

Ear-Witnessing Sin^{*}

The Law and Economics of Puritan Organization

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Abstract

Puritan congregations in 17th century New England instituted many prohibitions and regulations surrounding daily life. We argue the least cost mechanism for enforcing these laws was settlement proximity. By clustering their homes close to one another, Puritans were able to lower monitoring costs and effectively enforce their rules. Using an originally constructed data set of 327 New England towns, we find more religious towns were more compactly settled and vice versa. This theory explains why centralized land demarcating institutions were often found in New England but not in other American colonies.

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*A Puritan, is he ... that doth the selfe-accusing Oath refuse:
that hates the Ale-house, and a stage, and stews.
A Puritan, is he, whose austere life,
will not admit a Mistress and a Wife.
That when his betters sweares, doth bite the lip;
nor wilbe drunken for good fellowship.
That wisheth for the amendment of the best:
blames the least ill, and doth the worst detest.*

– Martin Mar-Prelat (1640)

*...the true convert sets himself most to seek the ruin and rooting out of...what ever sins
come within his reach, he labors the removal of them, out of the familyes where he dwels,
out of the plantations where he lives, out of the companies and occasions, with whom he
hath occasion to meet and meddle at any time... .*

– Thomas Hooker (1657)

1 Introduction

Puritans are inseparable caricatures from American history. Their zealousness for enforcing strict religious rules culminated in its own word in the English language: puritanical, an adjective to describe those who practice strict religious or moral behavior. One need not know much about Puritans to understand this nature of theirs. Puritans are well-known for prosecuting and executing witches, for “any Christian (so called) be a Witch; that is, hath or consulteth with a Familiar Spirit [the devil], he or they shall be put to Death” (Clerk, 1685, p. 10). Their religion was at the center of their life, not just spiritually, but literally. The famed New England town square placed the church at the very center of the town, with houses immediately surrounding it in a compact circumference. This formed the well-known New England town square as shown in Figure 1.

Economics can explain and link the laws Puritans created with their town settlement patterns. Puritans faced a free-rider problem in their congregations. Some members may choose to participate little in the religion, giving low effort, or even worse, committing sin. Puritans believed when sin was committed, God would punish not only the sinning individual, but the

entire congregation. To avoid these punishments and free-riding, Puritans created a voluminous set of prohibitions and stigmatizing norms surrounding all activities of daily life, from dress codes to regulations on baking cakes. This screened out less committed members and induced higher levels of participation from remaining members.

Rules are only as effective in generating their desired outcomes as their enforcement. The Puritans needed to ensure community members complied with their rules in order for them to be effective. The effectiveness of rules are determined by two elements: (1) Punishment - the severity of punishments and (2) Enforcement - the ability to compel obedience to the rules. We focus on the latter. Punishment for not following Puritan norms were severe, ranging from fines, lashings, and branding to death. But how were Puritans able to catch rule-breakers? We argue proximity was the least-cost method of enforcement for the newly-settled colonists. By clustering homesteads close together in their town layouts, Puritans were better able to keep an eye on congregation members. In the quiet woods of New England, neighbors could hear the rowdiness of tipplers (drunks) or a gambling house nearby. They could easily see if their neighbors were complying with Sabbath laws or out doing other secular activities. The Puritans encouraged watchfulness and relied on the “ear-witnessing” of neighbors to effectively enforce their religious rules.

We construct an original data set of 327 New England towns settled in the 17th century. Using delay of church organization and witchcraft cases as proxies for religiosity and house lot size as proxy for settlement compactness, we find more religious towns were more compactly settled and vice versa. The results are significant while controlling for population density, the agricultural quality of the land, and a town’s proximity to neighboring towns. Presumably towns which were more remotely settled on the frontier would have been more concerned with defending themselves from attacks from nearby indigenous tribes. However, the proximity variable is statically insignificant in all our results, suggesting defense itself cannot explain the unique settlement compactness exhibited by New England towns.

Becker (1968) and Stigler (1970) were the first to formally apply economics to rule enforce-

ment. Becker (1968) showed how the optimal amount of enforcement will depend on the cost of enforcement while Stigler (1970) identified the role the division of labor between state and private parties plays in enforcement. More contemporary research studies the effective enforcement of cultural codes (Leeson, 2012a), how formal and informal enforcement institutions compete in a competitive market (Dhillon & Rigolini, 2011), the interaction between legal and norm enforcement (Kube & Traxler, 2011), and the complementarity of communities and courts in enforcement (Masten & Prüfer, 2014). While in most of these analyses the enforcing is left to an agency or distinct body, the Puritans relied entirely on their townspeople to enforce their rules for most of the 17th century. We contribute to this literature by showing how residential proximity can be used as an effective enforcement mechanism.

We use our theory of Puritan organization to explain why New England colonies used centralized institutions to demarcate their land. Land was primarily granted by township to religious groups in New England. These groups collectively divvied up and demarcated the land among themselves. This centralized mechanism of demarcating land was abnormal relative to other American colonies at the time. For instance, settlers in Virginia primarily demarcated their land individually in a more decentralized fashion.¹ Libecap et al. (2011) construct a model to explain the variation in demarcating institutions across British colonies, but predicts New England colonies to have a decentralized system, as opposed to their prevailing centralized systems. We argue centralized demarcation was primarily used in New England towns as a mechanism for ensuring settlement compactness. Studying why these institutions emerge and how they change is of central importance to understanding arising economic and institutional outcomes. For instance, Libecap & Lueck (2011) find land demarcated under a centralized regime in nineteenth-century Ohio had higher per-acre land values, population densities, and rates of land use relative to land demarcated under a decentralized system. They also note the prevalence of boundary and title disputes in the regions which used decentralized land

¹See Kain & Baigent (1992, p. 265) for a brief summary highlighting this distinction and sections 8.3 (pp. 269-776) and 8.6 (pp. 285-288) for more detailed descriptions of the contrasting "Virginia" and "New England" methods of land distribution.

demarcation, leading to more litigation than there otherwise would have been (Libecap & Lueck, 2011, p. 451). This suggests land demarcating institutions can significantly impact economic growth and the development of other institutions.

Finally, we contribute to the economics of religion literature. Iannaccone (1992) first used economic reasoning to understand why religious clubs create prohibitions and stigmatizing norms leading to the application of the model in other religions (Berman, 2000) and further extensions of the model (Carvalho & Sacks, 2021). While the literature presents many instances of religious clubs effectively enforcing rules, norms, contracts, and property rights (Choy, 2020; Gill, 2021; Olds & Liu, 2000; Richman, 2006), less research focuses on the issues of monitoring. There are a few exceptions. Leeson (2013) presents a case when cheap monitoring/communicating is unavailable, and shows how Gypsy's overcome this obstacle and enforce rules through superstitions. Carvalho (2013) explains how veiling among Muslim women is used to signal religious commitment when individuals lie outside the monitoring range of the community. Finally, McBride (2007) shows how the Church of Jesus Christ of Latter-day Saints uses its administrative structure to monitor its members and encourage participation within the club. In the case of the Puritans, we argue they economized on monitoring costs through residential proximity. By clustering houses close together, congregations were able to more cheaply monitor and enforce their religious rules and norms. External validity may be shown in explaining why groups like the Latter-day Saints, Romani people, hippie communes of the 1960s, or cults like the Peoples Temple tend to have lived in compact settlements in remote areas.

2 Puritans in New England

2.1 Settling in the New World

The Puritans were English protestants who were separatists from the Church of England. They believed the Church of England reforms during the English Reformation did not do enough to move away from the previous religious practices associated with the Roman Catholic Church.

The Church of England was not particularly thrilled with them either. They persecuted them. The Archbishop William Laud was tasked with purging Puritans from the Anglican church (Fischer 1989, p. 16; Haller 1951, p. 15). Ultimately, with the culmination of these events, Puritans decided to leave England.²

The first of these separatist groups went to the Netherlands but decided the Dutch would have a poor influence on their young (Bremer, 1995, p. 31). After all, educating their children in the religious teachings of Puritanism was one of their most important objectives (J. Demos 1970, p. 3; Fischer 1989, p. 20; Wood 1997, pp. 19-20). These Puritans received a land patent from the Plymouth Company, a company chartered by King James I in 1606 who had rights to land on the northeastern coast in America. They sailed to America on the *Mayflower* and landed on the coast in 1620. They formed the Plymouth Colony, the first colony in New England.³ The Massachusetts Bay Colony was the next colony established in 1629. It was formed by Puritans from the Massachusetts Bay Company and was settled north of the Plymouth Colony. These colonies were self-governing and had permission from the King of England to elect their own governing officials and make decisions without referring to the crown. The remaining New England colonies formed in the 17th century included Connecticut, New Hampshire, and Rhode Island and Providence Plantations.⁴

The Great Puritan Migration occurred from 1629-1642.⁵ During this time, large groups of Puritans sailed the Atlantic to New England. These immigrants primarily came over in families who constituted “church congregations or neighborhoods in England” (Trewartha, 1946, p. 573) with a leading minister (Haller, 1951, p. 54). There seemed to be no confusion as to the reason why these people were fleeing England: “When most of these emigrants explained their motives for coming to the New World, religion was mentioned not merely as their leading purpose. It

²Wood (1997, p. 18) reviews the geographic English origins of these immigrants.

³See Vaughan (1972, pp. 41-53) for a brief history on the origins of the Plymouth Colony.

⁴The Province of Maine was a Proprietary colony which was first patented in 1622 but then later absorbed by the Massachusetts Bay Colony in 1640. Saybrook, New Haven, and the Connecticut River colonies were all established in the 1630s and would be absorbed into the Connecticut Colony in 1644.

⁵See Bremer (1995, p. 45) and Haller (1951, pp. 15-16) for estimates of populations increases in the colonies during this time.

was their only purpose” (Fischer, 1989, p. 18).⁶ In order to settle on land, Puritans needed to receive permission, in the form of a land grant, from the colony. In the Plymouth, Massachusetts Bay, and Connecticut colonies, where the majority of towns were formed in the 17th century, this meant petitioning the General Court for a land grant. The General Court was the Court of the colony who had permission from the King of England to grant land. In order to petition for a grant, settlers often had to first receive permission or buy the land from any Indigenous tribes residing near the territory.

Land was primarily granted in groups who either emigrated together from England or formed after settling for a period of time in New England. These grants typically took the form of a six miles square tract (Woodard, 1936, pp. 14-15).⁷ These grants were made often, as population increased in the established towns, enticing individuals to develop new settlements in the wilderness (Peterson, 1993, p. 579). Haller (1951) details how the primary unit of settlement within New England was that of the plantation. In order to have hope of receiving a grant, a plantation had to have an agreed upon and accepting minister with the intent of establishing a church (Haller, 1951, pp. 35-36). Haller (1951) denotes the church as one of the three “institutional foundation stones” (p. 18) of a plantation along with land and a political structure. A plantation most often represented a singular congregation.

One of the first tasks these settlers completed upon arrival was allocating land to each individual in the group (Haller, 1951, p. 24). The division of land occurred after the towns had agreed to form and was decided by the town’s government (Hall, 2011, p. 53), which consisted of the individuals who were granted the tract of land by the colony’s General Court. Although there existed some minor differences, Mead (1906, p. 62) notes there was enough similarity in the process of transforming the group-owned land grants to privately owned property such that we can generalize across towns. This process of individual allotment can be succinctly summed

⁶See also Haller (1951, p. 30) and Morgan (1966, p. 3) for a brief summary of the “Puritan vision.” J. Demos (1970, pp. 12-13) explains how they never lost sight of this vision even after settlement. There is a vast literature on the Puritan beginnings in New England, but some prominent works include Andrews (1934), Innes (1995), and Vaughan (1965).

⁷However, tracts of eight and ten miles square grants were not uncommon (Kain & Baigent, 1992, p. 286).

up as follows:

After townships had been defined, lands within their limits were divided by their inhabitants. In general divisions, the tract to be allotted was agreed upon in town meeting. A committee was appointed, generally the "seven men," with other principal inhabitants, to survey it, stake out the lots and number them. Sometimes the inhabitants would draw lots for their shares, some times they were assigned by the committee. Record was made of the lots in the town books, with the conditions upon which they were granted, and this constituted the title of their owners. (Frothingham, 1845, pp. 55-56)

A settling town had a multitude of lots to distribute and survey. The types of allotments were typically demarcated in the following order:

A town plot or village common was first laid out in a central location where a meeting house could be built. Often besides the town plot there would be set out a plot of land for the church, another for the burying ground and still another for the school. The remaining territory was divided into house lots, meadow lots and woodlots or upland. The house lots consisted of a few acres and provided not only a building site but also a place for planting purposes. Meadows were usually located along the river banks or marshy lands and served for hay and pasturage. They were larger than the house lots. Finally came the woodlands which were laid out in still larger plots, often as large as one hundred acres, on the uplands or upper river terraces.⁸ (Woodard, 1936, p. 23)

Deciding the location of the church and town-hall took top priority when laying out the lands.⁹ Second, followed the assigning of home lots which were usually small, varying from one to ten acres depending on the town, but "large enough for a house and out-buildings, a garden, and usually an inclosure for feeding cattle and raising corn" (MacLear, 1908, p. 82). Some land was used in these plots for agricultural production, but usually this was a minute amount as more land was granted to the household for these purposes.

Although the southern colonies were more well known for their plantations and cultivation of tobacco crops, the New England economies still primarily relied on agriculture in addition to production in other sectors associated with the maritime industry (Di Bonaventura 2007, p. 120;

⁸See also Hall (2011, pp. 55-56) and Reys (1965, p. 120) for other accounts of this process.

⁹See Stout (1986, pp. 13-14) for more on the formation of these often religious town-centers.

Reps 1965, p. 120). After home lots were decided, the next distribution of land was divvying up the arable land and the meadows where townspeople could grow their crops and herd their livestock. Each proprietor with land in this area could choose to use the land as they best saw fit (Woodard, 1936, p. 24). Whatever land left undivided from the original grant was called common land. The owners of which were the proprietors who first settled in the town. The following passage reflects the standard layout of most towns:

Suppose y^e towne square 6: miles eury waye. The howses orderly placed about y^e midst, especially y^e meetinghouse, the w^{eh} we will suppose to be y^e center of y^e wholl circumferance.... the extent from y^e meetinghouse as y^e cetner wilbe vnto eu^ry side 3 miles; the one halfe wherof being 2500: paces rownd about, & next vnto y^e sayd center, in what condiçon soeu^r it lyeth, may well be distributed & employed vnto y^e houses wthin the cumpas of y^e same, orderly placed to enioye comfortable comunion. Then for y^t grownd lyeing wthout, y^e neerest circumferance may be thought fittest to be employed in farmes: into w^{eh} may be placed skillfull bred husbandmen, many or fewe, as they may be attayned vnto, to become farmers, vnto such pportions as ech of them may well, & in convenient tyme impve, imploy according to y^e pportion of stocke ech of them maye be intrusted wth. (*Collections of the Massachusetts Historical Society*, 1871, p. 475)

This depiction is resembled in the layout of the towns in Figures 1-4 . Towns reflected a circular layout with a meeting house or church in the center, house lots surrounding in the inner most circumference, followed by meadow, upland, and woodlands in the outer circumferences.

One unusual characteristic of New England land markets was towns often did not allow settlers to sell their land. Written instances of this regulation appear all across New England. In Dedham, Massachusetts it was agreed that no settler “should sell land without leave of the settling company” (Akagi, 1924, p. 33). In Hadley, Massachusetts settlers bound themselves to the agreement “that no man shall have liberty to sell any of his land till he shall inhabit and dwell in the town three years; and also to sell it to no person, but such as the town shall approve on” (Akagi, 1924, p. 36). Or in the town of Bristol in the Plymouth colony, one could only sell his house lot to another congregation member (Winsor & Jewett, 1880, p. 443). The law in Connecticut read: “No inhabitant shall have power to make sale of his accommodation of house and lands until he have first propounded the sale thereof to the town where it is situate, and

they refuse to accept of the sale tendered” (Egleston, 1886, p. 49). Similar regulations were on the books in Boston, Braintree, Hartford, Wethersfield, and Springfield (Hall, 2011, pp. 58-59).

Regulating land markets was deemed essential to keep out undesirable persons from settling in towns (Mead, 1906, p. 75). For instance, at the founding of the town Ipswich, “the possibility that ‘doubtfull persons’ given to ‘drinking and pilferinge’ would arrive prompted the decision ‘to be very considerate in disposal of lootts and admission of people’ in order to have ‘lesse of Satans kingdome’ and ‘more’ of Christ’s” (Hall, 2011, p. 58). Puritans were exclusive in who they let into their towns, or more importantly, their congregations. In order for a newcomer to settle in a town, they had to have permission from the townspeople (Flaherty, 1972, p. 170). Sometimes they were required to bring a “certificate of good character from their previous residence” (Flaherty 1972, p. 171; MacLear 1908, p. 135). Such was the case in New London, where it was required for a person seeking residency in the town to “bring some testimonie from the magistrates or Elders of the place that they com from or from some neighbor plantations and some good Christian, what their carriage is or have been” (Caulkins, 1852, p. 57).¹⁰ Puritans did not want those who lacked commitment to their religion living among them. By not allowing settlers to sell their land and controlling who could live in their towns, Puritans were able to screen out those who were less devout, or keep out those “whose lives were publickely prophane and scandalous” (Rawson, 1639, p. 97).

While most towns settled in New England during this time were focused on propagating and practicing Puritanism with their families and congregation, not every town was solely fixated on this mission. Some towns were founded to focus on trades like fishing¹¹ and lumbering.¹² Other towns were founded for the purpose of trading posts¹³ or by entrepreneurs pursuing

¹⁰Being granted permission to settle in a town was not the same as becoming a member of a town’s congregation. The latter was an even more painstaking process. Those interested in joining a congregation had to go through private spiritual counseling sessions with the pastor (Hambrick-Stowe, 1982, p. 151). They had to confess their faith and show evidence of how the grace of God worked through them (Bremer, 1995, p. 107). See Bremer (1995, pp. 106-110) for more on how the Puritans conceived of church membership and how one could obtain it.

¹¹Manchester, Massachusetts (Tracy, 1878, p. 288); Kittery, Maine (Clayton, 1880, p. 277)

¹²South Berwick, Maine (Clayton, 1880, p. 315)

¹³North Kingston, Rhode Island (Cole, 1889, pp. 373-374)

profits.¹⁴ The founders of numerous towns were primarily focused on land speculation.¹⁵ These towns would have far less requirements and extensive reviews of incoming settlers and would have selected individuals looking to avoid these pestering processes. At least one town's origins were tied to violent disputes over land,¹⁶ having much more of a chaotic town founding relative to those who were interested in first organizing their churches. Some towns were founded by random settlers just looking for land to live off.¹⁷ Occasionally towns like these would be criticized by neighboring towns or the colonial government for not taking the time to organize a church and settle a minister.¹⁸ While these towns make up a minority of those settled in the seventh century, they existed and play an important role in understanding the nature of Puritan organization.

2.2 Puritanism

2.2.1 The Covenant of Grace

The strict religious rules that sculpted and cemented the Puritan caricature in American history derived from their unique theology. The Puritans that emigrated to America desired to create a “visible” Kingdom of God (Morgan, 1966, p. 3). While living in the ways of God played a central role in everyday Puritanical life, their beliefs surrounding obedience towards God's commandments uniquely differed from competing Christian theologies. Puritans believed that salvation was unattainable through good behavior, but instead was entirely dependent on God's grace (Bremer, 1995, pp. 18-19).¹⁹ It was only through faith in Christ that could redeem sin and result in eternal life. This was known as the Covenant of Grace, an agreement between God

¹⁴Attleborough, Massachusetts (Daggett, 1834, pp. 7-9)

¹⁵Freetown, Massachusetts (Bacon, 1902, p. 30); Milton, Massachusetts (Teele, 1887, pp. 18-30); Wareham, Plymouth (Hurd, 1884, p. 192); Westerly, Rhode Island (Martin, 1991, pp. 58, 61)

¹⁶Plainfield, Connecticut (Larned, 1874, pp. 107-108)

¹⁷Abington, Plymouth (Hobart, 1866, pp. 246-251); Brewster, Massachusetts (Deyo, 1890, pp. 893-899); Preston, Connecticut (Hurd, 1882, p. 596-597)

¹⁸Freetown, Massachusetts (Bacon, 1902, pp. 31-35); Kennebunkport, Maine (Clayton, 1880, p. 379)

¹⁹Adam had entered in the covenant of works with God but then broke this covenant. The Puritans were referred to the covenant Abraham, and all his children, had entered in to with God. See Miller (1961, pp. 376-378) for more on this Puritan distinction of covenants.

and the Puritan where God promised eternal salvation in exchange for faith.

Other Christian theologies like Catholicism believed good works led to eternal salvation. The Puritans vehemently disagreed with this point of view, stating many times that even the most morally righteous lived life was not sufficient for earning salvation (Morgan, 1966, pp. 1-3). Instead of good works and social conduct being the cause of salvation, as the Catholics believed, it was the result of it. Good behavior was evidence of an individual's faith which lead to salvation (Morgan, 1966, pp. 3-5). Those who were faithful were able to live honestly, civilly, and morally as consistent with God's laws.

It was not only important for the Puritan himself to uphold good conduct, but to ensure their surrounding neighbors did the same. For the Puritans, the Covenant of Grace was not something just the individual entered into with God, but the individual's family, congregation, and town. The works of the prominent Reverend John Cotton speak to how the Puritans conceived of the Covenant extending beyond the individual and to the family:

[t]aken from the great Covenant God hath made with every Christian man and his household, to be a God to him, and to his seed after him for ever... If God make a Covenant to be a God to thee and thine, then it is thy part to see it, that thy children and servants be God's people; for God becomes a God to thee and thy seed, that is his part of the Covenant (Cotton, 1641, p. 91)

when we undertake to be obedient to him [God]; not that we promise it in our owne names, and for our owne parts, but in the behalfe of every soule that belongs to us... our wives, and children, and servants, and kindred, and acquaintance, and all that are under our reach (Cotton, 1651, pp. 33-34).

Covenants did not stop at the household level but extended to the church. Reverend Cotton ties the Covenant as a defining feature of a church congregation while preaching a sermon in Salem:

[t]hat which doth make a People a joynd People with God, that doth make a Church: What is that? The Covenant of Grace doth make a People a joynd People with God, and therefore a Church of God; and therefore you shall find that when the Lord Establishes Israel for a Church unto Himself. He maketh this Covenant: not only that in Mount Horeb, but He doth make another Covenant with them in the Plains of Moab *Deut.* 29 10, 17. And so by this means they come to be established to be a Church unto the living God. (Cotton, 1636, p. 21).

Many congregational covenants were written down in church records. As Stout (1986, p. 18) notes, many of these covenants in New England were modeled after the 1629 Salem Church Covenant, a church which was founded on the eve of the Great Migration: “We Covenant with the Lord and one with an other; and doe bynd our selves in the presence of God, to walke together in all his waies, according as he is pleased to reveale himself unto us in his Blessed word of truth.” (Walker, 1893, p. 116). It was here Puritans committed their faith to one another and sought to uphold their pacts to the highest degree possible.

Crucial to these covenants was the expectation that those who had faith acted as so. Reverend Peter Bulkeley discussed how in the Covenant of Grace God “requires an actual performance of Covenant on our part, to walk according to the Grace received” (Bulkeley, 1651, p. 319).²⁰ Part of what was required in the Covenant was to act as having faith and receiving the grace of God (Bulkeley, 1651, p. 333). Having faith meant living obediently to God’s laws. Faith in the absence of this compliance was “like a dead carkasse without soule or spirit, it is dead in it felte, and leaves the soule in death, wanting life in it selfe, and yeelding no living fruit, it cannot bring life unto the soule” (Bulkeley, 1651, p. 332). Those who “say they have faith, and hope to partake in the blessing of the Covenant, and yet live loosely, carnally, unconscionably, they doe but deceive them selves; they may be in Covenant with hell and death, but have no part of the Covenant of life and peace.” (Bulkeley, 1651, p. 332). Any action which broke God’s commandments signaled a lack of faith and therefore not living up to the Covenant. It was in this sense the Covenant had a corollary condition requiring one to walk in the way of God and follow his will (Stout, 1986, p. 43).

Since Puritans entered into covenants with families, congregations, and communities, each individual had an incentive to ensure everyone lived morally to signal they were upholding their end of the agreement. This is precisely what made Puritans unique relative to other Christian sects. Other Christian theologies at the time, like Catholicism, believed eternal salvation was earned by living a moral life. In this view, if one sinned they bore the full consequences of

²⁰See Bulkeley (1651, pp. 312-397) and Miller (1961, pp. 384-385, 392) for more on the condition of the Covenant of Grace.

their actions. Their salvation depended on their own actions. Living out of accordance with God's laws jeopardized ones own eternal salvation, but not that of the entire group. In the Puritans case, their individual salvation depended on their faith and the acting out of faith by others. They believed their own salvation depended on the faith of those who they entered into covenants with, and correspondingly how well they lived according to God's commandments.

2.2.2 Puritan Laws & Norms

The Puritans believed from acute readings and rigorous analysis of their religious text that "the Ten Commandments meant volumes of prohibitions and injunctions to them" (Morgan, 1966, p. 11). Puritan religious norms contained many restrictions and regulations to various activities. The court records indicate these norms were strict throughout the 17th century (Parkes, 1932, p. 443) with 286 cases of theft, fornication, drunkenness, swearing, and immorality in general in Massachusetts between 1636 and 1644 (Parkes, 1932, p. 435). Social restrictions were stronger in New England than any other British territory at the time (Vaughan, 1972, p. 179).²¹ Although not all instances of sin need be taken care of in courts, as social ostracism and excommunications acted as effective mechanisms in ensuring compliance with the religious texts (J. Demos, 1970, p. 9).²² We will discuss some of the more prominently known restrictions, but this review is not meant to be exhaustive.

To start, gambling and card playing were strictly prohibited. If found with cards, the individual would be punished and the cards burned (Parkes, 1932, p. 438). Expectedly, drinking fell under considerable regulation. Individuals were not allowed to be out drinking past nine o'clock at night (Parkes, 1932, p. 439). Only establishments which were licensed could sell alcohol. When police officers came into existence in the later part of the 17th century, they would enter into houses suspected of violating these laws and destroy any liquor in sight (Parkes, 1932, p. 440). Even those who were allowed to operate "disorderly houses" where "swearing, play-

²¹See Vaughan (1972, pp. 179-192) for more on Puritan social order.

²²See Leeson (2013) for an example of how social ostracism can effectively create order among superstitious groups.

ing games, and drinking at unseasonable hours were allowed” were consistently being fined or stigmatized (Parkes, 1932, p. 439). In most towns, anyone caught consuming tobacco “in the streets” or “in and about barns, stalls, haystacks, cornstacks, hay yards, or other such places or outhouses” were heavily fined (Vaughan, 1972, p. 181-182).

An even stronger set of norms that were more strictly enforced existed for sexual activity. Parkes (1932) claims, “[i]n no other large community has sexual immorality been consistently detected and punished. In no other country at that period were the laws of all kinds so efficiently enforced” (p. 432). Adultery was by far the most serious offense of these norms and was a capital crime for which at least three individuals were hanged during this period (Fischer, 1989, p. 88). Communities would often come together to punish the sinners (Fischer, 1989, p. 89). Married women were forbidden to meet alone with those of the opposite sex unless she was related to them (Fischer, 1989, p. 91).

Fornication was also punished with severity and heavily stigmatized. Unmarried individuals were known and diligently monitored (Fischer, 1989, p. 91). For instance, unwed couples could be fined for lying in bed together even if they were about to get married (Parkes, 1932, p. 444). Penalties for fornication were typically “a fine, usually two pounds ten shillings a person, with the alternative of ten stripes” (Parkes, 1932, p. 446). Masturbation was another sexual offense that was punishable by death (Fischer, 1989, p. 91). Although rare, communities carefully watched for and strictly prohibited any act they saw relating to bestiality (Parkes, 1932, p. 445).²³

Since reading religious texts was seen as a large part of practicing and participating in religious activity, there existed literacy requirements for children that parents or school masters were required to meet (Fischer, 1989, p. 132). Despite this, school attendance was not compulsory. As long as parents met the education requirements through education at home, kids did not have to attend school (Fischer, 1989, p. 133). There were dress codes in place which included an extremely specific outfit for men (Fischer, 1989, pp. 139-146). Clothing which signified “great, superfluous, and unnecessary expenses occasioned by reason of some new and immodest fash-

²³As an example, see Fischer (1989, pp. 91-92) covering the case of the one-eyed servant, George Spencer, who was put to death after being seen with a deformed-eye pig.

ions” such as “the ordinary wearing of silver, gold, and silk laces, girdles, hatbands, etc... any apparel, either woolen, silk, or linen, with any lace on it, silver, gold, silk, or thread... all cut-works, embroidered or needlework caps, bands, and rayles,” and beaver hats were confiscated and the sinning individual was fined (Vaughan, 1965, p. 180).

One of the more unusual prohibitions was the forbidden activity of time-wasting, which was a criminal offense. This derived from a spiritual idea the Puritans held for ‘improving the time’ (Fischer, 1989, pp. 158-159). For instance, the church of Chelmsford in 1671 agreed unanimously that John Martin should be punished “for idleness and his neglect of his particular calling or living disorderly and not employing himself in any lawful outward employment” (Fiske, 1974, p. 226). In the town of Bristol, one could be fined for “[e]ntertaining any stranger or family into the town’ against the desire of the congregation” (Winsor & Jewett, 1880, p. 443). There were even restrictions on baking. In Medfield, “luxurious living was discouraged” by town orders prohibiting the baking or selling of “cakes or buns... except for burials or weddings” (Tilden, 1887, p. 31).

Night, and the darkness that ensued from it, was seen as evil by the Puritans. ‘Nightwalking’ occurred when one was out after curfew and was a punishable crime (Fischer, 1989, p. 162). Finally, many activities such as “[w]orking, traveling, walking, riding, loitering, assembling, swimming, hunting, gardening, and frequenting public houses were forbidden” on the Sabbath (Flaherty, 1972, p. 130). Slight infringements of this rule were seriously punished. For instance, consider the following recorded cases of such:

The Essex County Court indicted a man for carrying a burden on the Sabbath, and punished a woman for brewing on the Lord’s Day. When Ebenezer Taylor of Yarmouth, Massachusetts, fell into a forty-foot well, his rescuers stopped digging on Saturday afternoon while they debated whether it was lawful to rescue him on the Sabbath. Other New Englanders were punished for picking strawberries, playing quoits, marking fish, smoking a pipe, and sailing a boat on the Lord’s Day. At New London, a courting couple named John Lewis and Sarah Chapman were brought to trial in 1670 merely for “sitting together on the Lord’s Day under an apple tree.” (Fischer, 1989, pp. 162-163)

Magistrates admonished persons for traveling, serving a warrant, and “profaning the

Sabbath” but fined others, concluding a man who hunted raccoons during divine service, and a woman who beat another of her sex on Sunday. At Ipswich, James White and Jacob Davis were ordered fined or to sit in the stocks for stealing apples on the Lord’s Day, and at Salem, Thomas West, convicted on a first offense of Sabbath burglary, was condemned to be branded on the forehead with a *B* and to have one ear cut off. (Solberg, 1977, p. 169)

Elizabeth Eddy, presented to the General Court in 1651 “for wringing and hanging out clothes, on the Lords day, in time of publicke exercise.” was fined ten shillings, though the penalty was remitted. (Solberg, 1977, p. 180)

These instances exemplify the extent to which Puritan norms stigmatized activities not related to religious participation. No non-religious action was too inconsequential or urgent to be considered wrongdoing on the Sabbath.

Although other Christian denominations at the time like the Quakers, Baptists, and Anglicans had overlapping rules, one requirement that set Puritans apart was their expectation of private religious devotion. Hambrick-Stowe (1982, p. 94) delineates what form private devotion could take, including private prayer, conferences with other church members, family prayer, and secret prayer, for which he places special emphasis on the latter:

Important as family prayer was in the pattern of Puritan devotional life, a deeper and more intimate practice of devotion lay at the very heart of New England spirituality. ‘Secret,’ or ‘closet,’ devotions were considered imperative, mandated by Christ himself. . . Secret exercises were the most powerful channels through which grace might flow, whereby New Englanders attained their highest reaches of mystical experience. . . They provided the crucial point of connection between the believer and God; without them the outward forms of public worship and family devotions could become hollow and hypocritical performances. (Hambrick-Stowe, 1982, p. 156)

Secret devotion consisted of studying the Bible and other religious teachings, meditation, prayer, psalm singing, diary keeping, and fasting, with special time set aside for “ ‘extraordinary’ mediation and spontaneous, or ‘ejaculatory,’ prayer” (Hambrick-Stowe, 1982, p. 157). There were many devotional manuals for Puritans to work through in their private spiritual time (Hambrick-Stowe, 1982, pp. 158-161, 266-277) including Samuel Hardy’s *A Guide to Heaven from the Word* (1687) which instructed how to prepare oneself for Christ through morning, evening, and Sabbath devotions or John White’s *A Way to the Tree of Life* (1647) outlining how God worked

through reading scripture. Some manuals specified reading schedules to get through the Bible in one calendar year (Hambrick-Stowe, 1982, p. 158). It was not just reading these manuals and scriptures but the rereading of them over and over again sometimes hundreds of times which manifested the spiritual vitality in private devotion (Hambrick-Stowe, 1982, pp. 159-160).

3 A Theory of Puritan Organization

Puritan congregations share similar qualities to religious club goods in that membership in the congregation tends to be non-rivalrous but excludable. These clubs have positive returns to participatory crowding where the benefits derived from the club are a function of the input of other members as well as their own (Iannaccone, 1992, p. 272-274). The club will be more valuable when all of its members choose high participation levels. However, a member may choose a low level of participation because participating is costly. They can still derive benefits from the other participators in the club while doing so. If all members employ this strategy, the value of being a member of the club will fall drastically, if not to zero, and most members will exit (Carvalho, 2019, p. 27). The club is faced with a free-rider problem. There are positive externalities from members choosing high participation levels but participation is costly, so each member has an incentive to shirk and capture the benefits provided by other members' participation.²⁴

In order to solve the free-rider problem, religious clubs must internalize this externality. The first-best solution would be to charge membership dues and use these dues to subsidize high levels of participation. But religious participation, which usually takes form through commitment, effort, and enthusiasm levels, is costly to observe and measure leaving little to no adequate proxies for such activity (Iannaccone, 1992, p. 274). This is especially the case for Puritans. Since Puritans put such a strong emphasis on private religious participation, which consisted of reading and meditating inside one's home, monitoring such behavior is next to impossible.

²⁴See Carvalho (2019, pp. 25-26) for a brief account of the 'Summer of Love' hippie settlement in Haight-Ashbury as a good example reflecting this problem.

The second-best solution is to increase the cost of activities that are substitutes for religious participation, thereby lowering the relative price of participating in the club (Iannaccone, 1992, p. 275).²⁵ Carvalho (2019) classifies this as the strategy of “substitution: by lowering the payoff from outside activity, they induce members to divert time and money from non-group activities to group activities” (p. 27). An effective way to raise the costs of competing activities is to create and enforce norms in the club that prohibit such activities like “distinctive diet, dress, grooming, and social customs” (Iannaccone, 1992, p. 276). If this induces higher levels of participation because the costs of participating are relatively lower in the presence of these norms, then utility derived from the club will increase and the free-rider problem will be mitigated.²⁶

Most, if not all, Puritan regulations on behavior hold true to this model. Activities which were complements to religious participation, like educating one’s children in religious teachings and scripture, were encouraged or “subsidized,” while activities which took time away from religious activity were discouraged or “taxed.” Gambling, baking, alcohol and tobacco consumption, and entertaining guests are all time-intensive activities. The norms against fornication and adultery limit the opportunity for unnecessary sexual activity. Even restrictions on high quality clothing could be seen as preventing individuals from trying to accumulate wealth exceeding the needs of subsistence, which would require one’s dedicated time and effort to production and trade. Being outside at night in the dark left no opportunity for reading religious scripture or any other religious activity, and therefore was forbidden. Norms went as far as to stigmatize “time-wasting”, the act of doing nothing. None of these prohibited activities are apparent complements to religious participation, but rather substitutes. Any non-religious activity conducted on the Sabbath was quite literally a substitute for religious participation, and therefore was heavily stigmatized.

The key for this solution to work is the effective enforcement of these prohibitions and

²⁵This solution is second-best because it imposes costs on its members through its restrictions. In the first-best solution, the optimal amount of participation is brought about through subsidies *without* prohibiting other activities. If club members derive utility from prohibited activities and the optimal amount of club participation can be brought about through subsidies, then subsidizing participation is the first-best solution.

²⁶Iannaccone (1992, p. 280) more formally derives this case in Proposition 1 of his model. Carvalho & Koyama (2016) find this case occurring more in low-wage environments.

stigmatizing norms. Since monitoring religious participation is difficult, it is not obvious that monitoring compliance with the rules will be much easier. Especially since many of the activities Puritans restricted can and are done privately, like drinking, smoking, fornicating, time-wasting, cake baking, etc.²⁷ Without effective enforcement, the rules may not be followed and then there may be no substitution away from secular activities to religious participation. We argue in the case of Puritans, and often for other groups, controlling settlement proximity is the least cost device for monitoring compliance with and effectively enforcing the rules. By living close to each other, club members are better able to monitor each other. Puritans needed a way to ensure members stayed true to this high expectation of private religious participation. Since monitoring individual behavior outside the home is much easier and requires less invasive acts of surveillance, Puritans banned activities which could act as substitutes to private devotion and were less costly to monitor.

Settling houses compactly near each other does not come without trade-offs. The cost of proximity will depend on a couple factors. The greatest cost to this town layout stems from the separation of homestead and farmland. Farming has a labor-intensive production process. Having farmland in remote areas away from one's dwelling creates a major inconvenience and could significantly lower production. For instance, in Salem, New Hampshire where a settler was granted farmland on different plots scattered throughout the town, "the work of managing a farm with any degree of economy was all but impossible," ultimately leading to settler's exchanging with each other for land closer to their residing homes (Gilbert, 1907, p. 40). In addition, the greater the quality of lands in a town's boundaries, the greater the losses from lowering agricultural productivity by living in a compact settlement. How established a town is will also effect the costs of proximity. If townspeople originally settled on their farms, it would be more costly for a town to try and resettle their residences within close proximity relative to a town who has not settled yet. Finally, the benefits of proximity will be greater for

²⁷Iannaccone (1992) addresses this problem and notes how deception is costly in itself, "[a] secret sexual liaison is not at all the same as an open relationship, drinking in private from a hidden bottle is a poor substitute for social drinking at bars and parties, and maintaining a smoking habit that can never be satisfied in public may be more trouble than it is worth" (pp. 275-276).

the towns whose value from their religious club good is dependent on how effectively members can monitor each other. This is the case for the Puritans since so much of their expected religious participation was private and because their salvation depended on the behavior of other members. Monitoring was key to the value they obtained from their religion.

Contrast this with another religious group settling in 17th century colonial America, the Quakers. Those who belonged to the Religious Society of Friends were known as Quakers. They had many similar norms regulating sex, dress, drinking, etc. (Fischer, 1989, p. 428). However, their views on salvation were very different. For the Quakers, salvation came from the inner light. This light from within contained a divine goodness and virtue passed on from Jesus Christ (Fischer, 1989, pp. 426-427). Because of this inner light, the Quakers felt little individual effort was needed to reach salvation. After going through conversion the Quaker was much less worried about their salvation than the Puritan who was incessantly questioning their faith. As Fischer (1989) put it, the Quakers had “less of the brooding salvation-angst and violent mood-swings of hope and despair that troubled so many Puritans” (p. 427).

The Quakers then were far less concerned with the sinfulness of their fellow congregation members relative to the Puritans who believed sinning reflected a lack of faith and therefore a breach in their covenant with God. Additionally, Quakers’ religious participation was more expected through meetings rather than routine private devotion. The Society of Friends held many types meetings which took place more than once a week (Fischer, 1989, pp. 428, 522). Since the Quakers expected less private religious devotion and would have likely been able to better measure each other’s religious commitment through their meetings, the cost of using close proximity as a monitoring device was higher. They settled on their own individual farms spread out across the countryside (Fischer, 1989, p. 578).

An alternative solution to solving the monitoring problem the Puritans faced is to pay an individual to specialize in monitoring the congregation. While this is a plausible solution, it is likely to be more costly than proximity, or at least for the Puritan. If there was one individual who was paid by the town to specialize in their occupation in 17th century New England, it

was the minister. A towns tax revenue primarily went to the building of the church, road maintenance, and for supporting the minister. The minister's payment could take the form of housing, agricultural produce, or lumber, but often the minister still had to farm and provide for themselves as well. For another individual to live off the fruits of the community would be far costlier than watching over each other diligently in their day to day lives. Additionally, if everyone is living far a part from each other, it is not clear that one individual visiting each house spread far a part would be as effective, let alone feasible, as a community settled close together and monitoring each other.

Using proximity as a monitoring mechanism can take place in various forms, for instance, at the household, town, and state level. As the scope of territory and members to monitor increases, the more costly it is to use proximity as an effective monitoring device. Since the Puritans were establishing the first European settlements in America in the 1600s, the costliness of controlling settlement proximity at the colonial level was high, especially given the fact that these settlers primarily relied agricultural for subsistence. Puritans were likely most able to use proximity coupled with persistent monitoring most effectively at the household and township levels. Close proximity alone cannot induce compliance with norms. What is needed in pairing is diligent monitoring of each congregation member's behavior. While this type of watchfulness was certainly taking place in households, the community needed to ensure every household complied so they would not break the covenant they entered into. Thus, it was not only important to create structure in the household but for households to watch over their neighbors to ensure that structure and faithfulness continued.

Multiple implications can be derived from our theory for the case of New England. First, we should expect Puritans to encourage the monitoring of each others behavior at the household and town levels, which were at the scope of their covenants and least costly to use proximity as a monitoring device. Second, since living in close proximity is more costly for towns less focused on religion, we should expect more religious towns to be more compactly settled relative to less religious towns. Finally, if the cost of using proximity rises, we should expect to see them

shift into another device to encourage or monitor religious participation. We test these three implications in the following three subsections in Section 4.

4 Puritan Rule Enforcement

4.1 Spiritual Watchfulness in Puritan Towns

While proximity can lower monitoring costs, a certain level vigilance is required to ensure monitoring takes place. Through their various norms and beliefs, the Puritans created a culture of watchfulness in the household and community. Many of the religious teachings put great emphasis and responsibility on the family (Fischer, 1989, pp. 68-69). The Puritans held families responsible for “upholding Good Order” (Vaughan, 1972, p. 184).

One of the most important roles of the family was fostering their children to become active, good-standing members of the congregation. This entailed first and foremost teaching their young how to read; if parents neglected to do so they would be punished by law (Morgan, 1966, p. 87-88). Outside of church, the family was expected to practice daily with the father leading prayers, reading scriptures, or singing psalms upon waking up and before going to bed (Morgan, 1966, p. 136). It was thought weekly church services could not succeed without the constant practice and recital of scripture within the household. The families were then held responsible for conducting such activity and educating their children to comprehend the religious texts (Morgan, 1966, pp. 139-140).

With such high expectations and vital roles assigned to the family, the communities did everything they could to ensure households were well-functioning and fulfilling these roles. The community acted to change and eliminate any poor-functioning households:

Since the family was the foundation stone of the Puritan social order and disorderly families defiled God’s injunctions, the larger community gave fathers legal authority to maintain “well-ordered” families. If they failed, the community asserted its responsibility for enforcing morality and punishing misconduct. If a family failed to properly perform its responsibilities for teaching religion, morality and obedience

to law, then town selectmen had orders to “take such children or apprentices” from neglectful masters “and place them with some masters ... which will more strictly look unto, and force them to submit unto government.” (Mintz, 1992, pp. 640-641)

Parents who committed offenses or who failed to fulfill their duties were given a letter "P" to wear as punishment to let the community know of their actions. This made use of social pressure to ensure families would not shirk in their duties (Mintz, 1992, p. 641). The community acted swiftly when disturbances in the households arose and would not rest until peace was restored. Given the role of the family in enforcing the norms of the community, there was a very low tolerance for turbulent and disorderly behavior in the household (Fischer, 1989, p. 86).

There were two other preventive institutions which existed to reduce the risk of a house becoming disorderly. First, was the institution of divorce. Unlike in many other places at the time, divorce was fairly easy to obtain in the Puritan communities as many legitimate reasons for divorce were recognized (Fischer 1989, p. 82; Parkes 1932, p. 447). This reduced the chance of a disorderly house emerging since it allowed unhappy parents to separate and find better fits, which would increase the probability of them creating a well-functioning household. Second, the communities forced individuals residing by themselves to join households with established families (Fischer 1989, p. 73; Haller 1951, p. 51; Morgan 1966, pp. 27, 145-146). This was partially a religious obligation as “God had ordained that men live together in family, church, and state” (Morgan, 1966, p. 26), but was also to safeguard against prohibited acts. The driving reason behind these laws was to eliminate sin as “[v]agrancy, pauperism, and social disorders were the anticipated consequences of single living” (Flaherty, 1972, p. 175). A case brought to the Hampton court in 1672 illustrates this law:

Court being informed that John Littleale of Haverhill lay in a house by himself contrary to the law of the country, whereby he is subject to much sin and iniquity, which ordinarily are the companions and consequences of a solitary life, it was ordered Oct. 12, 1672, that within six weeks after date he remove and settle himself in some orderly family in the town, and be subject to the orderly rules of family government, unless he remove from the town within that time. If he did not comply with this order, the selectmen were ordered to place him in some family, which if

he refused, a warrant was to be issued to place him in the house of correction at Hampton. (Dow, 1916, p. 104)

The courts often described the cases of solitary living brought to them as ‘disorderly,’ as this lifestyle was closer to the ways of the devil than a life among a family (Flaherty, 1972, p. 176). Family members were required to keep “a watchful eye” over each other “so disorders may be prevented, and ill weeds nipped before they take too great a head” (Fischer, 1989, p. 73). 17th century Puritan minister Thomas Shepard specified this role of the family in his works:

our children, servants, strangers who are within our gates, are apt to profane the Sabbath; we are therefore to improve our power over them for God, in restraining them from sin, and in constraining them (as far as we can) to the holy observance of the rest of the Sabbath, lest God impute their sins to us, who had power (as Eli in the like case) to restrain them and did not; and so our families and consciences be stained with their guilt and blood. (Shepard, 1874, p. 263)

It was through the family the Puritans were able to enforce and regulate their many prohibitions and restrictions outlined in Section 2.2.2. And they had created ways of monitoring households to ensure their compliance and fulfillment of enforcing these norms.

The church supervised the domestic practice of religion by having “elders” go from house to house observing daily religious instruction (Morgan, 1966, pp. 140).²⁸ For instance, the town of Billerica chose three individuals after they settled to inspect the town’s families and “see whether their children and servants were taught in the principles of religion” (Farmer, 1816, p. 10). In Bristol, three individuals were appointed “to have inspection into families that there be no by drinking or any misdemeanor whereby sin is committed, and persons from their houses unseasonably” (Winsor & Jewett, 1880, p. 443). However, most monitoring was left to the members themselves and was considered “spiritual watchfulness” or “ear witnessing” (Mayr, 2008, p. 40). This created a “neighborly regulation of private behavior” (Konig, 1979, p. 126). It was the role of the congregation to watch over their fellow members and steer them away from any sinful activity:

²⁸In some sense, monitoring how educated children were in religious teachings was a way of measuring a household’s religious participation. If children were well educated, it must mean that they were practicing and receiving daily religious instruction from their parents.

The most intimate forms of surveillance emerged, the significance of which are difficult to grasp given contemporary notions of privacy. The shared use of designated common lands, the close proximity of the houses, the expanded notion of household, and the mutual interdependence of neighbors, inhibited notions of the private insular family from developing. (Mayr, 2008, pp. 40-41)

To encourage reporting sin, witnesses received many protections and rights when in court trials (Mayr, 2008, p. 42). Each member was responsible for vigilantly watching their neighbors which assured sinful activity was to go rarely unnoticed and reported. It was the households who were held responsible for enforcing the voluminous Puritan norms, and the responsibility of all members of the congregations to monitor each other to ensure the households were fulfilling their duties.

This monitoring was very much incorporated into the Puritans' belief system. Thomas Hooker, one of the most prominent ministers at the time who founded the Connecticut colony, encouraged the condemnation of all sin by members of the congregation: "what ever sins come within his reach, he labors the removal of them, out of the families where he dwells, out of the plantations where he lives, out of the companies and occasions, with whom he hath occasion to meet and meddle at any time" (Hooker, 1657, p. 684). These communities believed that when sin was committed it was not just the sinning individual who was punished, but also the entire group who had sworn their loyalty to God. This was God's way of punishing the community for breaking the Covenant of Grace, as discussed in Section 2.2.1. As Vaughan (1972) explains, "every sinner threatened the whole society: God's wrath could be unleashed at communities as well as individuals; the community's covenant with God made each member responsible for the purity of the whole" (p. 179). God's wrath could include attacks from indigenous tribes, storms, fires, poor harvest, and other misfortunes (Flaherty, 1972, p. 166). Therefore, every acting member of the congregation needed to stay vigilant against anyone who was engaging in sinful activity (Morgan, 1966, pp. 10-11), as it was the duty of neighbors to "watch over the spiritual welfare" of each other (Hambrick-Stowe, 1982, p. 150). As Flaherty (1972) puts it, "[a] zealous Puritan should have been constantly on the alert for offenses committed by his fellows"

(p. 167). These religious beliefs created order in the New England colonial settlements which was enforced through the watchful monitoring of congregation members over each other.

Flaherty's (1972) seminal work on privacy in colonial New England illustrates the invasive nature of these communities. The Covenant in Beverly First Church agreed that congregation members should "submit to the order, discipline & gouvernement of Christ in this his church... and to the brotherly watch of fellow members" (Upham, 1905, pp. 6-7). It was this belief in watching over each other that "subjected church members to a substantial degree of mutual surveillance" (Flaherty, 1972, p. 152), such that "[s]ome neighbors went beyond the customary relationships and actively interfered in the private affairs of their friends. Only a few did so by invitation; most were motivated by unbridled curiosity, the promptings of religious obligation, or both" (Flaherty, 1972, p. 93). If one continually tried to maintain and protect their privacy then this may draw attention from community members in the form of suspicion (Flaherty, 1972, p. 110). People often left their doors unlocked leading to visitors sometimes entering without knocking (Flaherty, 1972, p. 91).

Pastors also played a strong role in eliminating sin among their congregation. To be a Puritan pastor was to be a shepherd watching over his flock, knowing about their private life and ensuring it complied with their spiritual duties (Flaherty, 1972, p. 133-134). Thomas Hooker took on this responsibility as he wrote, "I stand charged in a most peculiar manner, to prevent all taint of sin in any Member of the Society, that either it may never be committed; or if committed, it may speedily be removed" (Hooker, 1648, Part 3, p. 3). This led New England pastors to take on a considerable amount of monitoring over their parishioners. For instance, the pastor of Roxbury Samuel Danforth situated his study so that he could see the local tavern through his window and send home any tippling dwellers (Flaherty, 1972, p. 134). Sometimes it took the surveillance powers of the whole community to stop frequenting tavern-goers. Such was the case in Ipswich where it was ordered that " 'no person should sell or give to John Browne, the glazier, any strong drink... and should any ordinaries suffer him to come or stay in their houses... they would do it at their peril' " (Flaherty, 1972, p. 182).

As has been shown, religious institutions can effectively enforce rules and constrain behavior (Leeson, 2012b). For instance, Hull & Bold (1994) demonstrate how the use of hell doctrines can enforce property rights and encourage cooperation. But even they note how in the early New England colonies, no such hell was needed because these individuals “lived in small, closely knit, independent communities” with “shared values and a collective vision” (p. 460). The Puritan communities needed no hell doctrine because of their isolated and compact settlements lowering monitoring costs enough to effectively enforce their religious norms. It was their close proximity of houses coupled with their culture of watchfulness that created such valuable religious club goods.

4.2 Settlement Compactness in New England Towns

The Puritans had many norms which relied on family and household units to enforce. To ensure households carried out their duties, there was a strong emphasis placed on “neighboring” (Fischer, 1989, pp. 186-188) and watching over families of the community. There then was a strong preference for compact settlement (Haller, 1951, p. 26) and a consistent geographical layout of compactly settled towns (Scofield 1938; Reps 1965, p. 120, 125; Trewartha 1946). Trewartha (1946) distinctly identified this correlation of compact settlement and religiosity: “where religious bonds were strong, a fairly compact community life was maintained for some time; where they were weak or lacking, disintegration was more rapid” (p. 589). For instance, take the town of Andover where “living away from the village was discouraged; and on one occasion, the town went so far as to forbid any inhabitants building a dwelling-house in any part of the town other than that which had been set apart for such houses” (Arrington, 1922, p. 148).²⁹ Or in the town of Newbury where the town “depended on a physical closeness, in order to ensure that the community worshipped together and kept an eye on each other” (Groff, 2008, p. 29).

Although the majority of New England towns were founded by emigrating congregations for religious reasons, not all of them had these foundations. After the Great Puritan Migration

²⁹On this point see also Flaherty (1972, p. 27) and Hambrick-Stowe (1982, p. 244).

in the first half of the 17th century, many of the emigrants from England were seeking more than just religious freedom. They were searching for a new, prosperous life in the New World. Therefore, towns emerged which were much less centered around religion and creating a holy congregation. If our theory is true, we should expect these less religious towns to be less compactly settled than religious ones.

We test this hypothesis by gathering an original data set of 327 New England towns first settled in the 17th century. The summary statistics of this data is presented in Table 1. Although it is impossible to know exactly how religious towns were relative to others, we can use delay of church organization as a proxy for religiosity.³⁰ The *Settled* variable is the year the town was first settled, *Church* variable the year the first church was organized, and *Delay* is the delay in church organization from the initial time of settlement ($Delay = Church - Settled$).³¹ We expect towns who organized a church with little delay after settlement to be more religious than those who organized a church with a long delay after settlement. The *Attend* variable is a dummy variable for whether settlers attended church in another town before organizing their own. Using this variable, we drop the towns whose settlers attended other churches before organizing their own to ensure *Delay* is a reliable proxy for religiosity.

As a second proxy for religiosity, we include dummy variable *Witchcraft Cases* which is equal to 1 if the town had a witchcraft case at some point during the 17th century, and 0 otherwise. Presumably, towns whose settlers were more religious were more likely concerned

³⁰Other dates like when the first church was built or when the first minister came to the town could have been used in place of church organization. However, building a church and bringing a minister to town both require a certain threshold of wealth from the townspeople. These variables could then be measuring wealth more than religious commitment. All that was required for a church to be organized was a decision to come together and form a church by the townspeople. Sometimes a church was organized with as little as seven members. In Haverhill, Massachusetts, the first church was formed with fourteen members, eight males and six females (Noyes, 1903, p. 6), in Newington, New Hampshire the church was organized with nine members (Hazlett, 1915, p. 568), Holliston, Massachusetts organized its church with eight members (Drake, 1879, p. 471), and in Rochester, Plymouth the church was founded by seven men and one minister (*Mattapoisett and Old Rochester, Massachusetts: Being a History of These Towns and Also in Part of Marion and a Portion of Wareham*, 1907, p. 73). Using church organization is the most appropriate measure because its less likely to be correlated with a town's wealth and population size.

³¹There were conflicting settlement and church organization dates found in different sources for some towns. When a town had two separate dates reported for both the *Settled* and *Church* variables, there were four possible ways to calculate *Delay*: *Settled* (Earliest) – *Church* (Earliest), *Settled* (Earliest) – *Church* (Latest), *Settled* (Latest) – *Church* (Earliest), *Settled* (Latest) – *Church* (Latest). For the *Delay* variable we took the average of these dates. Additionally, we include the *Settled* variable as a control. We use the earliest date of settlement.

with the evil doings of witches. Being a witch meant conspiring with the devil. Having a witch in the community reflected a lack of faith and going against the covenant the church congregation entered into. Towns centered around their churches who were ultimately more religious would then be more likely to encounter a case of witchcraft at some point during this time period. Less religious settlers were likely altogether less concerned with the matter of witches.

Most town maps are either missing or not drawn to a uniform scale. This makes it difficult to estimate settlement compactness but not impossible. One proxy is the size of house lots. Agricultural lands were often in a separate location from the dwellings of the townspeople, leaving houses all together at the center of the town. The bigger the house lot, the less compactly settled a town could be. The *House Size* variable is the size of house lots in acres made upon the first distribution of land.

Another theory to explain settlement compactness is defense. New England settlers may have chosen to live in compact settlement not to more easily monitor each neighbor's behavior, but rather to better protect themselves from attacks by indigenous tribes. If this theory is true, we should expect towns who were more vulnerable to indigenous tribes' attacks to be more compactly settled. We test this hypothesis by controlling for a town's proximity to other towns. The *Proximity* variable was constructed by counting all the towns within a 13.68 mile radius at the time of a town's settlement.³² Figure 5 maps the towns in our data set. To illustrate this variable, we map the buffer for a town with low proximity (Attleborough in Figure 6), average proximity (Marlborough in Figure 7), and high proximity (Malden in Figure 8). The higher the *Proximity*, the more neighboring towns a given town has at its time of settlement. The lower, the more remote a town's location was relative to others in the rest of the colony. We should expect towns with lower proximity to be more vulnerable to attacks as they are more likely to be near indigenous tribes' lands. The lower proximity towns were most often the towns settled on

³²The median town size was 36.75 square miles. The radius of a town with this area is $r = \sqrt{\frac{36.75}{\pi}} = 3.42$ miles. From this measure we construct three sizes for the proximity radius: Small: $2 \cdot r = 6.84$ miles, Medium: $4 \cdot r = 13.68$ miles, Large: $6 \cdot r = 20.52$ miles. We adopt the medium sized proximity for our analysis and in Appendix A we rerun the analysis with the small and large proximity variables to show the results are not sensitive to the size chosen.

the colony's frontier. If the defense hypothesis is true, then the coefficient on *Proximity* should be positive, suggesting that a decrease in proximity to other towns will cause the compactness of towns to increase, or lower the size of house lots.

A possible determinant of house lot size is the population density of a town. If a town was granted a small tract of land by the colonial court and had many families to settle, house lots may have been smaller not to lower monitoring costs, but because the constraint of available land. To control for this, we generate a population density variable using *Population* as the number of house lots distributed in the first distribution, *Town Size* as the size of the original town grant in square miles made by the colonial court, and *Population Density* as the number of house lots divided by the size of the town ($Population\ Density = \frac{Population}{Town\ Size}$).³³ It may also be the case that the agricultural productivity of the land determined house lot size. To control for this we used crop suitability data for wheat and maize from Global Agro-Ecological Zoning (GAEZ) version 4 from the Food and Agricultural organization (FAO). The *Maize* and *Wheat* variables measure potential crop yields in terms of tons per hectare per year.

The data was collected from various sources, but most often from town and county history books published in the nineteenth century. Martin's (1991, pp. 311-316) Appendix 2 was used to fill in missing church organization data. Data on witchcraft cases was taken from J. P. Demos (2004, pp. 401-409). If the number of house lots upon the first distribution of land was not reported, we used the number of initial settling families as a substitute for *Population*. When the number of settling families was not specifically mentioned, the number of land holding men at the town founding was recorded. When a range of house lot sizes was given, for instance 5-10 acre lots for Billerica Massachusetts (Farmer, 1816, p. 7), the average of the two numbers was entered (7.5 acres). When a complete list of house lots were listed, the median was calculated and reported instead of the average.

Figure 9 plots each towns' delay in church organization on the horizontal axis and house

³³Although it may seem this variable would be a good proxy for settlement density, that is not so. The reason why is town size is not the actual size of the settled town, but the total land granted to the town by courts. This, then, does not measure the settlement density of the town as individuals could either cluster together in some part of this granted land or spread out across their land grant.

lot size on the vertical.³⁴ Most of our observations are clustered in the lower left portion of the graph signifying towns which organized a church shortly after settlement and had small house lot sizes. These towns who have house lots smaller than 10 acres most closely resemble settlements concentrating houses within close proximity to each other.³⁵ Figure 10 is the same plot but signifies the towns which have at least one witchcraft case during this period. To show the consistency of religiosity in the *Delay* and *Witchcraft Cases* variables, we plot the year of town settlement and the year of church organization with witchcraft cases in Figure 11. Towns directly on the grey line represent towns with no delay in church organization. The towns with a large vertical distance above the grey line are those towns who took longer to organize their church. The towns with witchcraft cases tend to be close to or on the grey line, signifying little to no delay.

We construct a linear regression model and estimate it using ordinary least squares (OLS). Our model includes *House Size* (HS_i) as our dependent variable, *Delay* (D_i) or *Witchcraft Cases* (WC_i) as our independent variable of interest, and *Proximity* (R_i), *Population* (P_i), *Population Density* (PD_i), *Settled* (S_i), *Maize* (M_i), and *Wheat* (W_i) as controls,

$$HS_i = \mu + \alpha D_i + \beta R_i + \gamma P_i + \delta PD_i + \zeta S_i + \eta M_i + \theta W_i + \epsilon_i. \quad (1)$$

The results are shown in Table 2. With all controls, the coefficient on *Delay* stays statistically significant at the 1% level. A delay of 10 years increases house lot size by 7.92 acres on average, a significant amount given the median house lot is 6.91 acres. *Witchcraft Cases* also is statistically significant on the 1% level. The occurrence of a witchcraft case decreases house lot size by 12.95 acres on average. It is also worth highlighting *Settled* was statistically statistically

³⁴We exclude the outlier town Freetown, Massachusetts from Figures 9 and 10 to narrow the boundaries of the graph and more clearly see the relationship. Freetown had a delay in church founding of 71 years, an average house lot size of 208 acres, and had no witchcraft cases.

³⁵10 acre house lots may seem too large to classify a town as having a compact settlement, especially by today's standards. But in order to monitor neighbors it was not a necessity to always see them, but to hear them. Neighbors who could hear sinful acts were used as legitimate witnesses in court cases (Flaherty, 1972, p. 93). Even if house lot size prevented direct visibility to a neighbors house, if they were close to hear the actions of others in the quiet, rural landscape of the New England wilderness then compact settlements could be effective in lowering monitoring costs.

significant at the 5% level for the *Delay* regressions, but not significant in any of the *Witchcraft Cases* regressions.

These results validate an implication from our theory, that less religious towns, as measured by delay in church organization and witchcraft cases, tended to be less compact than more religious towns. We conduct multiple robustness checks. First, in Appendix B we fill in missing data for *Population* and *Population Density* with the medians of available data. Both our independent variables of interest stay statistically significant on the same levels as before. Then in Appendix C we use various metrics to identify possible outliers in the data. The towns of Acushnet, Attleborough, Bristol, Brunswick, Freetown, Kingston, and Medfield all have some identification of being an outlier. Robustness checks are conducted by running the model without these outlier observations. Both *Delay* and *Witchcraft Cases* decrease in magnitude, but *Delay* stays statistically significant on the same level while *Witchcraft Cases* barely misses the 1% statistical significance threshold. Finally, we change the *Delay* variable to a dummy variable in Appendix D where if delay is greater than 0 it is equal to 1. We also increase this threshold to 5 and 10 years and find *Delay* stays statistically significant and increases in magnitude.

Defense is used as a common explanation for settlement compactness in New England. We argue this cannot explain the variation in compactness at the town level for three reasons. First, settlers in the Virginia colony faced similar threats from indigenous tribes, but never came close to mirroring the compact settlement layouts of the New England towns. Appendix E presents a brief account of the relations between settlers and indigenous tribes in Virginia. At the very least, these relations were just as tumultuous as those in New England, if not more so.

Second, the proximity variable was statistically insignificant in explaining variation in house lot sizes for all columns of Table 2, 8, and 11. These results are not sensitive to the size of the proximity radius as evidenced in Appendix A. These results suggest a town's remoteness did not affect the compactness of town settlements. If the defense hypothesis were true, we should expect all towns settled on the "frontier," or in remote locations vulnerable to attacks

by indigenous tribes, to have small house lot sizes. However, many towns deviate from this prediction. Table 3 reports a couple of these towns which were settled on the frontier, with large house lot sizes and small proximity to other towns. All ten of these towns had house lot sizes equal to or greater than 20 acres with *Proximity* less than 11. Many of these towns were indeed vulnerable. Brookfield, Lancaster, Mendon, and Simsbury were all destroyed and Marlborough damaged during King Philip's War in 1675-1676.

Why did some towns on the frontier have large house sizes with little compactness? Frontier towns had a reputation for disregarding the strict religious norms of the Puritans, for only “[w]ild creatures’ would ‘ordinarily love the liberty of the [w]oods’ ” (Heimert, 1953, p. 369, footnote 42). Clergyman Increase Mather claimed these frontier settlers to be “scattered people, and such as had many of them Scandalized the Heathen, and lived themselves too like the Heathen, without any *Instituted Ordinances*” (Heimert, 1953, p. 374, emphasis in original). These settlers were criticized for prioritizing trade over religion as their main focus in the New World (Heimert, 1953, p. 375). Joseph Eastbrooks, Pastor at the church in Concord, Massachusetts, best sums the Puritans disdain for these settlements:

[H]ave we not cause to bewail the irreligious folly of many that have planted themselves in such remote corners of this Land, for the sake of Worldly conveniencies, that they might live as Lambs in a large place; so as that they have not been capable of enjoying the Ordinances of Christ, and by that means have seemed to bid defiance, not only to Religion, but to Civility it self: and such places thereby have become Nurseries of Ignorance, Prophaneness and Atheism. (Easterbrooks, 1705, p. 3)

There were movements to forcefully place resident ministers in frontier settlements (Shipton, 1937, p. 31), but this was met with objection from the targeted remote towns. Frontier settlements acted as a safe haven for religious dissenters (Stabler, 2019, p. 237). In sum, it would seem the religiosity of these settling frontiersmen had more of an effect on settlement patterns than the threat of indigenous tribes' attacks.

Finally, the defense hypothesis cannot explain the method of land demarcation chosen by New England settlers. When settling on land, there are two methods of demarcation settlers can

choose: centralized or decentralized. Decentralized demarcation involves individuals demarcating their land grant themselves, while centralized demarcation entails one or more persons demarcating the land lots for all settlers.³⁶

Previous research has investigated this difference in land demarcation, although in a slightly different context. Libecap et al. (2011) analyzed the British colonies and their choice of land-demarcating institutions, identifying three classifications: rectangular survey (RS), mixed system (MIX), and metes and bounds (MB). Libecap et. al.'s (2011, p. 302) Table 1 outlines the characteristics of each. Since RS did not come about until the late eighteenth century, we are only concerned with the latter two. The difference between these two institutions primarily lies in that a MIX system has controlled entry and settlement prior to survey, which are both absent features in a system of MB. The difference between the MIX and MB system boils down to what Libecap et al. (2011) coin centralized (RS, MIX) and decentralized (MB) demarcation.

In Appendix F, we use Libecap et al.'s (2011) empirical model to find the predicted demarcation systems for the New England colonies. This model predicts each colony to have a decentralized system, when in reality the New England towns used a centralized system. This presents a puzzle unexplained by the current literature, but well explained by the theory of religious clubs. If settlers were to demarcate their land themselves, they would likely live on their farms. In doing so, the settlers impose a negative externality on their religious club: it is more costly for club members to monitor each other when they live spread out on their farms.

To prevent this from happening, New England settlers demarcated land through a centralized group as described in Section 2.1. By using a centralized demarcation system, Puritans were able to guarantee settlement compactness from the moment they settled their towns. If settlements were compact because settlers were concerned with defending themselves, then there would be no externality from living on their farms. They would bear the full costs of being more vulnerable to attacks. In this case, there would be no need for centralized demarcation as every settler would demarcate their lots on their own, or at least part of the land granted to them, next

³⁶Alternative terminology classifies decentralized demarcation as *indiscriminate choice* and centralized demarcation as *discriminate choice*.

to each other. The defense hypothesis cannot explain why settlers would choose a centralized over a decentralized demarcation institution, but can be explained by our theory of Puritan organization.

4.3 Evolution of Enforcement Mechanisms

The population of New England colonies continued to grow after the Great Migration. As shown in Figure 5, population growth continued to exceed town growth in the later half of the 17th century. After 1660, sustained population growth and declining town growth due to the lack of westward expansion (Konig, 1974, p. 150) started putting pressure on land ownership.³⁷ Originally, when towns settled on their six to ten square mile land grants, they left some of the land undivided (Akagi, 1924, p. 104). Occasionally this land would be granted as compensation grants to individuals who received poor allotments, but otherwise it was not efficient to delineate rights to the land, thus the land was left in the public domain.

That was until the rising population and inability to expand west-ward started to increase the value of these undivided lands. Immigrating individuals were enticed by the existing infrastructure and positive externalities to be reaped from settling in a pre-established town. Consistent with Demsetz (1967), as the land values rose, those who had the economic property rights to the land started exercising their rights as the perceived benefits from selling the land to migrants exceeded the cost of delineating their rights.³⁸

Those who had rights to this land were the town proprietors, who were originally assigned the job of dividing up the undivided land when desirable (Akagi, 1924, p. 104). These individuals were part of those who originally purchased the land for the town, and if those individuals were

³⁷This is evident from the column of land values in Main & Main's (1988, p. 36) Table 2.

³⁸Barzel (1997) sums up this point nicely, "People choose to exercise rights when they believe the gains from such actions will exceed the costs. Conversely, people fail to exercise rights when the gains from owning properties are deemed insufficient, thus placing or leaving such properties in the public domain. What is found in the public domain, therefore, is what people have *chosen* not to claim. However, as Demsetz pointed out, when conditions change, a price of property considered not worth owning may be newly perceived as worthwhile; conversely, what was at first owned may later be placed in the public domain" (Barzel, 1997, p. 92, emphasis in original). In the case of the late 17th century colonial New England, we should expect to see the emergence of more accurately delineated property rights over the common lands that were left in the public domain as these lands starting becoming more valuable.

no longer alive their heirs or assigned successors were granted their duties. This held them responsible for “inducing and enlisting settlers and new comers, for locating home lots and dwelling houses, for building highway and streets, for subdividing the adjacent arable land, and subjecting the meadow and forest, for a time at least, to a common management” (Akagi, 1924, p. 3). However, their primary roles revolved around dividing and distributing land (Akagi, 1924, pp. 73-76, 103). This land, which was usually used for agricultural purposes, was sold to the incoming immigrants (Reps, 1965, p. 122).

As more immigrants came to live in these communities, houses were erected outside the densely settled town square. This increased the costs of monitoring behavior and enforcing Puritan norms because there were more and farther away houses to monitor. Even worse, the new settlers’ propensity to commit sin was higher because it was harder for congregation members to monitor them. In order for these congregations to induce high levels of religious participation from these new settlers, they would have to devote more resources to monitoring and enforcing their norms since living in close proximity was no longer the only monitoring device to be relied on.

To continue compliance with these norms, officers emerged known as tithingmen who were held responsible for watching over and inspecting a given number of families:

[T]he said tithingmen are required diligently to inspect all houses, licensed or unlicensed, where they have notice or have ground to suspect that any person or persons do spend their time or estates, by night or by day, in tipling, gaming, or otherwise unprofitably, or do sell by retail, within doors or without, strong drink, wine, ale, cider, rum, brandy, perry, metheglin, and without license. ... Also, the tithing men are required diligently to inspect the manners of all disorderly persons,... to present the names of all single persons that live from under family government, stubborn and disorderly children and servants, nightwalkers, tipplers, Sabbath breakers, by night or by day, and such as absent themselves from the public worship of God on the Lord’s days, or whatever the course or practice of any person or persons whatsoever tending to debauchery, irreligion, profaneness, and atheism among us, wherein by omission of family government, nurture, and religious duties, and instruction of children and servants, or idleness, profligate, uncivil, or rude practices of any sort... (Vaughan, 1972, pp. 183-184)

Each tithingmen was supposed to “take the charge of *Ten* or *Twelve Families* of his Neighbour-

hood, and shall diligently inspect them” (Morgan, 1966, p. 149, emphasis in original).³⁹ Their “jurisdiction and emphasis centered on breaches of the laws controlling church behavior and procedures, and of the moral code as laid down by regulations and practices of the church... His presence at church services was mandatory in order that he enforce good decorum throughout the service” (Baker, 1976, p. 18) and to check attendance (Baker, 1976, p. 24).

Additional steps were taken in Billerica Massachusetts in 1675, where “all children and youth from eight years old and upwards” were required to see the town’s reverend for catechetical instruction (Farmer, 1816, p. 10), instead of relying on their parents to teach them. If households of newcomers could not be relied on to enforce and carry on the social norms of the Puritans, further precautions would be necessary to monitor their behavior, such as delineating inspectors to monitor households or requiring children to be taught outside the home.

The Puritan Hell doctrine significantly changed during this period as well. Hull & Bold’s (1994) general thesis on hell doctrines is that religious doctrines about hell as punishment will occur in religions and cultures where the church is relatively more influential than the family, community, and government. They test this thesis on the experience of the Puritans in New England and review in detail the changes in how the Puritans promoted hell by splitting the colonial period into four sections: 1620-1660, 1660-1700, 1700-1740, and 1740-1776 (Hull & Bold, 1994, pp. 458-461). The Puritans always recognized the existence of hell. However, from 1620-1660 it was understood that a Puritan’s fate was preordained. If one was predestined and their actions had no effect on whether they went to hell or not, then the doctrine of hell was not a mechanism for enforcing their religious norms. The doctrine was not necessary in the small, compactly settled communities where it was easy to enforce their religious rules (Hull & Bold, 1994, p. 460). The understanding and promotion of hell would change in the 1660s as more individuals started living outside the center of the town. To ensure cooperation with the church’s prohibitions and norms, the Puritans started discussing and promoting a hell doctrine more than before. Michael Wigglesworth’s *The Day of Doom* (1867), originally published in 1662,

³⁹Other discussions of tithingmen in colonial New England include Fischer (1989, p. 72), Mayr (2008, pp. 36-37), and Mintz (1992, pp. 640-641).

describes hell and the kind of pain one could expect to endure while there (Wigglesworth, 1867, pp. 78-83). He promises hell for any misbehavior, from murder and adultery to drunkenness, with a special place reserved for vile children (Wigglesworth, 1867, pp. 28-31). This was one of the most popular books in American history, as roughly one in twenty persons owned the book in New England (Hull & Bold, 1994, p. 460). Before 1701, seven editions had been printed and distributed. Surely the preaching ministers, who had the means to afford copies of this book, were reading and discussing this text in their sermons. As the cost of using proximity as a monitoring device rose at the end of the 17th century, Puritans looked to other devices to enforce and ensure compliance with their religious norms.

5 Conclusion

Institutions often emerge to minimize transaction costs, the costs of defining, protecting, and enforcing property rights to goods (North, 1990, p. 28), faced by individual actors. Such is the case for the Puritans in 17th century New England. These groups faced a free-rider problem in their religious congregations. Since there were significant transaction costs associated with measuring religious participation, congregations used various prohibitions and stigmatizing norms to eliminate free-riding in their organizations. To lower monitoring costs and more effectively enforce these norms, the Puritans created compact settlements with individuals residing in close proximity and encouraged the monitoring of one another.

For most of the 17th century, proximity for the Puritans was the least cost device to enforce their rules. There are many factors which influence the costliness of using proximity as an enforcement mechanism. Part of what made this the best device for the Puritans stems from their theological beliefs in the Covenant of Grace and the impact sinning individuals had on the salvation of the whole. Other religious groups settling in America at this time had different theological beliefs surrounding salvation, and therefore chose different mechanisms to enforce their religious norms. As the cost of using proximity increased towards the end of the 17th

century, the Puritans looked to other mechanisms such as tithingmen, centralizing education, and changing their theological beliefs surrounding hell to enforce their religious norms.

This study adds to the literature on methods of rule enforcement, specifically for clubs seeking to solve the free-rider problem. Another previously mentioned device which should be viewed as distinct from proximity is remoteness. Settling a club in an isolated location can encourage rule compliance by lowering the opportunity cost to religious participation. This mechanism works similar to using stigmatizing behavior such as requiring that all members shave their heads and get visible club-specific tattoos (Iannaccone, 1992, p. 275). While proximity still lowers the opportunity cost of non-club related activities, it does so through being able to more effectively punish rather than making it more difficult to engage in this behavior.

A corollary of our analysis helps explain why centralized demarcation institutions were more often used in New England than other settlements in colonial America. Centralized land demarcation allowed settlers to ensure settlement compactness in their towns. This eliminated the negative externality borne on religious clubs from congregation members living in remote areas. The negative externality of remote settlement is absent when settlers are less demographically attached to religious clubs. This explains why decentralized demarcation prevailed in colonies like Virginia. Understanding why such institutions of land demarcation emerge is not only important for explaining the economic outcomes of a society, as depicted by Libecap & Lueck (2011) and Libecap et al. (2011), but also because they may play a key role in explaining the development of other institutions such as legal systems.⁴⁰

References

Akagi, R. H. (1924). *The town proprietors of the New England colonies: A study of their development, organization, activities and controversies, 1620-1770*. The University of Pennsylvania Press.

⁴⁰In his study of Essex County, Konig (1974, p. 149) found that land disputes kept the courts busy from 1672 to 1684 leading the courts to develop a robust system of property rights over the land. Chu (1987) and Steinberg (1993) also account in detail court cases over property assignment and boundary disputes which had significant impacts on the legal systems of their regions. Stilgoe (1976, p. 28) mentions the decline in boundary conflicts by the middle of the eighteenth century due to better demarcations of private lands. No more immune to such cases was Virginia, as due to the inaccuracy in surveys, litigations over property limits were constantly brought to the attention of the Burgesses (Seiler, 1949, p. 416).

- Andrews, C. M. (1934). *The colonial period of American history: The settlements* (Vol. 1). Yale University Press.
- Arrington, B. F. (1922). *Municipal history of Essex County in Massachusetts* (Vol. 1). Lewis historical publishing Company.
- Atwater, E. E. (1881). *History of the colony of New haven to its absorption into Connecticut*. Rand, Avery, & Co.
- Bacon, L. W. (1902). Church history. In *A history of the town of Freetown, Massachusetts: With an account of the Old Home Festival, July 30th, 1902* (pp. 29–49). Fall River: Press of J.H. Franklin & Company. Retrieved from <https://play.google.com/store/books/details?id=KPOMAAAAAYAAJ>
- Baker, G. S. (1976). *History of halifax, massachusetts*.
- Barzel, Y. (1997). *Economic analysis of property rights*. Cambridge University Press.
- Becker, G. S. (1968). Crime and punishment: An economic approach. *Journal of Political Economy*, 76(2), 169–217.
- Berman, E. (2000). Sect, subsidy, and sacrifice: an economist's view of ultra-orthodox jews. *The Quarterly Journal of Economics*, 115(3), 905–953.
- Bollen, K. A., & Jackman, R. W. (1985). Regression diagnostics: An expository treatment of outliers and influential cases. *Sociological Methods & Research*, 13(4), 510–542.
- Bremer, F. J. (1995). *The Puritan experiment: New England society from Bradford to Edwards*. University Press of New England.
- Bulkeley, P. (1651). *The gospel-covenant: or, the covenant of grace opened*. London: Matthew Simmons. Retrieved from <https://play.google.com/store/books/details?id=v3FmAAAAcAAJ&rdid=book-v3FmAAAAcAAJ&rdot=1>
- Carvalho, J.-P. (2013). Veiling. *The Quarterly Journal of Economics*, 128(1), 337–370.
- Carvalho, J.-P. (2019). Religious clubs: The strategic role of religious identity. In *Advances in the economics of religion* (pp. 25–41). Springer.
- Carvalho, J.-P., & Koyama, M. (2016). Jewish emancipation and schism: Economic development and religious change. *Journal of Comparative Economics*, 44(3), 562–584.
- Carvalho, J.-P., & Sacks, M. (2021). The economics of religious communities. *Journal of Public Economics*, 201, 104481.
- Caulkins, F. M. (1852). *History of New London, Connecticut. from the first survey of the coast in 1612, to 1852*. New London: Published by the Author. Retrieved from <https://play.google.com/store/books/details?id=7NOTAAAAAYAAJ&pli=1>
- Cave, A. A. (2011). *Lethal encounters: Englishmen and Indians in colonial Virginia*. ABC-CLIO.
- Chatterjee, S., & Hadi, A. S. (1986). Influential observations, high leverage points, and outliers in linear regression. *Statistical science*, 379–393.
- Choy, J. P. (2020). Religious rules as a means of strengthening family ties: Theory and evidence from the Amish. *Journal of Comparative Economics*, 48(3), 729–748.
- Chu, J. M. (1987). Nursing a poisonous tree litigation and property law in seventeenth-century Essex County, Massachusetts the case of bishop's farm. *The American Journal of Legal History*, 37(1), 221–252.
- Clayton, W. W. (1880). *History of York County, Maine: With illustrations and biographical sketches of its prominent men and pioneers*. Philadelphia: Everts & Peck. Retrieved from <https://play.google.com/store/books/details?id=-e8gAQAAMAAJ&rdid=book--e8gAQAAMAAJ&rdot=1>

- Clerk, N. (1685). *The book of the general laws of the inhabitants of the jurisdiction of New-Plimouth collected out of the records of the General Court*. Boston: Samuel Green. Retrieved from <https://www.proquest.com/docview/2248574089/12276252?accountid=14541&parentSessionId=saWot2TMT446v5WZnYAMlA8ouPlMxXAXFxE4CXC4XNY%3D&pq-origsite=primo#>
- Cole, J. R. (1889). *History of Washington and Kent Counties: Rhode Island, including their early settlement and progress to the present time; a description of their historic and interesting localities; sketches of their towns and villages; portraits of some of their prominent men, and biographies of many of their representative citizens, volume 1*. New York: W.W. Preston & Company. Retrieved from https://play.google.com/store/books/details?id=x_knAQAAMAAJ
- Collections of the massachusetts historical society*. (1871). Cambridge: Press of John Wilson and Son. Retrieved from <https://archive.org/details/s5collections01massuoft/page/n7/mode/2up>
- Cotton, J. (1636). *A sermon preached by the Reverend, Mr. John Cotton, teacher of the First Church in Boston in New-England. deliver'd at Salem, 1636*. Boston: Massachusetts Historical Society. Retrieved from <https://quod.lib.umich.edu/cgi/t/text/text-idx?c=evans;cc=evans;rgn=main;view=text;idno=N01347.0001.001>
- Cotton, J. (1641). *The way of life, or, God's way and course, in bringing the soule into, keeping it in, and carrying it on, in the wayes of life and peace*. London: M.F. for L. Fawne and S. Gellibrand. Retrieved from https://link.gale.com/apps/doc/CY0101558577/SABN?u=new64731&sid=gale_marc&xid=637063df&pg=90
- Cotton, J. (1651). *Christ the fountaine of life*. Robert Ibbitson. Retrieved from <https://quod.lib.umich.edu/e/eebo2/A80611.0001.001?rgn=main;view=fulltext>
- Daggett, J. (1834). *Sketch of the history of Attleborough: From its settlement to the present time*. Dedham: H. Mann, Printer. Retrieved from <https://play.google.com/store/books/details?id=KPOMAAAYAAJ>
- Demos, J. (1970). *A little commonwealth: Family life in plymouth colony*. Oxford University Press, USA.
- Demos, J. P. (2004). *Entertaining satan: Witchcraft and the culture of early new england*. Oxford University Press.
- Demsetz, H. (1967). Toward a theory of property rights. *Economica*, 57(2), 347-359.
- Deyo, S. L. (1890). *History of Barnstable County, Massachusetts: 1620-1637-1686-1890*. New York: H. W. Blake & Co. Retrieved from <https://play.google.com/store/books/details?id=9iBEAQAAMAAJ>
- Dhillon, A., & Rigolini, J. (2011). Development and the interaction of enforcement institutions. *Journal of Public Economics*, 95(1-2), 79-87.
- Di Bonaventura, A. (2007). Beating the bounds: Property and preambulation in early New England. *Yale Journal of Law & the Humanities*, 19, 115-148.
- Dow, G. F. (Ed.). (1916). *Records and files of the quarterly courts of Essex County* (Vol. V). Essex Institute. Retrieved from <https://saalem.lib.virginia.edu/Essex/vol5/table/index.html>
- Drake, S. A. (1879). *History of Middlesex County, Massachusetts: Containing carefully prepared histories of every city and town in the county* (Vol. 1). 301 Washington Street: Estes and Lauriat Publishers. Retrieved from <https://play.google.com/store/books/details?id=QGol0Ayd9RMC>

- Easterbrooks, J. (1705, 5). *Abraham the passenger his privilege and duty*. Retrieved from <https://ota.bodleian.ox.ac.uk/repository/xmlui/bitstream/handle/20.500.12024/N01008/N01008.html?sequence=5&isAllowed=y> (Described in an election-sermon at Boston.)
- Egleston, M. (1886). *The land system of the New England colonies*. Johns Hopkins University.
- Eleven little-known facts of cambridge*. (n.d.). Retrieved from <https://www.cambridgema.gov/historic/cambridgehistory/elevenfacts> (Published by the Cambridge Historical Commission)
- Farmer, J. (1816). *An historical memoir of Billerica, in Massachusetts: Containing notices of the principal events in the civil and ecclesiastical affairs of the town, from its first settlement to 1816*. R. Boylston.
- Fischer, D. H. (1989). *Albion's seed: Four British folkways in America*. Oxford University Press.
- Fiske, J. (1974). The notebook of the Reverend John Fiske: 1644 - 1675. In R. G. Pope (Ed.), *Publications of the Colonial Society of Massachusetts* (Vol. 47). Boston Society. Retrieved from <https://www.colonialsociety.org/node/1071>
- Flaherty, D. H. (1972). *Privacy in colonial new england*. Charlottesville, Virginia: University of Virginia Press.
- Frothingham, R. (1845). *The history of Charlestown, Massachusetts*. C.C. Little and J. Brown.
- Gilbert, E. B. (1907). *History of Salem, N.H.* Rumford Printing Company.
- Gill, A. (2021). The comparative endurance and efficiency of religion: a public choice perspective. *Public Choice*, 189(3-4), 313–334.
- Gleach, F. W. (1997). *Powhatan's world and colonial Virginia: A conflict of cultures*. University of Nebraska Press.
- Groff, B. (2008). *A brief history of old newbury: From settlement to separation*. Arcadia Publishing.
- Hall, D. D. (2011). *A reforming people: Puritanism and the transformation of public life in New England*. University of North Carolina Press.
- Haller, W. (1951). *The Puritan frontier town-planting in New England colonial development 1630—1660*. Columbia University Press.
- Hambrick-Stowe, C. E. (1982). *The practice of piety: Puritan devotional disciplines in seventeenth-century New England*. Chapel Hill, North Carolina: The University of North Carolina Press.
- Hardy, S. (1687). *A guide to heaven from the Word, or, Good counsel how to close savingly with Christ : some short, but serious questions to ask our hearts every morning and evening, whether we walk closely with him. And especially, rules for the strict and due observation*. London: Printed for Awnsham Churchil and Charles Brome at the Gun near the West end of St. Paul's. Retrieved from <https://collections.library.yale.edu/catalog/2057284>
- Hazlett, C. A. (1915). *History of Rockingham County, New Hampshire, and representative citizens*. Chicago, Illinois: Richmond-Arnold Publishing Company. Retrieved from <https://archive.org/details/historyofrocking00hazl/page/n5/mode/2up>
- Heimert, A. (1953). Puritanism, the wilderness, and the frontier. *New England Quarterly*, 361–382.
- Hobart, B. (1866). *History of the town of Abington, Plymouth County, Massachusetts, from its first settlement*. Boston: T.H. Carter and Son. Retrieved from <https://play.google.com/store/books/details?id=SZ2MLMV752kC&rdid=book-SZ2MLMV752kC&rdot=1>
- Hooker, T. (1648). *A survey of the summe of church-discipline*. London: Printed by A.M. for John Pellamy at the three Golden Lions in Cornhill. Retrieved from <https://play.google.com/>

- [store/books/details?id=e76etsW_m3IC&rdid=book-e76etsW_m3IC&rdot=1](https://play.google.com/store/books/details?id=e76etsW_m3IC&rdid=book-e76etsW_m3IC&rdot=1)
- Hooker, T. (1657). *The application of redemption*. London: Printed by Peter Cole, at the sign of the Printing-Press in Cornhill. Retrieved from <https://www.proquest.com/docview/2240895612/fulltextPDF/32998F4EFA4443E8PQ/1?accountid=14541>
- Hughes, S. S. (1979). *Surveyors and statesmen: Land measuring in colonial Virginia*. The Virginia Surveyors Foundation and the Virginia Association of Surveyors.
- Hull, B. B., & Bold, F. (1994). Hell, religion, and cultural change. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 447–464.
- Hurd, D. H. (1881). *History of Fairfield County, Connecticut: With illustrations and biographical sketches of its prominent men and pioneers*. J. W. Lewis & Co.
- Hurd, D. H. (1882). *History of New London County, Connecticut: With biographical sketches of many of its pioneers and prominent men*. Philadelphia: J.W. Lewis & Company. Retrieved from <https://play.google.com/store/books/details?id=GI6AQAIAAJ&rdid=book-GI6AQAIAAJ&rdot=1>
- Hurd, D. H. (1884). *History of Plymouth County, Massachusetts: With biographical sketches of many of its pioneers and prominent men, part 1*. Philadelphia: J.W. Lewis & Company. Retrieved from <https://play.google.com/store/books/details?id=fsUTAAAYAAJ>
- Iannaccone, L. R. (1992). Sacrifice and stigma: Reducing free-riding in cults, communes, and other collectives. *Journal of Political Economy*, 100(2), 271–291.
- Innes, S. (1995). *Creating the commonwealth: The economic culture of Puritan New England*. W.W. Norton & Company.
- Kain, R. J., & Baigent, E. (1992). *The cadastral map in the service of the state: A history of property mapping*. University of Chicago Press.
- Konig, D. T. (1974). Community custom and the common law: Social change and the development of land law in seventeenth-century Massachusetts. *The American Journal of Legal History*, 18(2), 137–177.
- Konig, D. T. (1979). *Law and society in Puritan Massachusetts: Essex County, 1629-1692*. University of North Carolina Press.
- Kube, S., & Traxler, C. (2011). The interaction of legal and social norm enforcement. *Journal of Public Economic Theory*, 13(5), 639–660.
- Larned, E. D. (1874). *History of Windham County, Connecticut: 1600-1760*. Worcester, Mass.: Published by the Author. Retrieved from <https://play.google.com/store/books/details?id=g90TAAAYAAJ>
- Leeson, P. T. (2012a). Cultural codes: An economic analysis. *Journal of Multicultural Discourses*, 7(3), 227–233.
- Leeson, P. T. (2012b). Ordeals. *The Journal of Law and Economics*, 55(3), 691–714.
- Leeson, P. T. (2013). Gypsy law. *Public Choice*, 155(3-4), 273–292.
- Libecap, G. D., & Lueck, D. (2011). The demarcation of land and the role of coordinating property institutions. *Journal of Political Economy*, 119(3), 426–467.
- Libecap, G. D., Lueck, D., & O'Grady, T. (2011). Large-scale institutional changes: Land demarcation in the British Empire. *The Journal of Law and Economics*, 54(S4), S295–S327.
- MacLear, A. B. (1908). *Early New England towns: A comparative study of their development* (Unpublished doctoral dissertation). Columbia University.
- Main, G. L., & Main, J. T. (1988). Economic growth and the standard of living in southern New England, 1640–1774. *The Journal of Economic History*, 48(1), 27–46.

- Mar-Prelat, M. (1640). *A dialogue. wherein is plainly layd open the tyrannicall dealing of lord bishops against gods children with certaine points of doctrine, wherein they approve themselves (according to Dr. Bridges his judgement) to be truly the bishops of the divell.* Amsterdam: Published, by the Worthy Gentleman Dr. Martin Mar-Prelat, Doctor in all the Faculties, Primat and Metropolitan. Retrieved from <https://www.proquest.com/eebo/docview/2240906377/pageLevelImage/63D5AF7E6CA24588PQ/1?accountid=12768&tocViewMode=tocViewModeSearchOther&imgSeq=1>
- Martin, J. F. (1991). *Profits in the wilderness: Entrepreneurship and the founding of New England towns in the seventeenth century.* University of North Carolina Press.
- Masten, S. E., & Prüfer, J. (2014). On the evolution of collective enforcement institutions: communities and courts. *The Journal of Legal Studies*, 43(2), 359–400.
- Mattapoisett and Old Rochester, Massachusetts: Being a history of these towns and also in part of Marion and a portion of Wareham.* (1907). New York: Grafton Press. Retrieved from https://play.google.com/store/books/details?id=frSr0Fc9N_UC&rdid=book-frSr0Fc9N_UC&rdot=1
- Mayr, P. A. (2008). *Order in the household: domestic violence in 17th century Massachusetts* (Unpublished master's thesis). Queen's University.
- McBride, M. (2007). Club Mormon: Free-riders, monitoring, and exclusion in the LDS Church. *Rationality and Society*, 19(4), 395–424.
- Mead, N. P. (1906). Land system of the Connecticut towns. *Political Science Quarterly*, 21(1), 59–76.
- Miller, P. (1961). *The new england mind: the seventeenth century* (Vol. 2). Boston: Beacon Press. Retrieved from <https://babel.hathitrust.org/cgi/pt?id=mdp.39015005163616&seq=9>
- Mintz, S. (1992). Children, families and the state: American family law in historical perspective. *Denver University Law Review*, 69, 635.
- Morgan, E. S. (1966). *The Puritan family.* Harper & Row.
- North, D. C. (1990). *Institutions, institutional change and economic performance.* Cambridge university press.
- Noyes, H. E. (1903). *A memorial of the town of Hampstead, New Hampshire: Historic and genealogic sketches.* Boston, Massachusetts: George B. Reed. Retrieved from <https://play.google.com/store/books/details?id=a7UMAAAAYAAJ&rdid=book-a7UMAAAAYAAJ&rdot=1>
- Nugent, M. N. (Ed.). (1963). *Cavaliers and pioneers: Abstracts of Virginia land patents and grants.* Genealogical Publishing Company.
- Olds, K. B., & Liu, R.-H. (2000). Economic cooperation in 19th-century taiwan: religion and informal enforcement. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 404–430.
- Parkes, H. B. (1932). Morals and law enforcement in colonial New England. *The New England Quarterly*, 5(3), 431–452.
- Peterson, M. A. (1993). The plymouth church and the evolution of puritan religious culture. *The New England Quarterly*, 66(4), 570–593.
- Porter, W. S. (1851). *1640 hartford map.* Retrieved from <https://www.foundersofhartford.org/1640-hartford-map/> (Published by the Society of the Descendants of the Founders of Hartford)
- Rawson, E. (1639, Feb). Edward Rawson to John Winthrop. In *Winthrop family papers* (Vol. 4). Massachusetts Historical Society. Retrieved from <https://www.masshist.org/>

publications/winthrop/index.php/view/PWF04d086

- Reps, J. W. (1965). *The making of urban America: A history of city planning in the United States*. Princeton University Press.
- Richman, B. D. (2006). How community institutions create economic advantage: Jewish diamond merchants in New York. *Law & Social Inquiry*, 31(2), 383–420.
- Rossiter, W. (1909). *A century of population growth: From the first to the twelfth census of the United States: 1790-1900*. Government Printing Office. Retrieved from <https://permanent.fdlp.gov/gpo115114/CenturyofPopulationGrowth/CenturyofPopulationGrowthComplete.pdf>
- Scofield, E. (1938). The origin of settlement patterns in rural New England. *Geographical Review*, 28(4), 652–663.
- Seiler, W. H. (1949). Land processioning in colonial Virginia. *The William and Mary Quarterly*, 6(3), 416–436.
- Sheehan, B. (1980). *Savagism and civility: Indians and Englishmen in colonial Virginia*. Cambridge University Press.
- Shepard, T. (1874). *The works of Thomas Shepard: First pastor of the First Church, Cambridge, Mass.: with a memoir of his life and character* (Vol. 3). Boston: Doctrinal Tract and Book Society. Retrieved from <https://play.google.com/store/books/details?id=JYF-cp2Q5WMC&rdid=book-JYF-cp2Q5WMC&rdot=1>
- Shipton, C. K. (1937). The new england frontier. *The New England Quarterly*, 10(1), 25–36.
- Smith, D. S. (1972). The demographic history of colonial New England. *The Journal of Economic History*, 32(1), 165–183.
- Solberg, W. U. (1977). *Redeem the time: the Puritan sabbath in early america*. Cambridge, Massachusetts: Harvard University Press.
- Stabler, S. D. (2019). Church, space, and pluralism: Two puritan settlements, territory, and religious tolerance. *Sociology of Religion*, 80(2), 222–246.
- Steinberg, T. (1993). God's terminus: Boundaries, nature, and property on the Michigan shore. *The American Journal of Legal History*, 37(1), 65–90.
- Stigler, G. J. (1970). The optimum enforcement of laws. *Journal of Political Economy*, 78(3), 526–536.
- Stilgoe, J. R. (1976). Jack-o'-lanterns to surveyors: The secularization of landscape boundaries. *Environmental Review*, 1(1), 14–30.
- Stout, H. S. (1986). *The New England soul: Preaching and religious culture in colonial New England*. Oxford University Press.
- Teele, A. K. (1887). *The history of Milton, Mass., 1640 to 1877*. Boston: Press of Rockwell and Churchill. Retrieved from <https://archive.org/details/historyofmiltonm00teel/page/n7/mode/2up>
- Tilden, W. S. (1887). *History of the town of Medfield, Massachusetts, 1650-1886: With genealogies of families that held real estate or made any considerable stay in the town during the first two centuries*. Geo. H. Ellis.
- Tracy, C. M. (1878). *Standard history of Essex County, Massachusetts: Embracing a history of the county from its first settlement to the present time, with a history and description of its towns and cities. the most historic county of America*. Boston: C. F. Jewett & Company. Retrieved from <https://play.google.com/store/books/details?id=-dw4QAAMAAJ&pli=1>
- Trewartha, G. T. (1946). Types of rural settlement in colonial america. *Geographical Review*,

- 36(4), 568–596.
- Upham, W. P. (Ed.). (1905). *Records of the First Church in Beverly Massachusetts 1667-1772*. Salem, Massachusetts: The Essex Institute. Retrieved from <https://babel.hathitrust.org/cgi/pt?id=hvd.ah5xmp&view=1up&seq=7>
- Vaughan, A. T. (1965). *New England frontier: Puritans and Indians, 1620-1675*. University of Oklahoma Press.
- Vaughan, A. T. (1972). *The Puritan tradition in America, 1620-1730*. University Press of New England.
- Walker, W. (1893). *The creeds and platforms of congregationalism*. Scribner. Retrieved from <https://play.google.com/store/books/details?id=Vv4QAAAAIAAJ>
- White, J. (1647). *A Way to the Tree of Life: Discovered in sundry directions for the profitable reading of the Scriptures*. Printed by M. F. for R. Royston, at the signe of the Angel in Ivy lane. Retrieved from <https://play.google.com/store/books/details?id=NXtjAAAAcAAJ&rdid=book-NXtjAAAAcAAJ&rdot=1>
- Wigglesworth, M. (1867). *The day of doom: Or, a poetical description of the great and last judgment: With other poems*. American News Company.
- Winsor, J., & Jewett, C. F. (1880). *The memorial history of Boston: Including Suffolk County, Massachusetts. 1630-1880. Ed. by Justin Winsor* (Vol. 1). JR Osgood and Company.
- Wood, J. S. (1997). *The New England village*. Johns Hopkins University Press.
- Woodard, F. M. (1936). *The town proprietors in Vermont: The New England town proprietorship in decline* (Unpublished doctoral dissertation). Columbia University.

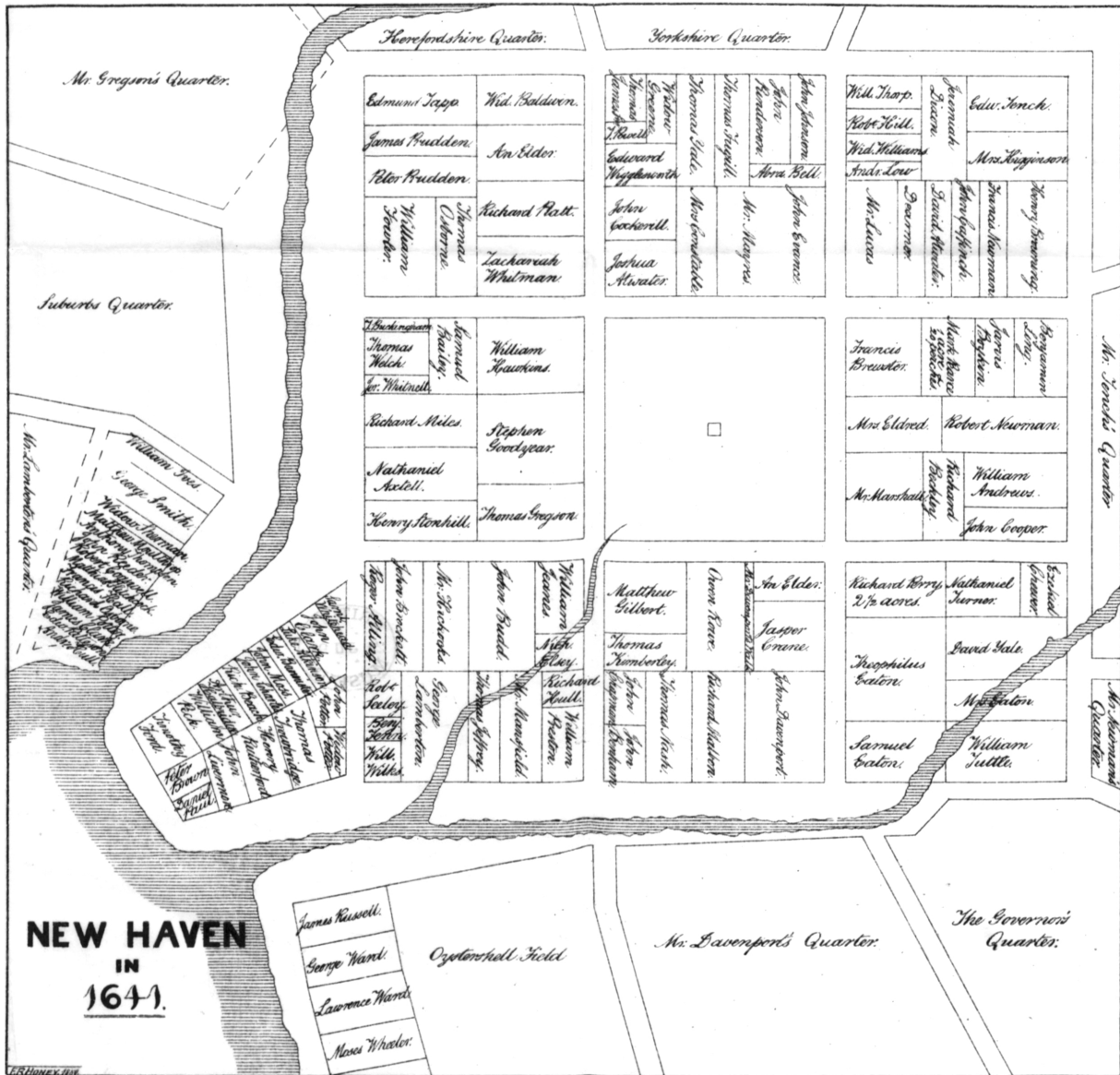


Figure 1: New Haven, Connecticut in 1641 (Atwater, 1881)



Figure 2: Cambridge, Massachusetts in 1635 (*Eleven Little-Known Facts of Cambridge*, n.d.)



Figure 3: Hartford, Connecticut in 1640 (Porter, 1851)

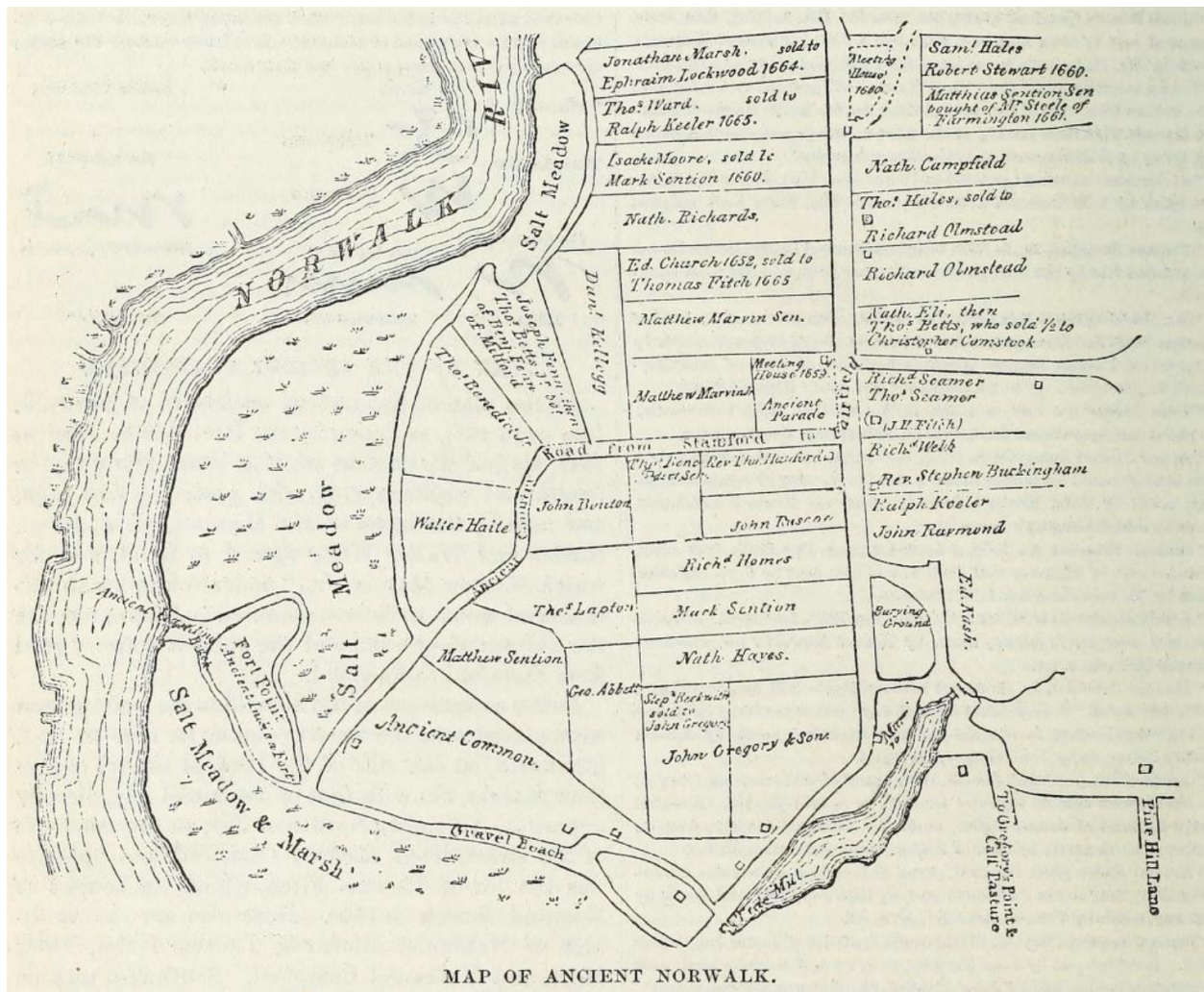


Figure 4: Norwalk, Connecticut (Hurd, 1881, p. 488)

17th Century New England

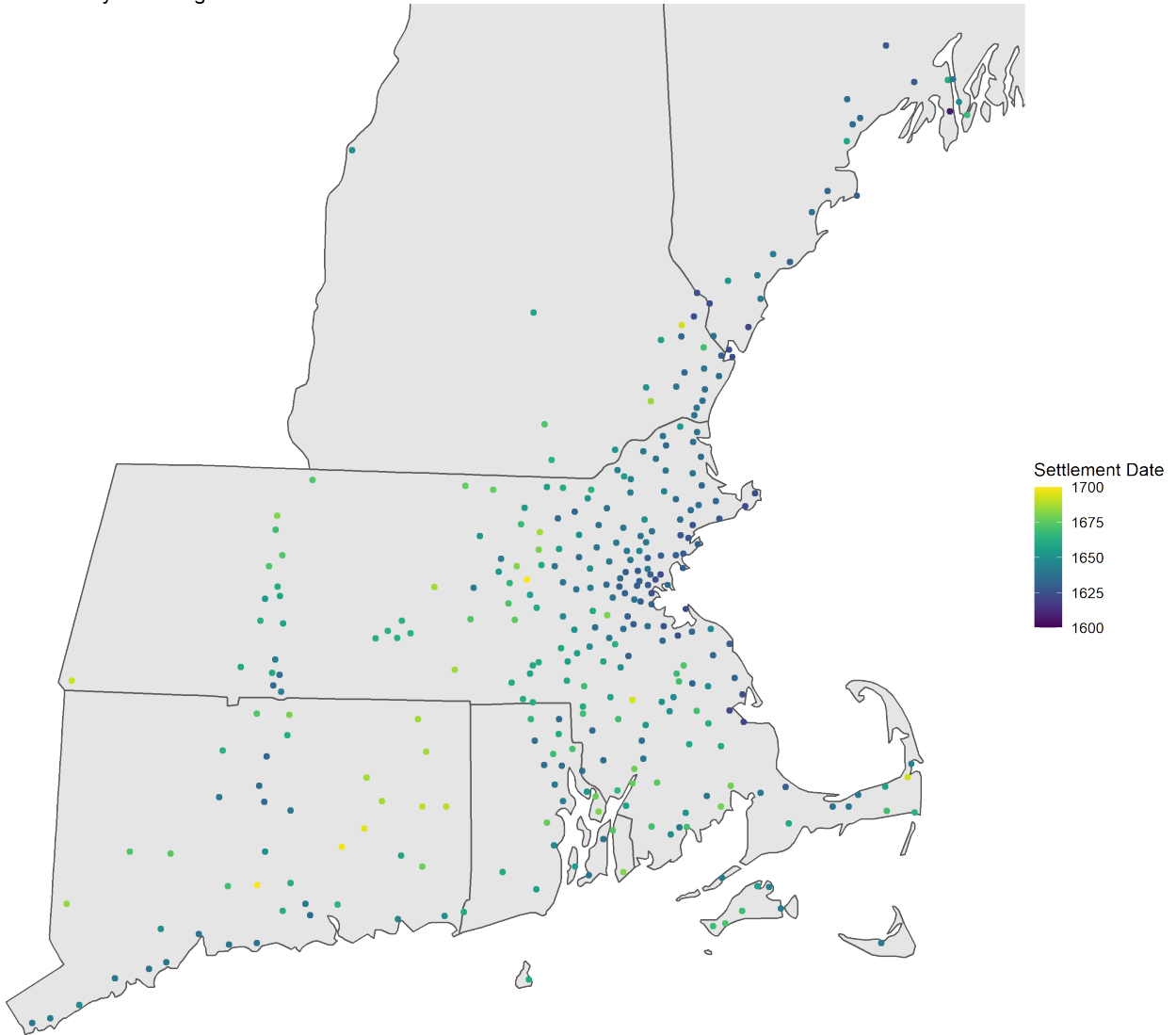


Figure 5: 17th Century New England Towns

1634

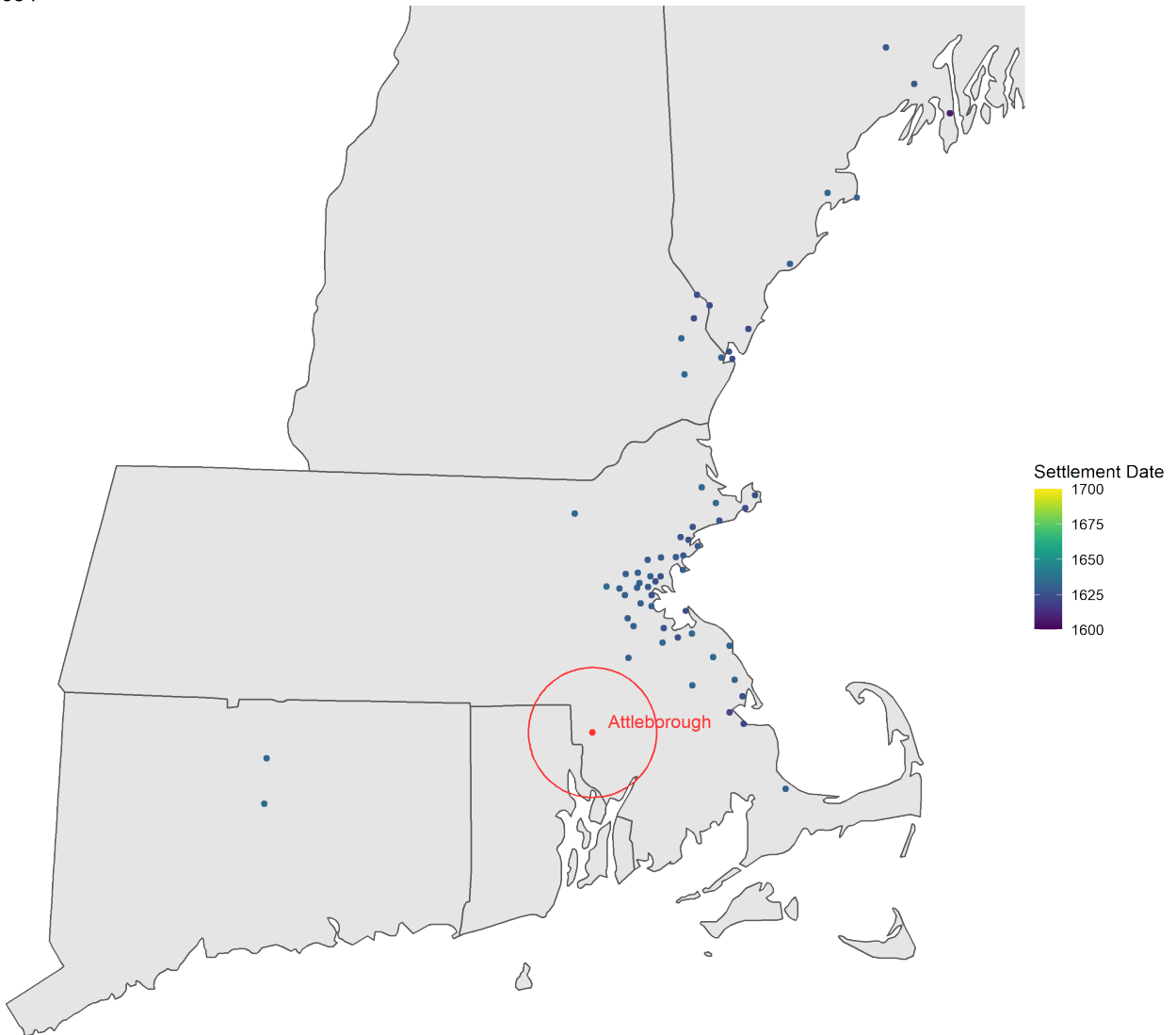


Figure 6: Attleborough | Proximity = 0

1657

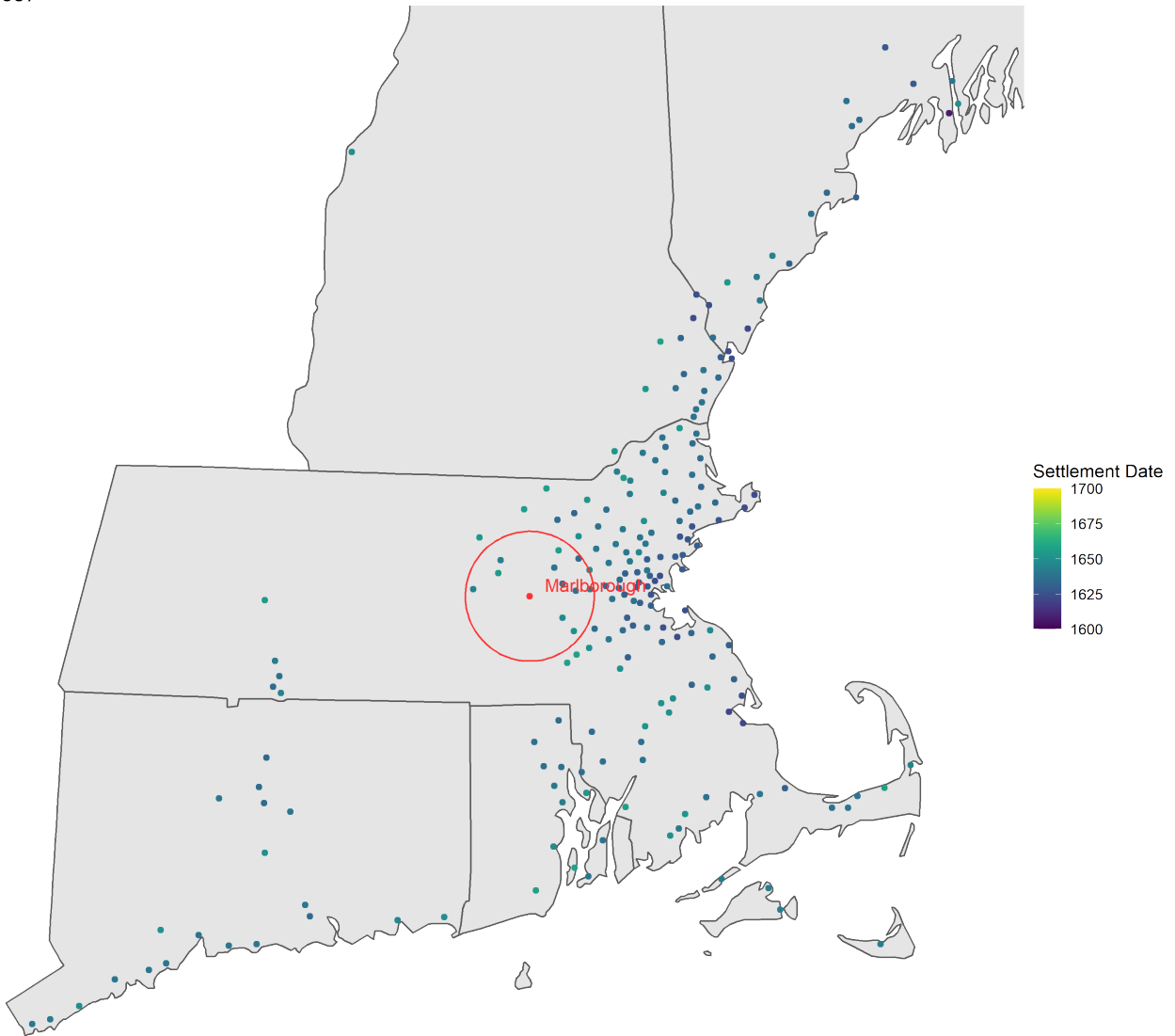


Figure 7: Marlborough | Proximity = 11

1640

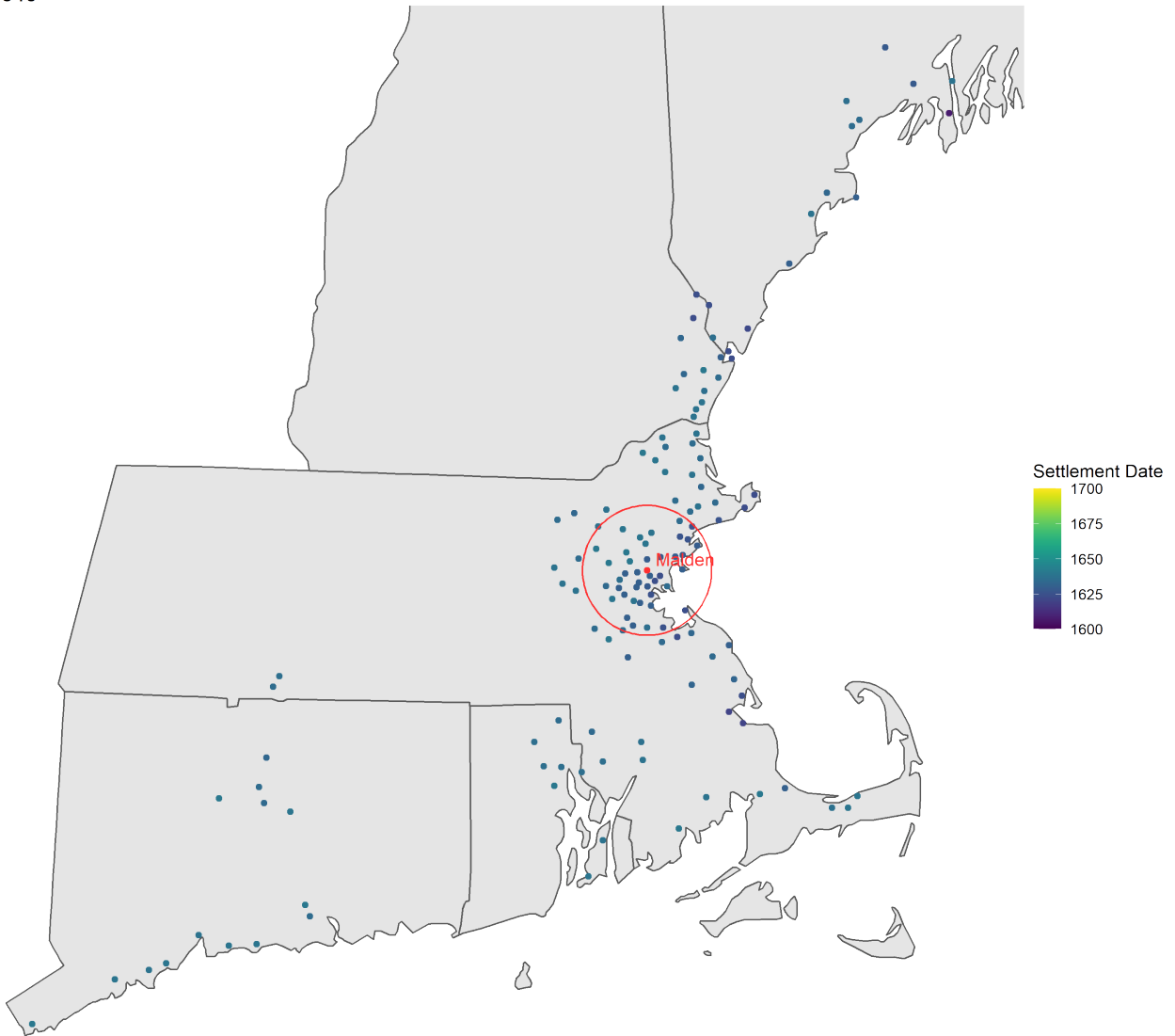


Figure 8: Malden | Proximity = 42

Table 1: Summary Statistics

Variables	(1) Observations	(2) Mean	(3) Standard Deviation	(4) Minimum	(5) Maximum
Settled	327	1650	18.54	1607	1699
Church	282	1705	55.42	1620	1877
Delay	282	54.46	53.37	0	235
Witchcraft Cases	327	0.113	0.317	0	1
House Size	106	19.45	29.65	0.500	208
Proximity	327	9.765	9.328	0	45
Population	134	33.25	21.08	6	128
Town Size	154	62.83	95.38	0.625	900
Population Density	113	1.437	2.138	0.0389	11.70
Maize	327	3,083	703.0	0	5,556
Wheat	327	4,803	974.7	0	6,347
Attend	270	0.456	0.499	0	1

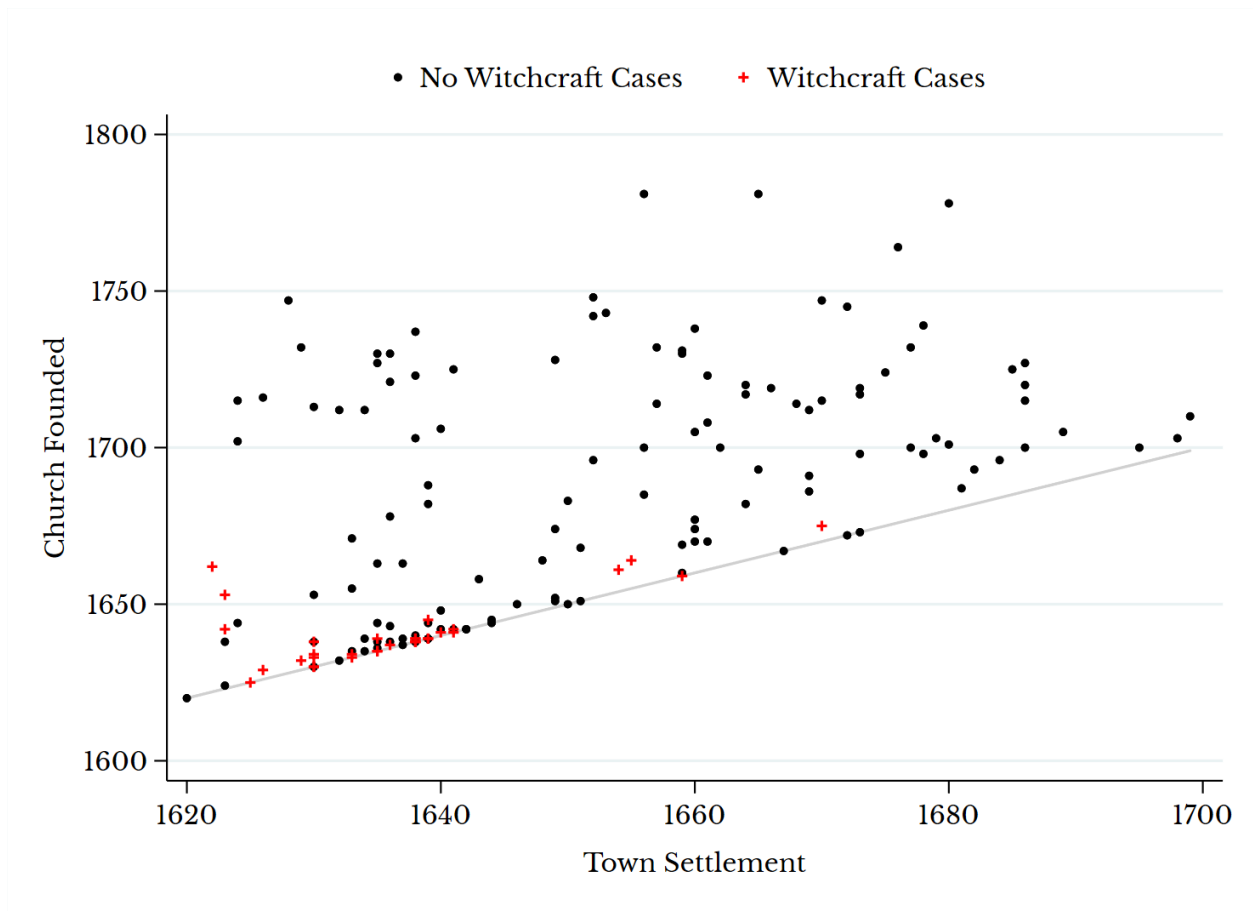


Figure 11: Witchcraft Cases and Delay in Church Organization

Table 2: OLS Results

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Delay	0.732*** (0.142)	0.734*** (0.144)	0.836*** (0.185)	0.820*** (0.168)	0.795*** (0.157)					
Witchcraft Cases						-19.06*** (4.016)	-19.07*** (4.001)	-20.37*** (5.104)	-16.36*** (4.918)	-13.87*** (4.837)
Proximity		0.137 (0.257)	0.253 (0.323)	0.345 (0.338)	0.150 (0.278)		-0.0280 (0.327)	-0.145 (0.339)	-0.0734 (0.383)	-0.390 (0.321)
Population			0.0409 (0.0613)	0.00878 (0.0556)	0.0207 (0.0672)			-0.188* (0.105)	-0.210* (0.123)	-0.186* (0.112)
Population Density			-2.302** (1.024)	-2.064** (0.861)	-2.267** (1.102)			0.897 (0.778)	1.172 (1.052)	0.784 (1.275)
Settled				0.325** (0.162)	0.403** (0.195)				0.253 (0.233)	0.416 (0.297)
Maize					0.00125 (0.00346)					0.00390 (0.00553)
Wheat					0.00327 (0.00405)					0.00485 (0.00578)
Constant	5.069*** (1.487)	4.023 (3.010)	4.138 (3.589)	-532.5* (268.6)	-678.3** (332.1)	23.77*** (3.956)	23.98*** (3.992)	31.94*** (6.579)	-387.3 (384.5)	-688.0 (505.6)
Observations	90	90	79	79	79	91	91	79	79	79
R ²	0.444	0.445	0.467	0.507	0.518	0.081	0.081	0.109	0.130	0.166
Robust standard errors in parentheses.										
* Significant at the 10% level										
** Significant at the 5% level										
*** Significant at the 1% level										

Table 3: Towns with Large House Lots Sizes and Low Proximity

Town	House Lot Size (acres)	Proximity
Attleborough	50	0
Brookfield	20	4
Dunstable	30	8
Lancaster	40	2
Leominster	40	2
Marlborough	23	11
Mendon	25	5
Oxford	75	4
Simsbury	60	3
Rutland	30	6



Figure 12: Population and Town Growth in New England

Notes: Population data was taken from Smith (1972, p. 175) Table 2, Column 2 and Rossiter (1909, p. 9) Table 1. Data from Smith (1972, p. 175) was reported for all New England colonies while data from Rossiter (1909, p. 9) was reported by colony. Using the average of these two estimates, we calculated the decade growth rates in population. We used our collected data to calculate the decade growth rates in towns. The data reflects growth rates from the previous decade. For example, the data for 1660 should be interpreted as the growth rates from 1650-1660.

Appendix A Changing Proximity Radius

For our analysis we use a proximity radius of 13.68 miles, calculated by multiplying the median town radius (3.42 miles) by 4. We create two other measures for proximity using a smaller and larger radius. The smaller proximity multiplies the median town radius by 2 and the larger proximity multiplies the median radius by 6. The summary statistics for these variables is reported in Table 4.

Table 5 and Table 6 rerun the regressions with the small and large proximity variables respectively. The coefficient and significant levels of *Delay* and *Witchcraft Cases* do not change in any statically meaningful way while the proximity variable continues to stay statistically insignificant in all regressions.

Table 4: Summary Statistics with Different Proximity Sizes

Variables	(1) Observations	(2) Mean	(3) Standard Deviation	(4) Minimum	(5) Maximum
Small Proximity (6.84 miles)	327	2.856	3.271	0	18
Medium Proximity (13.68 miles)	327	9.765	9.328	0	45
Large Proximity (20.52 miles)	327	18.90	16.67	0	78

Table 5: OLS Results With Small Proximity

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Delay	0.732*** (0.142)	0.729*** (0.141)	0.816*** (0.175)	0.806*** (0.162)	0.782*** (0.148)					
Witchcraft Cases						-19.06*** (4.016)	-18.72*** (3.953)	-19.60*** (4.930)	-16.31*** (4.888)	-13.80*** (4.972)
Small Proximity		-0.562* (0.305)	-0.403 (0.360)	0.122 (0.360)	-0.233 (0.365)		-0.653 (0.574)	-0.925 (0.583)	-0.595 (0.618)	-1.035 (0.739)
Population			0.0450 (0.0638)	0.0131 (0.0543)	0.0292 (0.0677)			-0.184* (0.0985)	-0.204* (0.116)	-0.182* (0.106)
Population Density			-1.806* (0.908)	-1.728** (0.746)	-2.106** (1.040)			1.166 (0.812)	1.326 (1.073)	0.803 (1.267)
Settled				0.317* (0.160)	0.400** (0.198)				0.225 (0.228)	0.370 (0.291)
Maize					0.00100 (0.00358)					0.00311 (0.00563)
Wheat					0.00419 (0.00447)					0.00503 (0.00621)
Constant	5.069*** (1.487)	6.404*** (1.736)	6.539** (2.677)	-516.8* (262.9)	-674.1** (337.7)	23.77*** (3.956)	25.16*** (4.487)	32.27*** (7.189)	-339.9 (374.6)	-612.0 (496.0)
Observations	90	90	79	79	79	91	91	79	79	79
R^2	0.444	0.448	0.465	0.500	0.517	0.081	0.086	0.118	0.133	0.169
Robust standard errors in parentheses.										
* Significant at the 10% level										
** Significant at the 5% level										
*** Significant at the 1% level										

Table 6: OLS Results With Large Proximity

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Delay	0.732*** (0.142)	0.742*** (0.144)	0.850*** (0.185)	0.830*** (0.170)	0.805*** (0.158)					
Witchcraft Cases						-19.06*** (4.016)	-18.92*** (3.916)	-20.45*** (4.994)	-16.35*** (4.942)	-13.66*** (4.757)
Large Proximity		0.240 (0.176)	0.294 (0.209)	0.272 (0.195)	0.148 (0.162)		0.0777 (0.216)	-0.0135 (0.226)	-0.0220 (0.220)	-0.292 (0.200)
Population			0.0487 (0.0598)	0.0195 (0.0545)	0.0252 (0.0641)			-0.192* (0.104)	-0.212* (0.119)	-0.194* (0.106)
Population Density			-2.490** (0.996)	-2.131** (0.842)	-2.287** (1.083)			0.770 (0.822)	1.132 (1.073)	0.714 (1.258)
Settled				0.302** (0.147)	0.379** (0.184)				0.257 (0.218)	0.462 (0.295)
Maize					0.000959 (0.00344)					0.00446 (0.00526)
Wheat					0.00283 (0.00408)					0.00538 (0.00596)
Constant	5.069*** (1.487)	1.394 (3.548)	1.276 (4.389)	-495.3** (244.0)	-635.8** (313.7)	23.77*** (3.956)	22.61*** (4.051)	31.37*** (6.526)	-394.1 (360.0)	-766.7 (502.2)
Observations	90	90	79	79	79	91	91	79	79	79
R^2	0.444	0.455	0.478	0.513	0.519	0.081	0.082	0.107	0.129	0.169
Robust standard errors in parentheses.										
* Significant at the 10% level										
** Significant at the 5% level										
*** Significant at the 1% level										

Appendix B Robustness Check: Missing Data

To test the robustness of our findings, we fill in missing data for the *Population* and *Town Size* variables. We take the median for each of these variables and replace that value with any observation missing this data. This allows us to calculate *Population Density* ($\frac{Population}{TownSize}$). The median *Population* value is equal to 29.5 and the median *Town Size* is 36.75 square miles. We then calculate the new population density variable with the new data. The new summary statistics for these variables are reported in Table 7.

Table 8 reruns the regressions with the missing data. Our observations increase from a minimum of 79 to 90. The *Delay* and *Witchcraft Cases* coefficients drop slightly in magnitude but stay statistically significant at the 1% level as they did before.

Table 7: Summary Statistics with Missing Data

	(1)	(2)	(3)	(4)	(5)
Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Population	327	31.04	13.59	6	128
Town Size	327	49.03	66.63	0.625	900
Population Density	327	1.077	1.388	0.0389	11.70

Table 8: OLS Results With Missing Data

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Delay	0.732*** (0.142)	0.734*** (0.144)	0.783*** (0.165)	0.757*** (0.150)	0.742*** (0.142)					
Witchcraft Cases						-19.06*** (4.016)	-19.07*** (4.001)	-18.10*** (4.361)	-13.40*** (4.068)	-11.93*** (4.174)
Proximity		0.137 (0.257)	0.307 (0.310)	0.345 (0.304)	0.173 (0.236)		-0.0280 (0.327)	-0.0565 (0.333)	-0.0111 (0.348)	-0.196 (0.296)
Population			0.0376 (0.0507)	0.0155 (0.0466)	0.0261 (0.0625)			-0.190** (0.0932)	-0.208* (0.107)	-0.204** (0.0997)
Population Density			-1.911** (0.950)	-1.704* (0.861)	-1.791* (1.049)			1.206 (0.779)	1.455 (1.069)	1.419 (1.189)
Settled				0.322** (0.140)	0.403** (0.180)				0.317 (0.203)	0.429 (0.270)
Maize					0.00230 (0.00311)					0.00510 (0.00547)
Wheat					0.00227 (0.00361)					0.00133 (0.00505)
Constant	5.069*** (1.487)	4.023 (3.010)	3.270 (3.402)	-526.4** (231.3)	-676.9** (308.0)	23.77*** (3.956)	23.98*** (3.992)	28.93*** (5.637)	-495.7 (333.6)	-700.5 (458.9)
Observations	90	90	90	90	90	91	91	91	91	91
R ²	0.444	0.445	0.460	0.503	0.513	0.081	0.081	0.102	0.139	0.158
Robust standard errors in parentheses.										
* Significant at the 10% level										
** Significant at the 5% level										
*** Significant at the 1% level										

Appendix C Robustness Check: Outlier Identification

We use three metrics to identify possible outliers in the data: studentized residuals, cook's distance, and Welsch distance. To identify outliers we compare the studentized residual to the t-distribution (Bollen & Jackman, 1985). With 79 observations, any t-statistic greater than 2.6409 is significant on the 1% level and signifies an outlier. Any Cook's distance greater than $\frac{4}{n}$ signifies an outlier (Bollen & Jackman, 1985) which in our case would be $\frac{4}{n} = \frac{4}{79} = 0.0506$. Any Welsch distance greater than $3\sqrt{k}$ signifies an outlier (Chatterjee & Hadi, 1986, p. 384). The threshold for this data set is then $3\sqrt{k} = 3\sqrt{7} = 7.9372$. Table 9 reports these three metrics for each town using the regression in Column (5) of Table 2. Table 10 does the same for the regression in Column (10) of Table 2.

Tables 9 and 10 identify the towns of Acushnet, Attleborough, Bristol, Brunswick, Freetown, Kingston, and Medfield as potential outliers in the data set. Table 11 reruns the regressions from Table 2 without these outliers. After we rerun our regressions without these seven towns, we find the coefficients on *Delay* and *Witchcraft Cases* to decrease in magnitude but stay statistically significant on the 1% and 5% levels respectively.

Table 9: Identifying Outliers in Regression Column (5) of Table 2

Town	Studentized Residual (r_i)	Cook's Distance (D_i)	Welsch Distance (W_i)	Town	Studentized Residual (r_i)	Cook's Distance (D_i)	Welsch Distance (W_i)
Acushnet	2.89329000	0.06077960	6.67443500	Milford	0.42346650	0.00239880	1.27908900
Andover	-0.04106550	0.00001190	-0.08790640	Milton	0.07797890	0.00011540	0.28571720
Attleborough	-0.99051660	0.07841080	-8.95440200	Nantucket	-0.88807310	0.01301470	-3.02700300
Barnstable	0.18748620	0.00033150	0.46821270	New London	0.28371170	0.00062450	0.63893690
Billerica	-0.07872880	0.00003210	-0.14347010	Newbury	0.19865030	0.00035430	0.48326370
Bridgewater	-0.16870950	0.00025810	-0.41259920	Newport	-0.00440200	0.00000019	-0.01132180
Bristol	-0.18625190	0.00332610	-1.89640400	Northampton	-0.23447020	0.00037890	-0.49597700
Brookfield	-1.32431400	0.01728060	-3.43011500	Northfield	-0.91346430	0.00565930	-1.92715300
Brunswick	0.15113740	0.00102680	0.92519970	Norwich	0.00432720	0.00000011	0.00858250
Cambridge	-0.13028380	0.00020800	-0.37464000	Oxford	1.53970400	0.02155400	3.83741900
Chelsea	0.00882870	0.00000453	0.06375060	Plainfield	0.99575730	0.01210860	2.87972900
Dedham	-0.03413460	0.00001240	-0.09095560	Portsmouth	0.08821940	0.00008810	0.24300730
Deerfield	-0.75440790	0.00349540	-1.50789000	Rehoboth	-0.06719070	0.00004800	-0.17882340
Dorchester	-0.18169330	0.00043310	-0.54236160	Rochester	-1.72878300	0.04303810	-5.55675800
Dunstable	-0.29075370	0.00056700	-0.60640420	Rowley	-0.16725700	0.00023790	-0.39523990
Durham	-1.06277300	0.01569740	-3.30243600	Roxbury	0.30016770	0.00135580	0.96667450
East Greenwich	-0.78621840	0.01141860	-2.85106200	Rutland	-0.76678870	0.00789200	-2.32781200
Edgartown	0.15752530	0.00024240	0.40081610	Salisbury	-0.00171030	0.00000002	-0.00378160
Enfield	-0.77880080	0.00644710	-2.08303300	Scituate	0.31704350	0.00145500	0.99947010
Exeter	-0.07700720	0.00003280	-0.14506020	Simsbury	1.84165000	0.01893660	3.57469400
Fairfield	0.28984740	0.00085200	0.75287390	Springfield	0.41892190	0.00257560	1.33148000
Falmouth	-0.66661400	0.00245080	-1.25847100	Stamford	0.24895010	0.00050980	0.57818700
Freetown	9.44493100	0.63620600	31.68728000	Stonington	-0.30339930	0.00065250	-0.65149160
Gloucester	-0.06786420	0.00011280	-0.28769640	Stow	0.38100690	0.00178930	1.10023700
Groton	-0.01587740	0.00000109	-0.02636270	Stratford	0.31910340	0.00102430	0.82537980
Haddam	-1.50175800	0.01608480	-3.28747200	Sudbury	-0.03550940	0.00001380	-0.09593710
Hadley	0.16082210	0.00017500	0.33679290	Suffield	0.91195350	0.00954310	2.54653100
Hampton	0.25900810	0.00042990	0.52738330	Swansea	-0.42932700	0.00196580	-1.14667500
Hatfield	-0.20753610	0.00029560	-0.43796250	Taunton	-0.10954300	0.00017600	-0.34758380
Haverhill	-0.29539590	0.00053640	-0.58857980	Wallingford	-0.39522920	0.00131980	-0.93171630
Hingham	0.04839040	0.00001340	0.09280630	Wareham	-0.47497640	0.00383780	-1.63936900
Kingston	-1.74483200	0.05578870	-6.41997600	Warwick	-0.05425600	0.00002320	-0.12317670
Lancaster	0.43025100	0.00169590	1.05920200	Watertown	0.12479260	0.00013590	0.29902150
Lebanon	1.07934500	0.01537420	3.26087500	Wenham	-0.23865620	0.00044120	-0.53692330
Malden	-0.12419550	0.00081100	-0.84025330	Westfield	-0.73313160	0.00432220	-1.68841800
Manchester	0.25128590	0.00544120	2.37272000	Wethersfield	0.33912630	0.00158640	1.04121100
Marion	-0.97423490	0.01226980	-2.90543400	Windsor	0.54851660	0.00840900	2.51908700
Medfield	-0.16508140	0.00147860	-1.14001300	Woodbury	-0.32244250	0.00101950	-0.82268300
Medford	-0.72252340	0.01431840	-3.28765600	Worcester	-0.99225440	0.00898350	-2.45223800
Mendon	0.57902990	0.00157370	1.00447500				

Observations with studentized residuals greater than 2.6409 (1% significance level) in magnitude are in bold.

Observations with Cook's distance greater than $0.0506 \left(\frac{4}{n}\right)$ are in bold.

Observations with Welsch Distance greater than $7.9372 \left(3\sqrt{k}\right)$ in magnitude are in bold.

Table 10: Identifying Outliers in Regression Column (10) of Table 2

Town	Studentized Residual (r_i)	Cook's Distance (D_i)	Welsch Distance (W_i)	Town	Studentized Residual (r_i)	Cook's Distance (D_i)	Welsch Distance (W_i)
Acushnet	2.54645000	0.04571400	5.70928200	Milford	-0.03979430	0.00002620	-0.13491380
Andover	-0.17684640	0.00036480	-0.49515250	Milton	0.58206210	0.00603990	2.06429600
Attleborough	1.02723500	0.06244160	7.58074500	Nantucket	0.58635320	0.00316800	1.44968200
Barnstable	-0.65679380	0.00384150	-1.59559600	New London	-0.31355100	0.00089380	-0.76824620
Billerica	-0.36231780	0.00083550	-0.73543810	Newbury	-0.04942590	0.00002750	-0.13567220
Bridgewater	-0.70134160	0.00422280	-1.67169600	Newport	-0.43035760	0.00246630	-1.29674700
Bristol	-1.18002700	0.12247410	-11.45501000	Northampton	-0.11940150	0.00016400	-0.33177720
Brookfield	-0.13625230	0.00012750	-0.28764010	Northfield	-0.70086220	0.00346080	-1.50466700
Brunswick	2.74787600	0.05707410	6.43968200	Norwich	-0.48804290	0.00156700	-1.00879200
Cambridge	-0.19686180	0.00060780	-0.64838270	Oxford	1.59226400	0.02107960	3.78831100
Chelsea	0.79693930	0.03414750	5.50179400	Plainfield	0.81868640	0.00821060	2.36581900
Dedham	-0.33532080	0.00144090	-0.98882200	Portsmouth	-0.38461830	0.00212460	-1.20769100
Deerfield	-0.66068360	0.00285910	-1.36452500	Rehoboth	-0.38831750	0.00180930	-1.10510800
Dorchester	-0.06658840	0.00007310	-0.22542870	Rochester	-0.24513110	0.00061180	-0.63795020
Dunstable	-0.01714150	0.00000197	-0.03576200	Rowley	0.13882740	0.00023540	0.39853360
Durham	-1.10656900	0.01658910	-3.39313900	Roxbury	-0.22657110	0.00083830	-0.76331790
East Greenwich	-1.10011000	0.02097450	-3.86681300	Rutland	0.19051240	0.00039740	0.51553240
Edgartown	-0.68147220	0.00411540	-1.65164600	Salisbury	-0.35214070	0.00115330	-0.87350900
Enfield	-0.34727210	0.00126340	-0.91818450	Scituate	-0.41633270	0.00277280	-1.38794300
Exeter	-0.47655400	0.00168220	-1.04839700	Simsbury	1.16120700	0.00857430	2.37728000
Fairfield	0.06820110	0.00005740	0.19689630	Springfield	0.06291900	0.00006510	0.21272340
Falmouth	-0.92651700	0.00457960	-1.72437600	Stamford	0.12225640	0.00016070	0.32751210
Freetown	8.33112300	0.33300900	20.94654000	Stonington	-0.06264970	0.00003270	-0.14648090
Gloucester	0.29180070	0.00247920	1.37049400	Stow	0.55238440	0.00369430	1.58164700
Groton	0.22787190	0.00056380	0.61388960	Stratford	0.28491320	0.00101720	0.82975670
Haddam	-0.67194260	0.00303410	-1.40671200	Sudbury	-0.68403300	0.00500570	-1.83397900
Hadley	0.07517900	0.00006810	0.21411520	Suffield	0.83892610	0.00820130	2.35995500
Hampton	0.34727760	0.00121480	0.89903010	Swansea	-1.10255500	0.00964310	-2.53371700
Hatfield	-0.55054500	0.00225110	-1.21356100	Taunton	-0.89205950	0.01110670	-2.77129400
Haverhill	-0.37443440	0.00141150	-0.96918890	Wallingford	-0.23371130	0.00088230	-0.78263700
Hingham	-0.51380740	0.00183100	-1.09216200	Wareham	0.53573810	0.00394430	1.64369200
Kingston	-0.75558330	0.01014870	-2.68034600	Warwick	-0.84219960	0.00503980	-1.81913300
Lancaster	0.12327620	0.00018130	0.34941330	Watertown	0.07305660	0.00006350	0.20666580
Lebanon	0.38306000	0.00183710	1.11563900	Wenham	-0.74341760	0.00482880	-1.78944900
Malden	-0.07127870	0.00027480	-0.49107440	Westfield	-0.78519370	0.00560160	-1.93076300
Manchester	0.74582980	0.04638450	6.91596900	Wethersfield	-0.35376960	0.00216200	-1.23057100
Marion	-0.85842450	0.00952660	-2.55594500	Windsor	0.80640380	0.01961040	3.88584700
Medfield	-1.16701200	0.06742270	-7.68887900	Woodbury	-0.92858310	0.00731000	-2.20471500
Medford	1.16170000	0.01734680	3.46435700	Worcester	0.05696820	0.00002050	0.11513930
Mendon	0.27608920	0.00044160	0.53332940				

Observations with studentized residuals greater than 2.6409 (1% significance level) in magnitude are in bold.

Observations with Cook's distance greater than $0.0506 \left(\frac{4}{n}\right)$ are in bold.

Observations with Welsch Distance greater than $7.9372 \left(3\sqrt{k}\right)$ in magnitude are in bold.

Table 11: OLS Results Without Outliers

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Delay	0.532*** (0.0515)	0.532*** (0.0514)	0.601*** (0.0903)	0.546*** (0.0766)	0.556*** (0.0762)	-13.78*** (2.582)	-13.78*** (2.598)	-13.17*** (3.241)	-8.085*** (2.885)	-8.041** (3.200)
Witchcraft Cases										
Proximity		0.0335 (0.124)	0.0178 (0.134)	0.134 (0.118)	0.115 (0.129)		0.00100 (0.223)	-0.180 (0.222)	-0.0334 (0.230)	-0.0842 (0.259)
Population			0.0370 (0.0576)	7.78e-05 (0.0512)	-0.00952 (0.0586)			-0.127 (0.0858)	-0.150* (0.0834)	-0.150 (0.0901)
Population Density			-1.158 (0.773)	-0.464 (0.800)	-0.403 (0.794)			1.913** (0.760)	2.547** (0.977)	2.552** (0.998)
Settled				0.271** (0.112)	0.301** (0.115)				0.314** (0.143)	0.348** (0.163)
Maize					0.00517 (0.00415)					0.00290 (0.00516)
wheat					-0.00207 (0.00257)					-0.000344 (0.00348)
Constant	6.071*** (1.224)	5.829*** (1.746)	5.842*** (2.168)	-440.7** (184.0)	-495.7** (189.7)	18.49*** (2.486)	18.48*** (2.967)	22.19*** (4.724)	-498.1** (235.1)	-561.7** (274.1)
Observations	83	83	72	72	72	84	84	72	72	72
R ²	0.504	0.504	0.494	0.566	0.577	0.123	0.123	0.197	0.281	0.287
Robust standard errors in parentheses.										
* Significant at the 10% level										
** Significant at the 5% level										
*** Significant at the 1% level										

Appendix D Robustness Check: Dummy Variable for Delay

We change the *Delay* variable from a continuous to a dummy variable. We construct three different dummy variables for delay in church organization. The first *Delay Dummy 1* classifies any town not organizing their church within a year as having a delay in church organization (*Delay Dummy 1* = 1). *Delay Dummy 5* and *Delay Dummy 10* classifies any town with a delay in church organization equal to or longer than 5 or 10 years respectively as having a delay. Table 12 reports the summary statistics for these new variables with the full data set and Table 13 reports the summary statistics for the observations that did not attend another church before organizing their own (*Attend* = 0). Table 14 reports the results. All the coefficients for delay stay statistically significant on the 1% level and increase in magnitude.

Table 12: Summary Statistics for Dummy Delay Variables

	(1)	(2)	(3)	(4)	(5)
Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Delay Dummy 1	327	0.930	0.256	0	1
Delay Dummy 5	327	0.826	0.380	0	1
Delay Dummy 10	327	0.774	0.419	0	1

Table 13: Summary Statistics for Dummy Delay Variables and Observations with Attend=0

	(1)	(2)	(3)	(4)	(5)
Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Delay Dummy 1	204	0.887	0.317	0	1
Delay Dummy 5	204	0.730	0.445	0	1
Delay Dummy 10	204	0.657	0.476	0	1

Table 14: OLS Results with Delay Dummy Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS	HS
Delay Dummy 1	18.28*** (3.814)	18.29*** (3.799)	19.53*** (4.715)	15.89*** (4.442)	17.59*** (5.179)										
Delay Dummy 5						22.98*** (4.647)	23.00*** (4.628)	23.83*** (5.436)	21.00*** (5.444)	20.94*** (5.266)					
Delay Dummy 10											24.91*** (5.213)	24.91*** (5.257)	26.04*** (6.326)	24.03*** (6.303)	23.33*** (6.127)
Proximity		-0.0231 (0.334)	-0.156 (0.351)	-0.0667 (0.389)	-0.493 (0.329)		-0.0477 (0.325)	-0.132 (0.350)	-0.0859 (0.385)	-0.439 (0.308)		0.0127 (0.328)	-0.0377 (0.343)	-0.0122 (0.371)	-0.362 (0.286)
Population			-0.183* (0.107)	-0.209* (0.120)	-0.162 (0.109)			-0.122 (0.0995)	-0.144 (0.115)	-0.122 (0.106)			-0.164* (0.0968)	-0.176 (0.109)	-0.148 (0.103)
Population Density			0.988 (0.800)	1.264 (1.101)	0.433 (1.412)			0.372 (0.951)	0.608 (1.126)	0.119 (1.347)			0.298 (0.844)	0.461 (1.003)	-0.0485 (1.256)
Settled				0.303 (0.226)	0.467* (0.273)				0.167 (0.232)	0.330 (0.285)				0.117 (0.231)	0.278 (0.281)
Maize					0.00230 (0.00531)					0.00558 (0.00392)					0.00387 (0.00387)
Wheat					0.00789 (0.00577)					0.00474 (0.00534)					0.00549 (0.00529)
Constant	4.491*** (0.568)	4.651* (2.383)	10.96*** (3.236)	-486.2 (371.7)	-798.5* (464.6)	4.813*** (0.426)	5.146** (2.302)	10.07*** (3.334)	-263.0 (381.7)	-569.6 (482.1)	5.540*** (0.971)	5.447** (2.649)	11.54*** (3.333)	-181.3 (378.8)	-480.4 (474.9)
Observations	91	91	79	79	79	91	91	79	79	79	91	91	79	79	79
R ²	0.065	0.065	0.091	0.124	0.182	0.147	0.147	0.160	0.169	0.218	0.182	0.182	0.197	0.201	0.244
Robust standard errors in parentheses.															
* Significant at the 10% level															
** Significant at the 5% level															
*** Significant at the 1% level															

Appendix E Relations with Indigenous People in Virginia

If the Puritan settlers were concerned with attacks by the indigenous tribes already residing on the land, then they may have chosen to settle in compact arrangements to better defend themselves against such threats. Although this may be an effective tactic in defense, we argue this cannot explain the variability in compactness between the colonies because indigenous tribes were just as, if not more, threatening in Colonial Virginia than in the New England colonies.

In the Virginia Company of London's settlement in colonial Virginia, land was privately granted for ownership in 1619; one hundred acres for every share of £12 10s or to original settlers and fifty acres for every person brought to the colony or migrating person coming over on their own expense (Hughes, 1979, p. 4).⁴¹ This type of land granting in colonial America was commonly associated with the term 'headrights.'⁴² The minimum lot size settled on was 50 acres, but larger lots were available in increments of 50 acres depending on the headrights and stock owned by the settler. This led to a more sparsely inhabited colony.⁴³ The absence of a strong incentive to enforce religious norms lead to a less compact settlement layout than the ones commonly found in New England.

The Englishmen who founded the London Company in Virginia were well aware and concerned of the potential assault from indigenous tribes in the New World (Sheehan, 1980, p. 144). There had already been some literature accounting the dangers of Natives which suggested colonists "to be alert to any hostile activity" (Sheehan, 1980, p. 146). This implies that settlement layouts should have reflected these concerns.

These concerns were well justified. As early as April 26th, 1607, a group of settlers were attacked on the shore of the Chesapeake Bay followed by another attack on May 26th (Sheehan, 1980, p. 152). Capturing and killing was common practice until 1614 when some peace was agreed upon (Sheehan, 1980, p. 152). Although this peace lasted for eight years, the settlers never let down their guard and continued to view the native people as "savages" (Sheehan, 1980, pp. 144-145). Trust was never gained as the indigenous people frequently stole artifacts from the colonists (Sheehan, 1980, pp. 150-151). The built up hostility eventually led to one of the most deadly attacks in the history of Colonial America: the Jamestown Massacre.⁴⁴ The Powhatan tribe, under the leadership of Chief Opechancanough, attacked the Jamestown settlement in 1622:

⁴¹Kain & Baigent (1992, p. 269) review this granting process citing the original 1618 charter.

⁴²See Nugent (1963, pp. xxiv-xxvi) for a more detailed description of headright grants in Virginia during this time. See also Andrews (1934, pp. 123-133) for one of best accounts of the patenting and granting of land in these years of the Virginia Company.

⁴³Of course with threats from attacks by indigenous tribes and gains from specialization, costs would rise as individuals searched for land far outside the closest town. To lower the costs of accessing the local market, individuals in Virginia mainly settled on waterways along the Chesapeake Bay (Hughes, 1979, p. 40).

⁴⁴See Cave (2011, Chapter 6) and Gleach (1997, Chapter 6) for more detailed accounts of the attack.

Presents of food had been taken the previous evening, and on that morning some joined the colonists in their breakfasts, and worked alongside them in the fields. Having entered the settlements unarmed, when the time came they picked up the colonists' tools and weapons and killed them all, men, women, and children, old and young alike... (Gleach, 1997, p. 149)

The English suffered 347 deaths (Gleach, 1997, p. 149) which was approximately a quarter of the settlement's population (Sheehan, 1980, pp. 169-170). Sheehan (1980, p. 172) notes a view held that the attack may have been less deadly if the Virginia settlement was less dispersed. But even after this attack, which would stay vivid in the minds for the English for the rest of their tenure in the New World, settlement density would prove to be of minimal or no concern.

Attacks would continue to take place in Virginia through the rest of the 17th century instilling pervasive fear in the colonists (Cave, 2011, p. 130). Another attack wiping out a trade party occurred shortly after in 1624 (Cave, 2011, p. 124). Until some peace was reached in 1632, the English and Natives were practically at war with each other (Cave, 2011, p. 131). But even after the settled peace, the Powhatan would strike again in 1644.⁴⁵ There were likely 400 casualties in this attack, but it was less significant than the one in 1622 because the population in Virginia was much larger (Gleach, 1997, p. 175). In 1670 there were rumors spreading around the colony of an "Indian uprising" (Cave, 2011, p. 144) and in 1676 there was an attack by the Susquehannock tribe on settlements in the Rappahannock killing 36 colonists (Cave, 2011, p. 150).

Throughout the 17th century "vehement hatred and fear of Indians" (Cave, 2011, p. 168) persisted among the settlers as evidenced by the colonists writings back to England (Sheehan, 1980, p. 147). After the initial attacks in Virginia the colonists "always expected treachery and violence from the Indians" (Sheehan, 1980, p. 175). If these colonists shared the same concern for indigenous peoples' attacks as the Puritans in New England, then why did they not too settle in compact towns for defense? Trewartha (1946) also makes this point as he lists other colonies who also shared hostile neighbors but had dispersed settlements,

...there were parts of colonial America where hostile natives made life and property insecure in which settlement was in large part by individuals on separate farms. This was the case in New Netherland, New Sweden, the Mohawk country, South Carolina, and Georgia. By itself the Indian menace does not seem to have been powerful enough to prevent dispersed settlement... It was something more than defense that seventeenth-century New Englanders had in mind as they dotted the wilderness with compact communities. (p. 575)

The Virginians had similar threats from hostile Natives as settlers in New England, yet they continued to settle on their large lots of land distant from one another.

⁴⁵See Gleach (1997) Chapter 8 for more details on the 1644 attack and Gleach (1997) Chapter 9 for a survey of the threatening indigenous enemies to the English in the middle of the 17th century.

Finally, it is worth noting that relations with indigenous tribes were at times less hostile in New England than in Virginia. In New England, it was required of settlers to first purchase lands rights from indigenous tribes who either owned the land or used it as hunting grounds. The Colonial courts would only accept sign off on a land grant after this was done. Bremer (1995, pp. 33-34) chronicles a peace treaty between natives and the Plymouth Colony that account for more than half a century of peace. During these times, the indigenous tribes showed the colonists how to succeed agriculturally on the new land. J. Demos (1970) accounts the same relations during the initial settlement in New England, “For forty years the two peoples lived alongside one another in a state of peace, and even of amity” (p. 15).⁴⁶ Other historians have shown skepticism of the importance of defense in the structuring of New England plantations (Wood, 1997, p. 39). But overall we cannot conclude that the threat of indigenous peoples’ attacks was at all greater in the New England colonies than in Virginia. Therefore, this cannot adequately explain the variance in compactness between the colonies in the seventeenth century.

Appendix F Libecap et al. (2011) Model Predictions

Libecap et al. (2011) focus on four: terrain ruggedness (T_i), soil quality (S_i), size of area governed (A_i), and year of initial settlement (D_i). Equation 8 in Libecap et al. (2011, p. 319) regresses these variables on a dummy variable (Y_i) where $Y_i = 1$ implies a centralized MIX system and $Y_i = 0$ a decentralized MB system. Libecap et al. (2011, p. 320) runs this regression and report the results in their Table 4. The first column of table uses the centralization dummy variable as the dependent variable. In this model, Libecap et al. (2011) omitted MIX systems in New England and Canada since parts of the colonies fell under a centralized MIX system and other parts operated under a decentralized MB system. The only statistically significant dependent variable is year of settlement, where having a later year increases the probability of having a centralized system. Therefore, we should expect colonies who had earlier dates of initial settlement to use a decentralized system and colonies settled in later years to use a centralized system.

What system does this data predict for the New England colonies? Of the 32 observations, the five New England colonies are within the first seven settled colonies. Given the only significant variable being initial year of settlement and early settlement dates of the New England colonies, we would expect them to adopt a MB system. Table 15 list each American colony in the 32 observation dataset with their initial year of settlement. The New England colonies are highlighted in blue. To see what land demarcation institutions Libecap et al.’s (2011) data would predict, we calculate the predicted values for each colony. However, we cannot use Libecap et al.’s (2011, p. 319) Equation 8 since it is a linear probability model that will return negative

⁴⁶J. Demos (1970, p. 15) goes on to discuss how this peace broke down as the increasing levels immigration after 1660 caused towns to further sprawl into the territory of the natives. However, prior to this when Puritans were establishing their towns and surveying and distributing land after settlement, the relationship was primarily one of peace.

fitted values. Instead we use the following logistic regression with the same independent and dependent variables:

$$Y_i = \frac{e^{\mu + \alpha T_i + \beta S_i + \delta A_i + \theta D_i}}{1 + e^{\mu + \alpha T_i + \beta S_i + \delta A_i + \theta D_i}}. \quad (2)$$

The fitted values from this model are shown in the far right column of Table 15. Since the fitted values are almost zero for every New England colony, they are predicted to have most likely used a decentralized (MB) system. However, as shown in the table's third column, each of these colonies used a MIX or centralized system. This distinguishes New England from all other American colonies.

Table 15: Predicted Demarcation System for Each American Colony

Country	Year ↑	System	Predicted Values (MB = 0; MIX = 1)
Virginia	1607	MB	0.00005
Maine	1622	MIX	0.00009
New Hampshire	1623	MIX	0.00010
Massachusetts	1620	MIX	0.00011
Connecticut	1633	MIX	0.00017
Maryland	1632	MB	0.00021
Rhode Island	1636	MIX	0.00028
New Jersey	1664	MB	0.00068
South Carolina	1663	MB	0.00082
North Carolina	1663	MB	0.00084
New York	1664	MB	0.00105
Delaware	1664	MB	0.00106
Pennsylvania	1681	MB	0.00246
Georgia	1733	MB	0.03029