rights and economic growth: an empirical study. *Kyklos*, 47(2), 231-247.

Vazquez, J.Z. (1998). *México al tiempo de su guerra con Estados Unidos (1846-1848)*. Ciudad de Mexico: Fondo de Cultura Económica.

Weingast, B. R. (1995). The economic role of political institutions: Market-preserving federalism and economic development. *Journal of Law, Economics, & Organization*, 11(1): 1-31.

Winders, R.B. (1997). Mr. Polk's Army: The American Military Experience in the Mexican War. College Station, TX: Texas A&M University Press.

World Bank (2006). Doing Business in Mexico in 2006. Washington D.C.

World Bank (2007). Doing Business in Mexico in 2007: Comparing Regulation in the 31 States and Mexico City. Washington D.C.

World Bank (2009). Doing Business en México 2009: Comparado La Regulación En 31 Estados, El Distrito Federal y 181 Economías. Washington D.C.

World Bank (2012). Doing Business en México 2012: Comparado La Regulación En 32 Entitades Federativas y 183 Economías. Washington D.C.

World Bank (2014). Doing Business en México 2014:Entendiendo Las Regulaciones Para Las Pequeñas y Medianas Empresas. Washington D.C.

World Bank (2016). Doing Business in Mexico 2016. Washington D.C.

Zamora, S., Cossío, J.R., Pereznieto, L., Roldán-Xopa, J. & Lopez, D. (2005). *Mexican Law*. New York, NY: Oxford University Press.