Going Postal:
State Capacity and Violent Dispute Resolution

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Abstract

Scholars have long tried to understand the conditions under which actors choose to use violent versus non-violent means to settle disputes, and many argue that violence is more likely in weakly-institutionalized settings. Yet, there is little evidence showing that increases in state capacity lowers the use of violent informal institutions to resolve disputes. Utilizing a novel dataset of violence—specifically, duels—across American states in the 19th century, we use the spread of federal post offices as an identification strategy to investigate the importance of state capacity for the incidence of violent dispute resolution. We find that post office density is a strong, consistent, and negative predictor of dueling behavior. Our evidence contributes to a burgeoning literature on the importance of state capacity for development outcomes.

Keywords: Dispute Resolution, State Capacity, Informal Institutions, Violence, Political Economy

JEL Classification: D02, D74, O17, P16

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1   Introduction

On July 11, 1804 in Weehawken, New Jersey, the rivalry between two giants of the American founding generation, the inaugural Secretary of the Treasury, Alexander Hamilton, and Vice President, Aaron Burr, came to a bloody apex. Bitter political foes, the enmity between the two culminated on this day with a duel by pistols. Following standard dueling protocol, Burr challenged Hamilton to a duel, having been offended by Hamilton's successful campaign to defeat Burr's bid for the governorship of New York. At the same location that Hamilton's son was killed in a duel three years earlier by a Burr supporter, Burr mortally wounded Hamilton. While dueling was illegal in both New York (their home state) and New Jersey (and both states charged Burr with murder and a grand jury in New Jersey indicted him), the charges were ultimately dropped (Winfield, 1874). Burr would go on to complete his term as Vice President without prejudice.

Clearly, such a bloody affair was an inefficient resolution to a long-standing conflict between these two men. Moreover, the failure of the state to adequately punish Burr maintained an unfortunate precedent, as many more duels would be fought on this spot in the subsequent years.[1] Does this event, and the pervasiveness in this period of dueling to solve conflicts, reflect a long-ago "culture of violence"? Did duels serve as the "[rules] that [were] neither promulgated by an official source, such as a court of a legislature, nor enforced by threat of legal sanctions, yet [were] regularly complied with" (Posner, 1997, p. 365)? Or does the weakness of the early republic's formal political institutions better explain the pervasiveness of this violent informal institution?

Answering this question is important to our understanding of the incidence of violence and peaceful conflict resolution across societies. Indeed, scholars have long argued that a society's ability to resolve disputes efficiently and non-violently is essential to not only maintaining

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[1]The "Weehawken dueling grounds" was the site of 18 documented duels and likely many unrecorded ones between 1700 and 1845.

order but a critical pillar of development.[2] In weakly-institutionalized societies, informal institutions and norms play a more central role in dispute resolution (Milgrom and North, 1990). Yet, societies that can rely on formal institutions to adjudicate disputes and credibly enforce its rules are less prone to break down into violence, especially when reputation and commitment problems are present (Bates, 2001; North, Wallis and Weingast, 2009).[3]

For any formal system to be effective, however, the state must have the capacity to not only adjudicate disputes fairly but also enforce compliance to its ruling. Scholars in comparative political economy have increasingly focused on the importance of the state's capacity to enforce its rule as an important determinant of economic development (e.g., Besley and Persson, 2009; Michalopoulos and Papaioannou, 2013; Dincecco and Katz, 2014; Acemoglu, Garcia-Jimeno and Robinson, 2015; Dell, Lane and Querubin, 2018; Rogowski et al., 2019). Despite the prominence of this view, there is a paucity of comparative empirical evidence that identifies the effects of state strength on minimizing violence, especially informal institutions to resolve conflicts. There is even less empirical evidence using panel data measuring within-unit changes in state capacity on changing rates of the use of violence to resolve disputes.

In this paper, we investigate the role that state capacity had on the incidence of dueling using a panel of American states over the 19th century. Like many developing countries, the

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[2]That is, mechanisms to resolve disputes non-violently are seen as critical for expanding the scope of impersonal exchange by lowering transaction costs and credibly protecting property rights (e.g., Besley and Persson, 2009; Knight, 1992; North, 1990; North, Wallis and Weingast, 2009).

[3]It is commonly argued that bargains that avoid costly violence that are struck in weakly-institutionalized societies without centralized third-party enforcement are less credible (Bardhan, 1993). Ellickson (2009), among others, however, emphasizes the importance and efficiency of informal institutions and norms even in strong states. A large literature has emerged on the costliness of relying solely on third-party enforcement (Gintis et al., 2003) and there is strong evidence of at least the complementarities of formal and informal institutions as necessary to enforce cooperation, maintain order and resolve disputes non-violently.

pre-20th-century U.S. states were in the early stages of political and economic development and, especially in the early 19th century, remained an overwhelmingly pre-industrialized and agriculture-based society.[4] Minimal infrastructural development severely constrained the ability of state governments to impose their rule, especially in the interior hinterland. Hence, an institutional environment of weak states, which continues to characterize many societies in the world today, also characterized many of the U.S. states in this period. Yet, in critical ways, as we discuss below, the degree of institutional and economic development varied significantly across states and time. Exploiting these contextual features, we investigate the relationship between state capacity and the spatial and temporal incidence of dueling in a panel of all states using a novel dataset consisting of all duels that occurred in the 19th century as reported in over 1,000 newspapers (Byron, 2008).

Following Acemoglu, Moscona and Robinson (2016) and Rogowski et al. (2019), we use the number of federal post offices in existence at the state level as a proxy of early investments in "infrastructural" state capacity.[5] This not only provides a plausibly exogenous source of variation across states and time in state capacity, as post office locations were determined by the federal government, it is also a good measure of the extent of the federal government in the early Republic. For instance, in 1841, nearly 80% of all civilian federal employees worked for the post office (John, 2009, p. 3). A recent literature has demonstrated the crucial economic and political role that post offices played in spreading information and creating a network that connected the geographically large and sparsely populated country (e.g., John, 2009; Acemoglu, Moscona and Robinson, 2016; Rogowski et al., 2019). Given that mail was only transported from post office to post office until the late 19th century, proximity

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[4]For instance, according to the 1820 Census, the share of Americans living in cities of at least 2,500 people was 7.2%; and, in no state did this exceed 25%.

[5]We use the famous conception of capacity by Mann (1984), who defined a state's "infrastructural power" as the "institutional capacity of the state to actually penetrate civil society, and to implement logistically political decisions throughout the realm" (p. 189).

to a post office was vital to being connected to the country's political and economic life. Perhaps, more critically, post offices were the primary investments by the federal government in infrastructural capacity during this period, especially in the country's vast interior. As a result, Acemoglu, Moscona and Robinson (2016, p. 62) claim that the "presence of a post office is indicative of a much broader state presence and functionality, for example, via legal services and regulation, access to land, and security of other forms of property rights."

Using American states in a panel model allows us to minimize many of the omitted factors that bias cross-national empirical studies. Namely, the states shared the same colonial history, and did not vary as significantly as countries in terms of cultural, linguistic, and religious diversity. Our empirical strategy also allows us to control for variation across states in a number of institutional factors that could explain the reliance on formal institutions and which are often observed jointly with increases in state capacity. Namely, we control for the timing in which states removed economic suffrage restrictions on adult white men, political party competition, and whether state-level judges were given lifetime appointments (and therefore plausibly more insulated from local politics). Furthermore, we also control for economic development and other regional factors that could influence the incidence of dueling. Even after accounting for these confounding factors, we find that post office density has a large, negative effect on the incidence of dueling. This is true whether the duel took place in the South, a region in which dueling's pervasiveness is often explained by a prevailing "culture of honor" (e.g., Greenberg, 1990).

We add additional support to our baseline findings by using multiple lagged panel models to show that early expansions in the density of post offices predicts increases in later state-level fiscal capacity, specifically, greater per capita state tax revenues. This supports our claim that the federal government's investment in post offices, which we call infrastructural capacity, facilitated the expansion in the capacity of state governments. Our results also survive a series of robustness tests. Specifically, we show that our results hold whether or

not we measure the number of post offices on the basis of population (i.e., per capita) or county area (i.e., per square mile) and, furthermore, are robust to the inclusion of state and decade fixed effects.

These findings provide one of the first comparative designs that shows that increases in state capacity reduce the use of violent informal institutions to resolve disputes. Furthermore, our data and strategy of using federally-determined post offices allow us to identify the effects of state capacity independently of other state-level institutional factors that might influence the use of dueling. Not only does this contribute to the recent literature on the importance of early investments in state capacity on later development outcomes (e.g., Michalopoulos and Papaioannou, 2013; Dincecco and Katz, 2014; Rogowski et al., 2019), our evidence also suggests that one critical channel by which this happens is through the reduction of violent informal institutions to resolve disputes.

2   The Institution of Dueling

Dueling is a premeditated form of violence between two combatants with matching weapons, and usually in accordance with agreed upon, and highly ritualized, rules of engagement. It was a common practice in Europe, and was brought by European setters to British North America during the colonial era (1607-1775). By the time of American Independence, the "affair of honor," as dueling was known, was a prevalent form of conflict resolution throughout the original 13 states, and spread west with the rapidly enlarging country. Although dueling is often considered to be a Southern institution, the number of recorded duels in the North was similar in the early 19th century. While dueling remained an integral extralegal form of dispute resolution in the South until the U.S. Civil War (1861-1865), it declined rapidly in the North in the early 19th century. By the early 20th century, recorded duels had essentially disappeared everywhere in the U.S.

Although "anti-dueling laws were on the books in all states[6]," Wells (2001) argues "their enforcement [relied] too heavily on men deeply embedded in the very social practices the laws sought to overturn." Scholars have developed several theories to explain the widespread use of dueling to resolve disputes in the 19th century. Perhaps the most common explanations focus on cultural determinants. In particular, the American South is argued to have embodied a "culture of honor" in which the paramount importance of reputation and honor precluded legal remedies to many types of disputes (Greenberg, 1990). For instance, to settle a case of libel in the court system and accept monetary compensation for personal insult was for "women, cowards, and those religiously opposed to engaging in the more speedy process" (Johnson, 1937, p. 45). This emphasis on a highly individualistic extralegal method of dispute resolution is epitomized in the North Carolinian proverb, "Every man should sheriff his own hearth."

Given the duel's prevalence as a method of dispute resolution, its decline over the 19th century could reflect either a decrease in the number of disputes or in the propensity to use violence. The rapid rise of civil litigation in American courts over the 19th and 20th Centuries, respectively, suggests that a secular decline in disputes cannot explain the eventual disappearance of dueling.[7] Another possibility is that the cultural changes caused social norms regarding the importance of honor to diminish. The presence of a culture of honor,

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[6]Furthermore, dueling was illegal under English common law, which was adopted in the colonies, before the founding of these colonies (Wells, 2001).

[7]The prevailing consensus in this literature studying the rise of civil litigation is that population growth, greater economic development, and changes in the social order result in more disputes (e.g., Black, 1973; Blankenburg, 1975; Felstiner, 1974; Horowitz, 2010; Hurst, 2007; Sarat and Grossman, 1975). Each of these factors strongly characterizes the American experience in the 19th century. According to McIntosh (1983), "conflict is translated into a format that is appropriate for the institution to which it is directed". Hence, it is argued that the rise of civil litigation over this period reflects a greater reliance on formal judicial institutions to resolve disputes. We thank an anonymous referee for suggesting this connection.

however, could certainly be endogenous to a society's institutional quality. In a society with weak third-party enforcement of contracts, economic exchange will be heavily dependent on social ties and reputation. Therefore, protecting one's honor through costly dueling, could be a strong signal of a person's integrity and social capital (Allen and Reed, 2006). Similarly, it has been argued that the prevalence of duels in the South was due to the fact that credit markets in this region were less formal and based more on personal ties (Kingston and Wright, 2010). Without the institutional capacity to determine who was worthy of some financial service, such as a loan, and punish fraud, another screening process was necessary (i.e. the duel). By participating in a high-risk duel, a man shows his willingness to defend his honor, thus highlighting his trustworthiness and integrity. Each argument raises the possibility that the incidence of dueling is endogenous to institutional development, and we should see a decline in violent informal institutions as formal state institutional quality improves.[8]

3 Data

In this section, we describe the variables we use to test the importance of state capacity on dueling incidence. The sample for the panel is by state-decade between 1800 and 1900. The summary statistics for each variable are presented in Appendix Table A-1.

3.1 Post Offices as a Measure of State Capacity

For our primary measure of state capacity, we use the number of post offices in each state per decade. In doing so, we follow Acemoglu, Moscona and Robinson (2016) and Rogowski et al. (2019), who each use the number of post offices to test the relationship between post office

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[8]See, for instance, Beck, Demirgüç-Kunt and Levine (2003), who argue that legal institutions influence the development of financial systems.

expansion and patents filed and economic development, respectively.

The use of post offices as a measure of state capacity is appropriate in this context for a number of reasons. While often associated with patronage, John (2009) and other historians have recently argued that the post office was perhaps the federal government's primary state-building policy in this period, especially in connecting the far-flung and often remote residents of the US. At the time of the U.S. Constitution's adoption (1788), there were 75 post offices, mostly in the country's few coastal towns. With the landmark Postal Service Act of 1792, and many subsequent important pieces of legislation thereafter, Congress created a network that in the words of noted political theorist, Francis Lieber, was "one of the most powerful agents of civilization" (as cited in John, 2009, p.13). The expansion of this network was swift, and by 1860, there were nearly 29,000 post offices from coast to coast. Second, the postal service comprised an enormous share of the federal bureaucracy (as mentioned previously, nearly 80% of the entire civilian federal work force was employed by the postal service in 1841). In the words of one New York Times columnist in 1852, the postal service was the "mighty arm of civil government" (John, 2009, p. 10).[9]

This argument on the importance of post offices in building state capacity in the U.S. is consistent with recent work showing that post offices are not only a good metric of state capacity within the United States but globally as well (Rogowski et al., 2019). A key to the argument on the importance of post offices is that mail was not delivered to residential addresses until late in the period of our study. Thus, in an era of extremely slow communication and travel, proximity to a post office was crucial for any impersonal, long-distance exchange, as well access to most of the country's economic and legal institutions (Acemoglu, Moscona and Robinson 2016). In addition to the role that post-office expansion played in supporting markets (e.g., substantially lowering transaction and information costs),

[9]Furthermore, he argues that in the lives of most Americans, the post office was the only visible arm of the federal government (John, 2009, p. 4).

Rogowski et al. (2019, p. 6) argue that the "development of the postal services enhanced social capital and integrated far-flung communities with national markets".

We contend that this investment in infrastructural capacity had a similar effect on the ability of US states to invest in the formal capacity to enforce its rule. Before the postal service, communication across anything but small distances was incredibly costly. As with markets, these costs necessarily reduced the scale of efficient governance. Thus, when Howe (2007, p. 231) claims that the postal service "played an even more important role than did changes in state laws and constitutions" in democratic diffusion in this period, we claim that this in part is due to the importance of post offices in reducing the costs to each state in expanding its reach and building a functioning bureaucracy. Without this enormous investment in communication infrastructure by the federal government, the costs to each American state in creating sufficient legal and administrative capacity to enforce its rule would have increased substantially. The expansion of the postal network not only facilitated the "the presence of state functionaries and agencies" (Acemoglu, Moscona and Robinson, 2016, p. 2365), but substantially lowered the costs of communication (and with it the cost of routine collective action) between public officials. Simply put, without the postal network, the benefits to more localized and informal governance rise (Dixit, 2009; Rodrik, 2008). We empirically explore this particular claim in Section 3.2.2 below.

Despite the findings that the expansion of post offices spurred development in the U.S. and elsewhere, we may still be concerned that this relationship reflects reverse causality (i.e., post office incidence reflects development and not vice versa). For one, using a placebo strategy, Rogowski et al. (2019) "find no evidence that economic growth led to the siting of post offices (rather than the other way around) or that underlying trends in economic activity drove the establishment of post offices." Furthermore, the policy by which new post offices were created additionally undermines some of these concerns. According to Acemoglu, Moscona and Robinson (2016, p. 62), "the expansion of the postal network re-

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flected a range of idiosyncratic factors and motivations". One factor was that the goal of the postal service was to create an information network that connected a vast and largely rural nation (John, 2009). Profitable coastal routes subsidized the creation of unprofitable routes in the country's remote interior. That is, federal politics tended to trump local economic conditions when opening post offices. We argue that this expansion facilitated state-level control of their frontiers.[10]

3.1.1   Measuring State Capacity: Post Offices

To construct this variable, we consult the official records of the United States Postal Service and create a dataset of the number of post offices in existence across states and decades. For our measure, in each state, we count the number of post offices in existence at the beginning of each decade of our dueling data. Following Acemoglu, Moscona and Robinson (2016), we transform this variable by taking the logarithm of the number of post offices plus one.[11] Figure 1 shows the growth of the United States Postal Service over time across states. Consistent with John (2009), the number of post offices grows almost exponentially over time (which can be seen by examining the shifting scales of shading for each map). In 1800, Virginia had the most post offices with 184. By 1890, Pennsylvania had the most with

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[10]We might also be concerned that the distribution of post offices was driven by political patronage. In this vain, Gordon and Simpson (2018) show that, for all sorts of federal infrastructure projects in the 19th century, partisanship was a significant driver of infrastructure development. To test for this possibility, we replicate the regressions of Gordon and Simpson (2018) and find no evidence for this concern with the growth of the postal service. We demonstrate this finding graphically in the Appendix, Figure A-2. This figure shows the change in the number of post offices per (100,000 residents) from the previous decade by state plotted against the average ideological distance of the state's Congressional delegation from the median member of Congress during that decade (Poole and Rosenthal, 1997)—the key predictor considered in Gordon and Simpson (2018). With the exception of a mild negative trend for the 1870s, we find no systematic evidence of partisan determinants of post-office growth.

[11]All results presented below remain significant with the unlogged scale.

4,780.

We use three different measures of post offices in our panel specifications below: 1) a count of total post offices, logged; 2) post offices per 1,000 square miles; and 3) post offices per capita, respectively. As shown below, our results do not depend on which measure of state capacity we use.

### 3.1.2 Evidence that post offices predicts later state capacity

While creating the postal service network comprised a substantial portion of federal government resources during this period, it is important to understand the mechanism by which post office expansion affects the use of violent informal institutions to resolve disputes. We posit that being connected to the postal network in this period, which often required the construction of postal roads, was a prerequisite for the creation of the local *formal* capacity to protect property rights, promote order and enforce compliance with contracts and other growth-enhancing rules. For one, the lack of access to the country's primary informational network would make a state government's task of creating the infrastructural capacity to enforce its rule much more costly. Not only would higher informational costs make collective action more difficult, but would also increase the initial costs of building a state's formal institutional rule (e.g., establishing state courts, sophisticated tax-collecting systems). Instead of paying these high fixed costs of creating formal institutions, smaller, more localized groups might find it more efficient to use informal governance mechanisms (Dixit, 2009; Rodrik, 2008).[12]

We explore this argument using a more direct and conventional measure of each state's formal capacity: per capita state tax revenues. We construct this measure using an annual state-level dataset of state revenues and expenditures, as collected by Sylla, Legler and Wallis
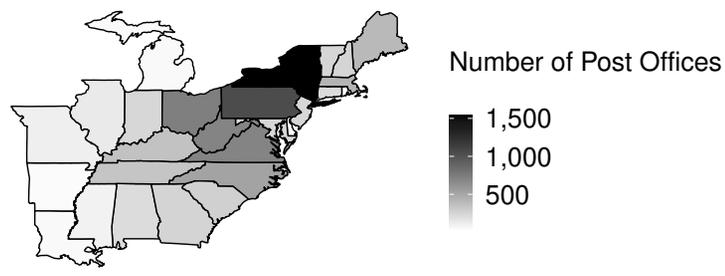
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[12]Furthermore, the lack of nearby access to the postal office would lower the benefits of formal institutional capacity, as access to state and national credit markets and other growth-enhancing institutions would be lower and therefore less valuable.
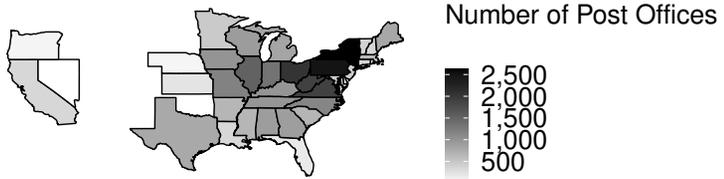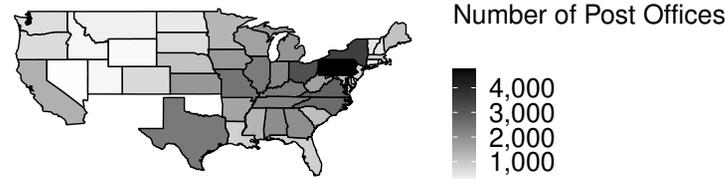
Figure 1: Growth of Post Offices, 1800–1899

(a) 1800s
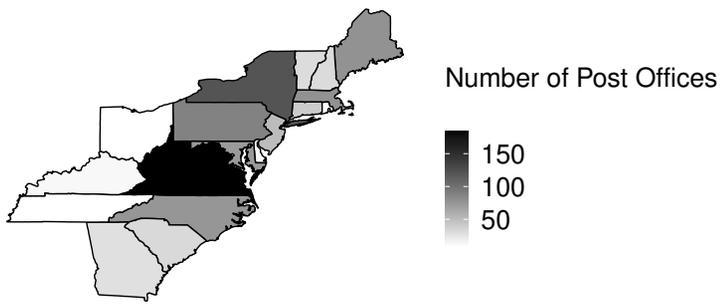
(b) 1830s

(c) 1860s

(d) 1890s

([1993](#)).[13] This measure is relevant as scholars have shown that legal and fiscal capacity are complements, and the ability to raise revenue is critical to the state's ability to make investments in formal institutional capacity (Besley and Persson, 2009). If post office presence was an important prerequisite for creating formal state-level capacity, then it should be able to predict *future* state tax revenues.

We test this claim using regressions of the form

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\begin{aligned}
\log(\text{Revenues p.c.})_{s,d} &= \gamma_0 + \gamma_1 \log(\text{post offices} + 1 \text{ p.c.})_{s,d-x} + \gamma_2 \log(\text{population})_{s,d-x} \\
&+ \quad + \gamma_3 \log(\text{urbanization})_{s,d-x} + \eta_s + \varepsilon_{s,d},
\end{aligned}
\tag{1}
$$

where $\log(\text{Revenues p.c.})_{s,d}$ is the average amount of tax revenue per capita collected in state s in decade d, $\log(\text{post offices} + 1 \text{ p.c.})_{s,d-x}$ is the logged number of post offices per capita in state s in decade $d-x$, $\log(\text{population})_{s,d-x}$ is state s's logged population in decade $d-x$, $\log(\text{urbanization})_{s,d-x}$ is state s's level of urbanization (as per the United States Census; see below) in decade $d-x$, and η_s are fixed effects for states. The value of x denotes the number of lags for each regression model. We consider lags of up to three decades, i.e., $x \in \{1, 2, 3\}$. The results of these regressions, disaggregated by the number of lags used, are presented in Table 1. As is evident, the lagged value of post offices per capita predicts future state tax revenue whether we lag by one, two, or three decades. Even more stark, the precision of our estimate of this effect increases the farther back we lag, suggesting that post offices present not just a contemporaneous proxy for state capacity but also a *long-run* determinant thereof. These results provide solid evidence for our claim that post offices are a clear proxy for state-level capacity.[14]

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[13]For some states, there is nearly complete data on the amount of tax revenues collected each year; while in a few others, there is little-to-no data.

[14]An alternate approach to estimating each lag separately is to estimate a distributed lag model in which all intermediary lags are included simultaneously. We report these estimates

Table 1: Post Offices Predict State Capacity to Collect Taxes

Outcome: Log State Rev. per Cap.$_d$	All Independent Vars Lagged One Decade			All Independent Vars Lagged Two Decades			All Independent Vars Lagged Three Decades		
Intercept	25.83***	4.99*	18.85***	17.24***	6.39***	12.65***	10.06***	5.09***	4.79
	(4.99)	(2.04)	(4.70)	(3.64)	(1.63)	(3.71)	(2.68)	(1.21)	(2.68)
Log Post Offices per Cap.	0.86**	0.76*		0.84***	0.91***		0.70***	0.69***	
	(0.27)	(0.30)		(0.21)	(0.22)		(0.15)	(0.15)	
Log Population	−1.45***		−1.36***	−0.82**		−0.91***	−0.36*		−0.35
	(0.32)		(0.34)	(0.25)		(0.27)	(0.18)		(0.19)
Log Urbanization	7.97***	3.17***	8.27***	6.33***	3.13***	7.52***	3.94***	2.35**	5.05***
	(1.24)	(0.69)	(1.30)	(1.17)	(0.69)	(1.22)	(1.07)	(0.76)	(1.15)
R^2	0.93	0.92	0.93	0.93	0.93	0.92	0.93	0.92	0.91
Adj. R^2	0.91	0.89	0.90	0.91	0.90	0.89	0.90	0.89	0.88
Num. obs.	126	126	126	125	125	125	125	125	125
RMSE	0.45	0.50	0.47	0.45	0.47	0.48	0.47	0.48	0.52

Note: Cell entries are OLS coefficient estimates with standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. State and decade fixed effects are suppressed. The dependent variable for each model is a state's total tax revenues per capita in decade d. The independent variables are lagged post offices per capital, lagged (log) population, and lagged urbanization; depending on the model in question, these are either lagged by one decade, two decades, or three decades.

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3.2 Controls

3.2.1 Controlling for Institutional Quality

We want to estimate the influence of state capacity independent of other institutional factors that might influence the incidence of dueling. We include three such measures. Given the possibility that the prevalence of violent norms of conflict resolution may be related to the perceived impartiality of the state's judicial system, we include a measure of judicial independence. Specifically, we include whether a state's judges were appointed for lifetime terms in that decade. We derive this measure from the American Judicature Society (AJS) and, therein, note all formal changes to each state's judicial system from inception to 1900.[15] This method of judicial selection was one of three major methods of selection used in the 19th century—the other being elections and selection for fixed terms. The introduction of judicial elections by voters was initially one of the Jacksonian-era political reforms designed to wrest control of the judiciary from elites and place it in the control of the masses (Nelson, 1993). Although perhaps well-intentioned, some scholars have argued that an elected judiciary is even more prone to corruption than lifetime appointees (e.g., Rose-Ackerman, 2007).

Second, we include a measure of how inclusive access to political power was across states. We create a variable measuring whether a state had any economic restrictions on suffrage for adult white males. While most states removed all restrictions over the first half of the 19th century, there was significant variation in the timing. Moreover, a few states even maintained tax-paying restrictions over the entire period of our data. We code the timing

in Appendix Table A-2. In that table, the key parameter of interest is the net effect of post offices, calculated as the sum of the coefficients of the lags on the post office variable (see, e.g. Acemoglu, Moscona and Robinson, 2016). The net effect increases as the number of lags included increases, further supporting our claim that past post offices is a valid measure of long-run state capacity.

[15]The data for this are available at the AJS's website: http://www.judicialselection.us/judicial_selection/reform_efforts/formal_changes_since_i

in which state's removed these restrictions according to Keyssar (2009).

Finally, we also consider the importance of political competition. Alt and Lassen (2008) argue that the propensity for corruption is *higher* in U.S. states where one party dominates. Thus, higher political competition should capture states with less corruption. Building on this insight, we construct a variable measuring the effective number of political parties representing each state at the federal level during each decade in our data using the Laakso and Taagepera (1979) formula.[16] Since each Congress is a two-year period, we pool together the delegations for each of the five Congresses during the decade. The effective number of parties tells us whether or not there is substantial electoral competition in the state. As a robustness check, we also include an alternative, and perhaps more appropriate, measure of political competition: the number of effective political parties in the state legislatures (as collected by Dubin (2015)). However, we only use this as a robustness check because this information is largely unavailable for the early decades of our sample.[17]

3.2.2 Controls for Development

In addition to these variables, we also consider four other explanatory variables that may have additional influence on the frequency of dueling. One concern is that economic development could explain both increases in the number of post offices and declines in dueling.[18] While federal policy of creating postal routes before they were commercially viable mitigates some of this concern, we include two controls for development. Unfortunately, state income per

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[16]According to this formulation, the effective number of parties is $1/\sum_i p_i^2$, where p_i is the fraction of seats held by party i.

[17]Re-running the models described below using state legislative data for years in which we have it (approximately 1830-1900) produces substantively similar results.

[18]As previously mentioned, Rogowski et al. (2019) explore precisely this question and find no evidence that post office locations were explained by development; in fact, they find the reverse to be the case. Also see Acemoglu, Moscona and Robinson (2016) for additional evidence that post office expansion was not driven by economic development.

capita is only available for a few years of the sample. Yet, in this era of pre-industrialized economies, changes in urbanization should capture increasing economic development.[19] We therefore include the U.S. Census' measure of the share of each state's population living in towns of at least 2,500 residents. Second, in all models that we consider below, we account for state population using the total number of inhabitants by state and decade. In the American context in which the native population was killed or removed and otherwise not counted in the Census, rapid changes in population reflect to some extent development through the channel of in-migration (both domestically and internationally). Therefore, if population growth determined the expansion of the postal network (contra the arguments of John (2009)), it is important to control for changes in population.[20] This concern is further mitigated by showing that our estimates are robust to measuring state capacity as the number of post offices per capita (see Table 3 below).

3.3 Measuring Violence: Dueling Incidence

While dueling was a well-chronicled and highly-ritualized institution of the early Republic, lists of duels in the U.S. are notoriously hard to come by. As a result, most extant data sources massively undercount the number of duels. To ameliorate this, Byron (2008) combed through more than 1,000 newspapers (both digitized and microfilm) from all regions in the United States for the period of 1783 to 1899. Using this newspaper-culling approach, Byron found 734 duels. For the vast majority, he was able to find the names of the duelists, the date of the duel, the state in which each duel occurred, and whether a duelist was injured or killed. While certainly an undercount, newspapers—including small, local ones—are the

[19]In 1800, the first year of our sample, the country's urbanization rate was 6% and tiny Rhode Island had the highest rate at 20%. By 1900, the last year of our sample, the country's urbanization rate was nearly 40%, and three states exceeded 70%.

[20]That is, the population of rapidly developing states, such as New York, grew much faster than more economically stagnant states, such as in the South.

single best resource available to identify the occurrence of duels.[21]

While measurement error in the dependent variable is a concern, the bias likely works against our estimates. For one, newspaper coverage was almost certainly correlated with post office incidence. One of the key provisions of the aforementioned Postal Service Act of 1792 was the highly subsidized rates charged to mailed newspapers, especially local ones (John, 2009). Hence, post offices indirectly subsidized local newspapers. If post offices also predict the likelihood that dueling was reported, then any estimates of the relationship between state capacity and dueling frequency should be downwardly biased.[22] We provide evidence for this claim using Grosjean's (2014) measure of the number of newspapers by state in 1840. As shown in Appendix Figure A-1, our post office measure of institutional capacity is quite highly correlated with this measure of newspaper incidence.

For our empirical models, we operationalize this database by aggregating the number of duels across states decennially; that is, we count the number of duels that took place in each decade from 1800–1899 in each state. Based on this metric, Figure 2 shows the evolution of dueling aggregating across states over time. In this figure, we notice that dueling is relatively steady in the early 19th century, spikes prior to the Civil War, and mostly declines thereafter. This spike in dueling was driven by the nation's expansion westward, in general, and the California Gold Rush, in particular. The non-monotonic nature of this data provides us with the temporal variation, along with the great spatial variation in the incidence of dueling, to test state capacity's role in driving the observed trends.[23]

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[21]Prior to Byron's (2008) work, the only other comprehensive list of duels came from Sabine (1859). Sabine's (1859) list—which ended in 1859—included 353 duels. In our data, for the same period of time, we have 468. This suggests that Byron's data, albeit incomplete, is far more comprehensive.

[22]Appendix B provides a formal elaboration of this argument.

[23]Appendix Figure A-4 shows the geographic distribution of dueling for select decades.

Figure 2: Duels Over Time
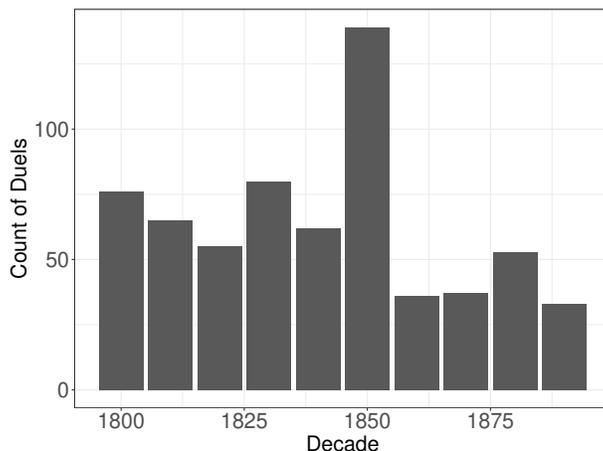
4 Empirical Evidence

To test the relationship between state capacity and dueling, we run a series of cross-sectional panel regressions. The unbalanced panel is by decade-year, and the sample consists of each state that exists in each decade between 1800 and 1900. Across all specifications, our goal is to model the relative incidence rate of dueling, offset by the total state population during the decade in question. In these regressions, the general specification is of the form

$$\mathbb{E}[\text{Duels}_{s,d}] \quad = \quad \exp\{\theta \log(\text{post offices}_{s,d} + 1) + \boldsymbol{\gamma}' \boldsymbol{x_{s,d}} + \eta_{r(s)} + \zeta_{t(d)}\}, \tag{2}$$

where θ is the main parameter of interest, $\boldsymbol{x_{s,d}}$ is the vector of covariates described above, and the last two terms account for variation across states (i.e., cross-sectional units) and decades (i.e., time). In our base specifications, the last two terms are state and decade fixed effects—that is, $r(s) = s$ and $t(d) = d$, so these terms become η_s and ζ_d, respectively. For other specifications, we eschew state fixed effects in favor of two regional dummies—one for whether the state belongs to the South (measured as the eleven states of the Confederacy) and another for whether the state entered the Union during the decade in question. These dummies

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capture fundamentally different aspects about the role of geography and dueling.[24] Since one explanation for dueling is that it was about a culture of honor, the *South* dummy controls for the region in which honor is claimed to have played a key role in societal interactions (Grosjean, 2014). For the *New State* dummy, the logic is related to the previous discussion of development and state capacity. At the time of independence, there were 13 states, each of which was largely arrayed on along the Atlantic Coast. New states were added periodically as they came to be settled. By 1900, the last year of our sample, there were 45 states. New states should be less institutionally developed than older states and, as such, we should expect more violence in these locales. Note that all variables, save for the South dummy, vary across states and time. Additionally, in these alternate specifications, we replace decade fixed effects with a linear time trend. This approach is motivated by the secular decline in dueling shown in Figure 2.

The dependent variable is the number of duels during decade d while *all* other time-varying covariates are measured at the start of the decade; for example, the number of post offices is the count of post offices in state s at the beginning of decade d. Given the number of duels is a count variable with potential over-dispersion across panel units, the Negative Binomial model is our preferred approach to capturing the data generating process. That said, we also consider linear models and, as we will show, the results are substantively similar.

The first set of general results are presented in Table 2, which is organized into two groups. The first group uses the counts of duels as the dependent variable and treats the (log of) population in the state-decade as a control variable. The second group *offsets* the number of counts by population, thereby allowing us to model the rate of duels per unit of population. Within each group, the first two columns use a linear regression framework (with the dependent variable equal to the logged number of duels plus one) and the second two use Negative Binomial specifications. The first and third columns only control for the key

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[24]For the South dummy, the results hold if all 15 slave states are included.

variable of interest—the number of post offices—whereas the other two include all relevant controls. The final model omits state and decade fixed effects, replacing these with regional dummies and a linear time trend, respectively.

Across all specifications, the number of post offices is negative and precisely estimated; the more post offices in a state, offset by population, the lower the incidence of dueling in that state. The dummy for whether the state entered the data in the decade in question is also large and significant across specifications. Since this is, in effect, another measure of state strength, the combined effect of the lack of post offices and being in a newly-formed state is large. By comparison, the control for the South is positive but comparatively smaller in magnitude. This suggests that, while that region does have a larger incidence of dueling, state capacity seems to be a much stronger predictor of violence. None of the other controls are consistently significant across specifications.

Given the logged nature of the variables and our preference for the Negative Binomial specifications, it is much easier to get a sense of the magnitude of the effects of post offices on dueling by using marginal effects. We use the final model—the fully-specified Negative Binomial with a population offset—to generate predicted rates of dueling per 100,000 inhabitants.[25] Figures 3a and 3b present such predicted rates, varying the number of post offices from the first to the third quartiles and region—either South vs. non-South in the former (a) or new vs. old state in the latter (b). All other covariates are held at typical values. We can see in these figures that the expansion of state capacity is strongly associated with a substantial reduction in the rate of dueling. For Southern states with few post offices, the dueling rate is about 2 per 100,000 residents; for non-Southern states, it is just over 0.5. As state capacity increases, the gap between the two shrinks to near zero. The differences are even starker when comparing new and old states. New states with low state capacity have

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[25]This choice was not arbitrary, as contemporary rates of homicides and other crimes are typically reported this way.

Table 2: Predicting the Rate of Dueling by State, 1800-1899

	Counts				Rates (offset by population)				
	OLS	OLS	Pooled NB	Pooled NB	OLS	OLS	Pooled NB	Pooled NB	Pooled N
Intercept	−2.561***	−8.463***	−1.511	−3.109	−7.174***	−7.244***	−7.039***	−7.364***	−8.306**
	(0.439)	(1.221)	(1.145)	(2.185)	(0.155)	(0.311)	(0.304)	(0.488)	(0.446)
Post Offices (logged + 1)	−0.365***	−1.039***	−0.370**	−0.547**	−0.874***	−0.914***	−1.043***	−0.944***	−0.771**
	(0.052)	(0.125)	(0.146)	(0.223)	(0.027)	(0.054)	(0.059)	(0.103)	(0.092)
Pop. (logged)	0.412***	1.150***	0.350***	0.533**					
	(0.053)	(0.141)	(0.130)	(0.234)					
% Urban			−1.149**	−3.014***			−2.239***	−3.389***	−0.017
			(0.503)	(0.881)			(0.474)	(0.863)	(0.748)
Lifetime Judges			0.294**	0.274			0.313***	0.327	−0.091
			(0.114)	(0.216)			(0.119)	(0.219)	(0.214)
Num. Eff. Parties			−0.035	0.033			−0.035	0.065	0.104
			(0.058)	(0.103)			(0.061)	(0.104)	(0.086)
Suffrage Restrictions			0.120	−0.068			0.115	−0.128	−0.410*
			(0.139)	(0.226)			(0.146)	(0.228)	(0.231)
South									1.414***
									(0.186)
New State									1.967***
									(0.466)
Decade Counter									−0.109*
									(0.059)
State & Decade Fixed Effects		✓		✓		✓		✓	
R²	0.145		0.669		0.751		0.888		
Adj. R²	0.140		0.593		0.750		0.862		
Num. obs.	358	358	314	314	358	358	314	314	314
RMSE	0.732		0.509		0.847		0.532		
AIC		1165.899		883.513		1164.855		885.433	1010.811
BIC		1181.421		1112.226		1176.496		1110.397	1048.304
Log Likelihood		-578.949		-380.756		-579.427		-382.717	-495.405
Deviance		318.256		249.618		319.520		249.253	295.007

Note: cell entries are either OLS or Negative Binomial coefficient estimates with standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. The first four models treat state population as a control variable and the next five models offset the counts of dueling by state populations. For OLS models, the dependent variable is the log of the number of duels plus one whereas, for the Negative Binomial models, the dependent variable is the number of counts.

Figure 3: Predicted Number of Duels per 100,00 Population

(a) South vs. Non-South   (b) New vs. Old States
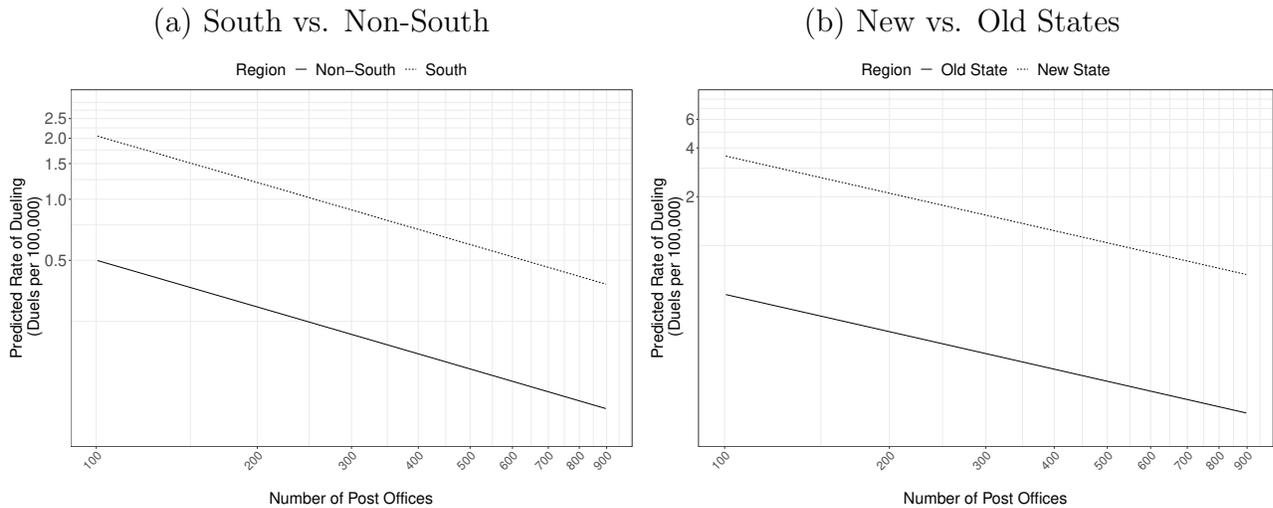
a recorded decade dueling rate nearly equivalent to the contemporary homicide rate in New York City.[26]

Table 3 reports the estimates by additional sub-samples of the data. In each of these columns, we split the data temporally (pre- and post-1850), regionally (South vs. non-South), and based on state age (states in existence by 1800 and those formed subsequently). Across all of these sub-samples, we find that post office presence is always statistically significant and precisely estimated. Interestingly, the effect size for Southern and non-Southern states is virtually the same; that is, even in the region dominated by a "culture of honor," state capacity nevertheless mattered for the presence or absence of violent dispute resolution. Also of note: the effect of being a new state was not statistically significant prior to 1850 but, after is strongly correlated with dueling propensity. While this no doubt is due in part to the paucity of news reporting along the remote frontiers of the early Republic, it also likely reflects the geography of Western expansion. New states formed after 1850 were increasingly

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[26]New York City's annual homicide rate in 2016 was estimated at 3.9 per 100,000 residents. See https://www.brennancenter.org/analysis/crime-2016-final-year-end-data.

Table 3: Predicting the Rate of Dueling by State (Alternate Specifications), 1800-1899

Data Split	Pre-1850	Post-1850	South	Non-South	Original States	Other States
Intercept	−8.494***	−8.359***	−7.246***	−8.497***	−9.161***	−4.665***
	(0.512)	(0.964)	(0.643)	(0.631)	(0.500)	(1.237)
Post Offices (logged + 1)	−0.793***	−0.916***	−0.738***	−0.683***	−0.567***	−1.117***
	(0.097)	(0.135)	(0.149)	(0.124)	(0.111)	(0.188)
% Urban	0.982	−0.012	3.527**	−0.640	−0.967	2.932*
	(1.498)	(0.857)	(1.681)	(1.010)	(0.896)	(1.694)
South	1.255***	1.581***			1.138***	1.488***
	(0.253)	(0.265)			(0.225)	(0.353)
Lifetime Judges	0.088	−0.313	−0.217	−0.006	−0.024	0.593
	(0.247)	(0.454)	(0.338)	(0.292)	(0.225)	(0.693)
New State	−0.696	2.067***	−0.339	2.349***		0.655
	(1.104)	(0.613)	(0.793)	(0.630)		(0.594)
Num. Eff. Parties	0.054	0.227	0.061	0.078	0.034	−0.220
	(0.101)	(0.164)	(0.135)	(0.112)	(0.094)	(0.231)
Suffrage Restrictions	−0.247	−0.852	−0.117	−0.575*	−0.313	−1.594*
	(0.258)	(0.588)	(0.361)	(0.315)	(0.235)	(0.851)
Decade Counter			−0.121	−0.144*	−0.141**	−0.292**
			(0.092)	(0.081)	(0.069)	(0.144)
AIC	486.777	530.777	472.782	537.374	738.779	265.106
BIC	511.789	560.234	495.767	567.876	769.483	290.104
Log Likelihood	-234.389	-256.388	-227.391	-259.687	-360.389	-122.553
Deviance	128.660	168.775	108.699	180.826	221.457	72.245
Num. obs.	119	195	95	219	224	90

Note: cell entries are Negative Binomial coefficient estimates with standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All models offset the counts of dueling by state populations.

farther from Washington, D.C., and therefore increasing the cost to the central government of effectively penetrating and controlling all of its vast territory.[27]

Putting this all together, Figure 4 compares the predicted number of duels per 100,000 population for the fully specified Negative Binomial model from Table 2 (the final column) as well as all data splits considered in Table 3. In this plot, all covariates are held a typical values and the number of post offices is varied between the 25th and 75th percentile. For simplicity, we order the models from largest to smallest effects of low state capacity. In this plot, we see that, for all models, the cases in which state capacity is low have significantly higher predicted dueling rates than those in which state capacity is high. Even in the model for the Southern states—the one in which the gap between low and high capacity is the smallest—the dueling rate in low capacity states is more than triple the rate in high capacity states.

5   Robustness Checks

Despite the consistency of the findings across model specifications found above, our central measure of state capacity—the number of post offices—might be seen as being problematic for a few reasons. For one, using counts of post offices as our primary measure could be partly capturing geography: larger states may simply have more post offices because of their size. Thus, we also create a variable for each state-decade measuring the number of post offices per 1,000 square miles. As we see in Appendix Figure A-3, this measure also demonstrates that the footprint of the federal government is much greater in the Northeastern states than in the new, Western states. Similarly, as shown in the first column of Table 4, the results are unchanged when we run the same main model specification presented above using this

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[27]Famous movies set in the "Old West", such as the *The Searchers* and *Unforgiven*, may provide a visual backdrop to this remote context. For a recent scholarly inquiry regarding this setting, see Couttenier, Grosjean and Sangnier (2017).

Figure 4: Predicted Dueling Rate Across Models
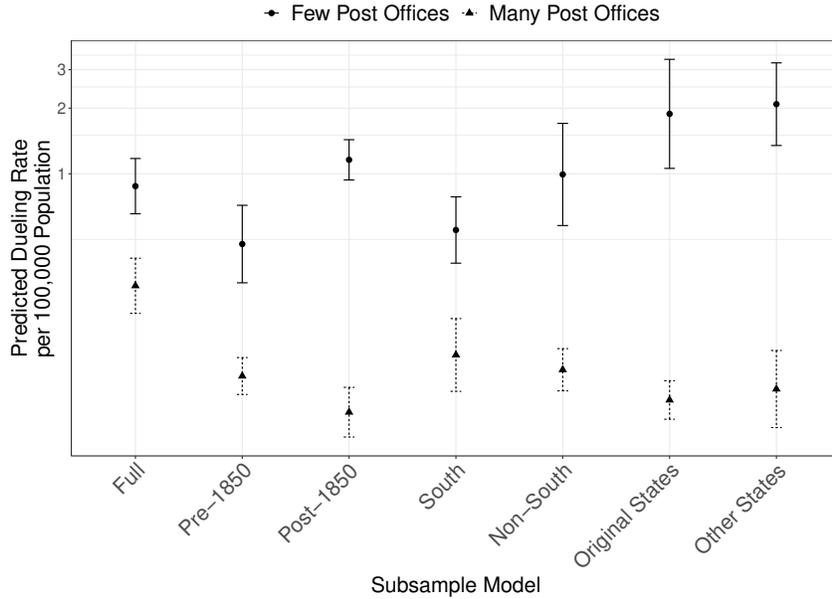
measure of state capacity.

Going further, it seems plausible that just as the number of post offices might be driven by physical geography, it may also be related to *human* geography. That is, post office deployment could be influenced by population movements and, as such, our measure is partly capturing changes in population. Just as with the concern of physical geography above, we reconstitute our measure of post offices by dividing the number of post offices by the total number of inhabitants in the state at the start of each decade. The 2nd column of Table 4 shows that when we re-run our principal model using this reformulation the substantive results remain unchanged. In some respects, this is unsurprising, as our previous models already offset the data by unit population.

We also provide an additional test for whether our estimates are confounded by development; that is, our results are being driven more by population increases than by the presence of post offices in and of themselves.[28] To address this, we employ a simple residualization

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[28]Recall that Rogowski et al. (2019) used a placebo strategy to test for this and found no

technique. This proceeds in two stages. First, we regress the logged number of post offices (plus one) on logged population, urbanization, and the logged total area of the state in question. Second, we take the residuals from this regression and replace the raw post office count with this residualized number of post offices as the postal variable in our main specification. The logic behind this approach is straightforward. The residuals represent "abnormalities" in the number of post offices by state and decade; that is, positive residuals are cases where a state has more post offices than population, urbanization, or state area would have led us to expect and negative residuals are the opposite. The third column of Table 4 shows the results from this approach. Again, our main effect still holds, remaining strong and precisely estimated.

Lastly, the final column of Table 4 reports the estimates when decade fixed effects (but not state fixed effects) are included in the primary models. The estimates remain strongly negative.

6   Discussion

Our evidence suggests that increasing state capacity - as proxied by the expansion of federal post offices - explains a significant amount of variation in the incidence of dueling. This violent informal institution, which despite its illegality was widespread across all regions of the early Republic, was largely extinct by the end of the 19th Century. Our data suggests that this was far from inevitable. While dueling has the reputation of being an activity that was particular to elites, the nation's westward expansion coincides with the democratization of the duel in the second half of the 19th century. Hence, the rapid expansion of the federal government into these remote areas may have been critical in quelling this violent informal institution.

evidence that development predicted post office locations.

Table 4: Robustness Regressions: Varying Specifications

	Postal Offices per. Sq. Mi.	Postal Offices per Cap.	Residualized Post Office Measure	Decade Fixed Effects
Intercept	−14.769***	−8.075***	−11.498***	−8.283***
	(0.658)	(1.803)	(0.446)	(0.462)
Post Offices per Sq. Mi. (logged)	−0.579***			
	(0.084)			
Post Offices per Pop. (logged)		−1.086***		
		(0.219)		
Post Offices (residualized)			−0.562**	
			(0.231)	
Post Offices (logged + 1)				−0.834***
				(0.092)
% Urban	0.912	−0.264	−0.864	−0.167
	(0.828)	(0.880)	(1.110)	(0.726)
South	1.167***	1.368***	1.427***	1.309***
	(0.199)	(0.201)	(0.241)	(0.180)
Lifetime Judges	−0.006	−0.094	0.004	−0.037
	(0.234)	(0.215)	(0.255)	(0.208)
New State	1.698***	1.172**	3.395***	1.493***
	(0.514)	(0.510)	(0.523)	(0.477)
Num. Eff. Parties	0.065	0.152*	0.030	0.137
	(0.090)	(0.088)	(0.100)	(0.135)
Suffrage Restrictions	−0.216	−0.345	−0.517**	−0.333
	(0.248)	(0.238)	(0.264)	(0.221)
Decade Counter	−0.254***	0.009	−0.343***	
	(0.056)	(0.073)	(0.078)	
Pop. per Sq. Mi. (logged)		−0.045		
		(0.079)		
AIC	1020.570	1018.392	1058.786	1014.145
BIC	1058.064	1059.635	1096.280	1081.634
Log Likelihood	-500.285	-498.196	-519.393	-489.072
Deviance	292.449	295.923	294.112	302.406
Num. obs.	314	314	314	314

Note: cell entries are Negative Binomial coefficient estimates with standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All models offset the counts of dueling by state populations.

Thinking more broadly, our findings support the growing political economy literature on the importance of a state's ability to enforce its order. Similarly, a number of prominent scholars have argued that violence is decreasing over time (e.g., Pinker 2012), a fact for which the development of the modern state is largely responsible (e.g., Morris 2014). Our evidence contributes to this in two ways. First, it demonstrates that early investments in infrastructural capacity are likely a critical prerequisite of this process. Second, one mechanism by which violence declines is the reduced reliance on informal mechanisms of dispute resolution.[29] Furthermore, our work demonstrates a key mechanism by which increased capacity, violence, and development are related. Acemoglu, Moscona and Robinson (2016) find that increasing state capacity via post offices increased patents and, as a result, fostered economic development and innovation. Complementing this work, Rogowski et al. (2019) find that, looking cross-nationally, the existence of post offices is a significant long-run predictor of GDP and economic growth. Combined with our evidence, the growth of the US Postal Service did not simply make sending letters across the nation possible. Rather, it fostered economic development and, perhaps just as importantly, helped make peaceful and legal dispute resolution a more viable strategy for ordinary citizens.

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[29]We thank an anonymous referee for pointing out this connection.

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Appendix A: Supporting Figures and Tables as cited in the text of the paper

Figure A-1: State-level Number of Newspapers (1840) and Post Offices in 1840
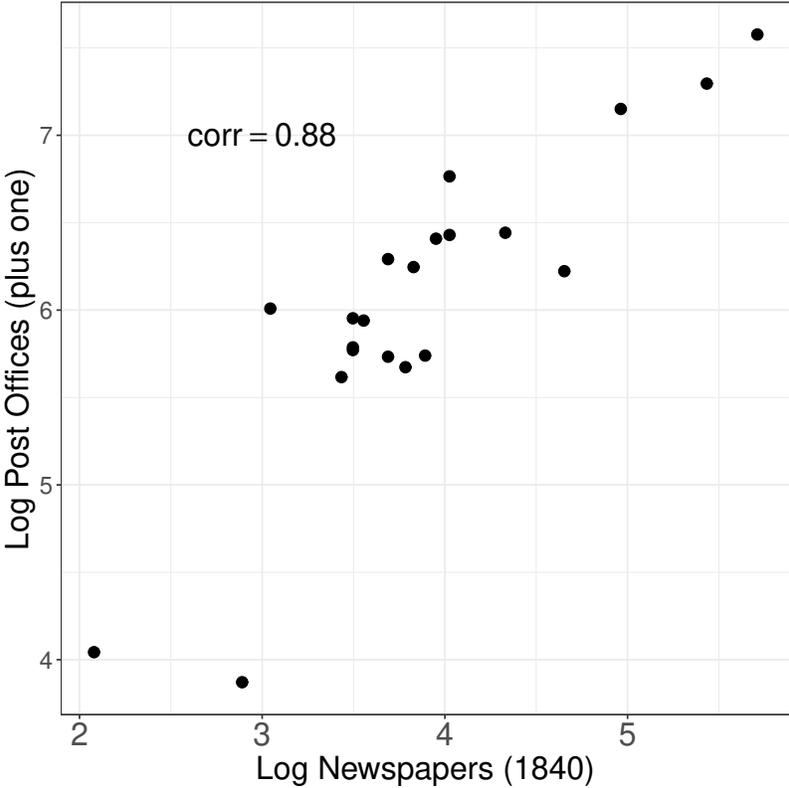
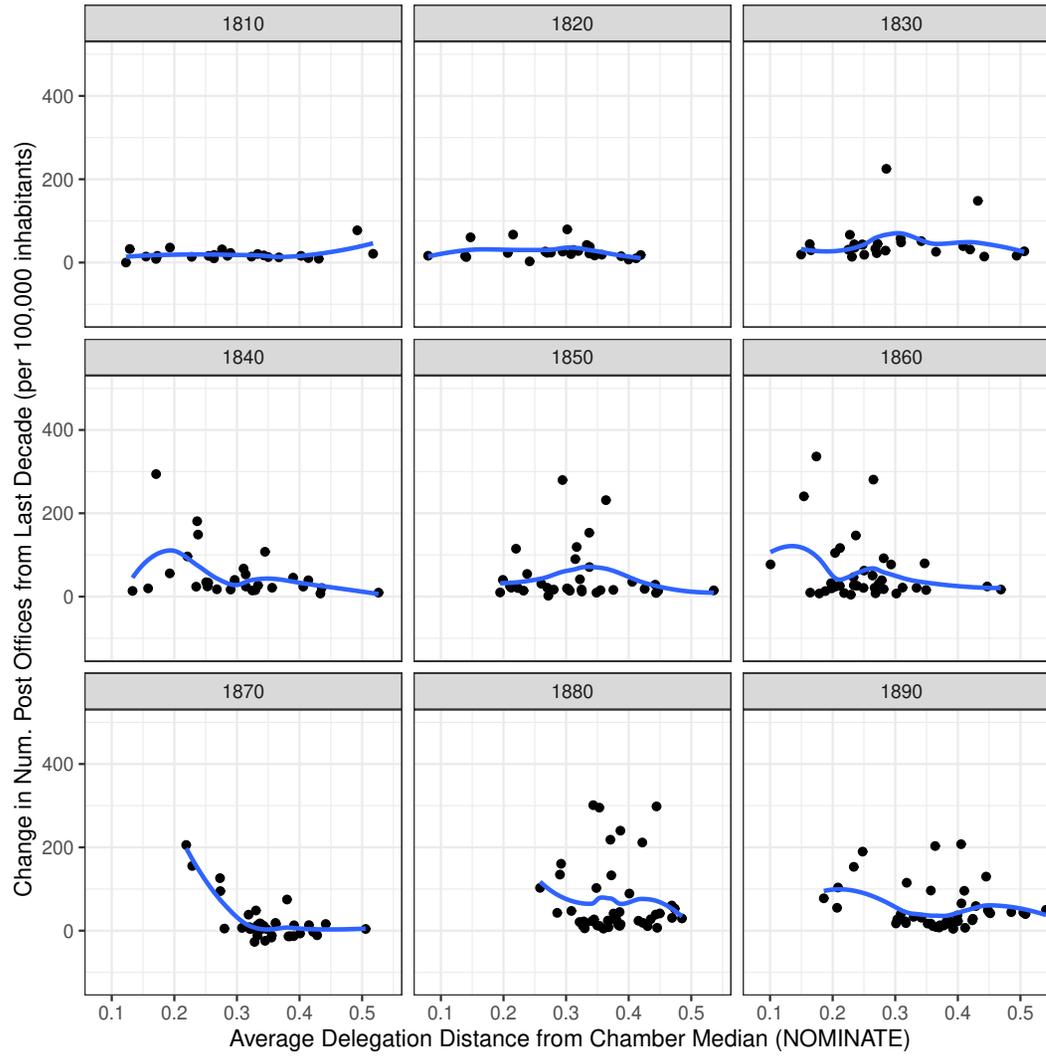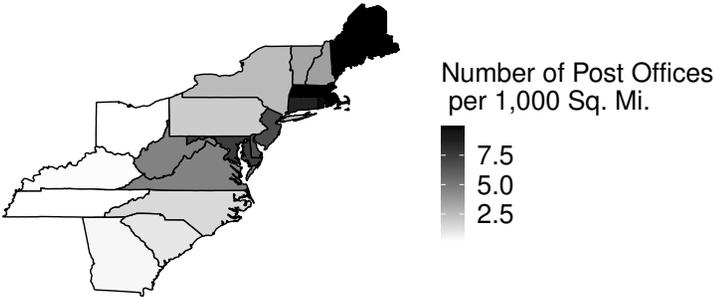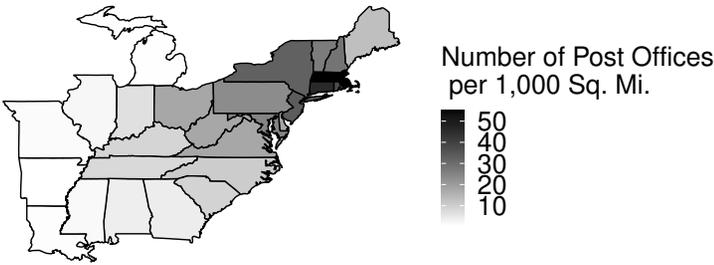Figure A-2: Growth in Post Offices as a Function of Partisanship

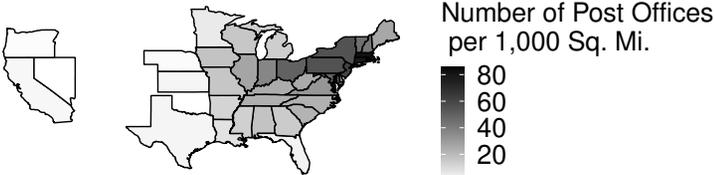Figure A-3: Growth of Post Offices, 1800–1899 (per 1,000 Square Miles)

(a) 1800s

(b) 1830s

Number of Post Offices
per 1,000 Sq. Mi.

7.5
5.0
2.5

Number of Post Offices
per 1,000 Sq. Mi.

50
40
30
20
10

(c) 1860s

(d) 1890s

Number of Post Offices
per 1,000 Sq. Mi.
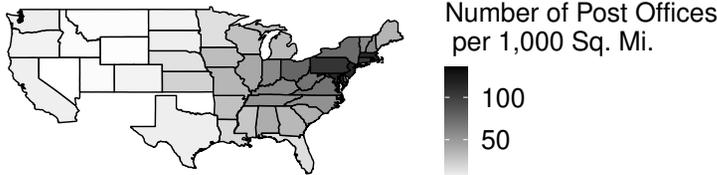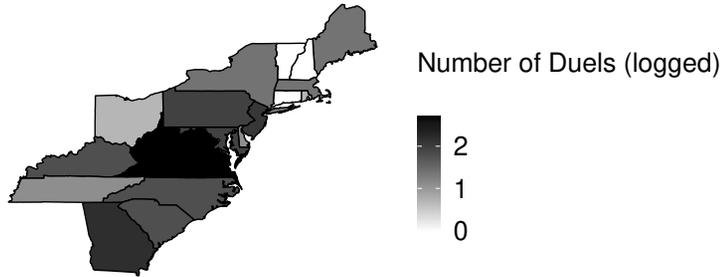
80
60
40
20

Number of Post Offices
per 1,000 Sq. Mi.

100

50

Figure A-4: Geographic Distribution of Dueling, 1800–1899

(a) 1800s
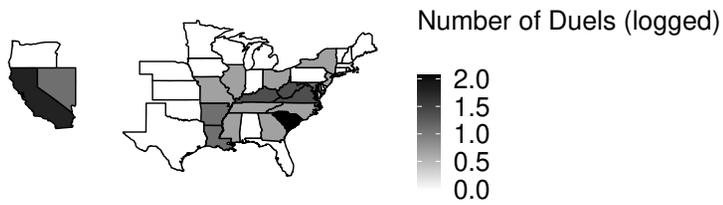
(b) 1830s

Number of Duels (logged)

2

1

0

Number of Duels (logged)

3

2

1

0

(c) 1860s

(d) 1890s

Number of Duels (logged)

2.0
1.5
1.0
0.5
0.0

Number of Duels (logged)

1.5

1.0

0.5

0.0
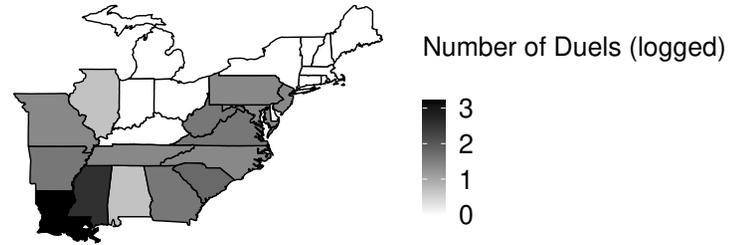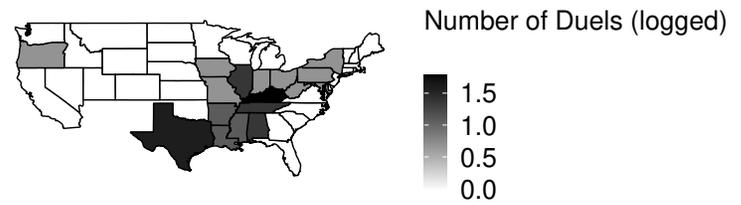
Table A-1: Summary Statistics

Variable	N	Mean	St. Dev.	Min	Max	Source
Number of Duels	358	1.777	3.886	0	50	Byron (2008)
State Population	358	719,589.600	879,854.800	1,062	6,003,174	U.S. Census
Urbanization	356	0.142	0.161	0.000	0.853	U.S. Census
Number of Post Offices	358	629.190	738.081	0	4,780	U.S. Postal Service
Lifetime Judges	358	0.260	0.439	0	1	American Judicature Society
Number of Effective Parties	316	1.922	0.976	1.000	5.882	Poole and Rosenthal (1997)
Suffrage Restrictions	358	0.215	0.411	0	1	Keyssar (2009)

Table A-2: Distributed Lag Models of State Revenue Collection

	First Lags	Second Lags	Third Lags
Intercept	25.83***	31.52***	34.18***
	(4.99)	(4.99)	(5.32)
Log Post Offices per Cap.$_{d-1}$	0.86**	0.55	0.71*
	(0.27)	(0.33)	(0.35)
Log Post Offices per Cap.$_{d-2}$		0.82**	0.15
		(0.28)	(0.43)
Log Post Offices per Cap.$_{d-3}$			0.53
			(0.28)
Log Population$_{d-1}$	−1.45***	−2.33***	−2.72***
	(0.32)	(0.61)	(0.67)
Log Population$_{d-2}$		0.77	0.88
		(0.50)	(0.78)
Log Population$_{d-3}$			0.12
			(0.37)
Log Urbanization$_{d-1}$	7.97***	−1.42	−0.26
	(1.24)	(2.49)	(2.55)
Log Urbanization$_{d-2}$		9.56***	8.31*
		(2.46)	(3.50)
Log Urbanization$_{d-3}$			−0.19
			(2.58)
Net Effect of Post Offices	0.86**	1.37***	1.40***
	(0.27)	(0.30)	(0.30)
R^2	0.93	0.95	0.95
Adj. R^2	0.91	0.92	0.92
Num. obs.	126	124	122
RMSE	0.45	0.42	0.42

Note: Cell entries are OLS coefficient estimates with standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. State and decade fixed effects are suppressed. The dependent variable for each model is a state's total tax revenues per capita in decade d. The independent variables are lagged post offices per capital, lagged (log) population, and lagged (log) urbanization. The so-called "net effect" of post offices is the sum of the lagged coefficients on the post offices per capita variable.

Appendix B: Proof that the Attenuation Bias is Downward

One concern about our results may be biased by the fact that our dependent variable of interest comes from newspaper reports. If newspaper existence is related to state capacity (e.g., Grosjean, 2014), then our findings about the influence of state capacity on dueling might be attenuated. In this Appendix, we show that such concerns are not problematic and, if anything, suggest our estimates are downwardly biased.

To make this clear, suppose that y_i^{true} is the "true" number of duels for cross-sectional unit i. Suppose further that x_i is the state capacity for unit i. Our regressions are of the form

$$y_i^{true} = \beta x_i + \varepsilon_i, \tag{3}$$

where $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$. However, we do not observe y_i^{true}. Rather, we observe y_i^{obs} such that

$$y_i^{true} = y_i^{obs} + y_i^{miss}, \tag{4}$$

where $y_i^{miss} \geq 0$ is the (potentially) missing number of duels. It seems logical to think that the number of missing duels is also related to state capacity, i.e.,

$$y_i^{miss} = \gamma x_i + \nu_i, \tag{5}$$

where $\nu_i \sim N(0, \sigma_\nu^2)$. Based on this setup, both β and γ should be negative.

In our statistical models, we run regressions on the (potentially) misspecified model

$$\begin{aligned} y_i^{obs} &= y_i^{true} - y_i^{miss} & (6) \\ &= (\beta - \gamma)x_i + (\varepsilon_i - \nu_i) & (7) \\ &= \rho x_i + \eta_i. & (8) \end{aligned}$$

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Based on standard OLS results, the expected value of the estimate of the effect of x_i on y_i^{obs} is

$$
\begin{aligned}
\mathbb{E}[\hat{\rho}] \;&=\; \mathbb{E}\left[\frac{\sum_i x_i y_i^{obs}}{\sum_i x_i^2}\right] & (9)\\[2mm]
&=\; \mathbb{E}\left[\frac{\sum_i x_i(y_i^{true} - y_i^{miss})}{\sum_i x_i^2}\right] & (10)\\[2mm]
&=\; \mathbb{E}\left[\frac{\sum_i x_i(\beta x_i + \varepsilon_i - \gamma x_i - \nu_i)}{\sum_i x_i^2}\right] & (11)\\[2mm]
&=\; \mathbb{E}\left[\frac{\sum_i (\beta - \gamma) x_i^2 + x_i(\varepsilon_i - \nu_i)}{\sum_i x_i^2}\right] & (12)\\[2mm]
&=\; (\beta - \gamma) + \mathbb{E}\left[\frac{\sum_i x_i(\varepsilon_i - \nu_i)}{\sum_i x_i^2}\right] & (13)\\[2mm]
&=\; (\beta - \gamma). & (14)
\end{aligned}
$$

Since $\beta < 0$ and $\gamma < 0$ by construction, the bias in our estimated quantity relative to the true value will be towards zero.