

Ordeals*

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Abstract

I argue that medieval judicial ordeals accurately assigned accused criminals' guilt and innocence. They did this by leveraging a medieval superstition called *iudicium Dei*. According to this superstition, God condemned the guilty and exonerated the innocent through clergy conducted physical tests. Medieval citizens' belief in *iudicium Dei* created a separating equilibrium in which only innocent defendants were willing to undergo ordeals. Conditional on observing a defendant's willingness to do so, the administering priest knew he was innocent and manipulated the ordeal to find this. My theory explains the peculiar puzzle of ordeals: trials of fire and water that should've condemned most persons who underwent them did the reverse. They exonerated these persons instead. Boiling water rarely boiled persons who plunged their arms in it. Red-hot iron rarely burned persons who carried it. Ordeal outcomes were indeed miraculous. But they were "miracles" of mechanism design.

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“It is a fearful thing to fall into the hands of the living God.”

—*Hebrews 10:31*

1 Introduction

For 400 years the most sophisticated persons in Europe decided difficult criminal cases by asking the defendant to thrust his arm into a cauldron of boiling water and fish out a ring. If his arm was unharmed, he was exonerated. If not, he was convicted. Alternatively, a priest dunked the defendant in a pool. Sinking proved his innocence. Floating proved his guilt. People called these trials ordeals.¹

No one alive today believes ordeals were a good way to decide defendants’ guilt. But maybe they should. This paper argues that ordeals accurately assigned accused criminals’ guilt and innocence. They did this by leveraging a medieval superstition called *iudicium Dei*. According to this superstition, God condemned the guilty and exonerated the innocent through clergy conducted physical tests.²

Medieval citizens’ belief in *iudicium Dei* created a separating equilibrium. Guilty defendants expected ordeals to convict them. Innocent defendants expected the reverse. Thus only innocent defendants were willing to undergo ordeals. Conditional on observing a defendant’s willingness to do so, the administering priest knew he was innocent and manipulated the ordeal to find this.

My theory explains the peculiar puzzle of ordeals: trials of fire and water that should’ve condemned most persons who underwent them did the reverse. They exonerated these persons instead. Boiling water rarely boiled persons who plunged their arms in it. Red-hot iron rarely burned persons who carried it. Ordeal outcomes were indeed miraculous. But they were “miracles” of mechanism design.

It’s easy to dismiss ordeals as the irrational custom of Dark Age ignorance. Much scholarship that addresses ordeals treats them as such (see, for instance, Robertson 1802; Gibson

¹Several other ordeals existed. But they were rarely used and generally unimportant. Where they were more important, I discuss them below. When this paper refers to “ordeals,” it’s referring to the hot and cold ordeals described below.

²Unilateral judicial ordeals weren’t the only medieval judicial procedures grounded in the *iudicium Dei* superstition. Oath swearing and, to a much lesser extent, judicial battle, were also connected to this belief.

1848; Plucknett 1956; Baldwin 1961; van Caenegem 1988). More recently, several authors have attempted to rescue ordeals from European legal history's museum of the absurd. One account argues that ordeals facilitated community consensus and unity (Colman 1974; Brown 1975; Hyams 1981). Another account suggests ordeals were criminal punishments (Lea 1973; Hyams 1981).³ A third argues nearly the opposite: ordeals were a tool of mercy, a way to get criminals off the hook (Kerr, Forsyth, and Plyley 1992).

No one seriously entertains the idea that ordeals actually did what they were supposedly designed to do: determine if defendants were guilty of the crimes they were accused of.⁴ My analysis uses economics to show how ordeals did precisely this. In doing so I contribute to a "law and economics of superstition." The law and economics of superstition explores the role that objectively false beliefs play in the legal systems of rational people.

Economists have said little about superstition and even less about ordeals. Torgler (2007) examines the empirical determinants of various superstitions. He finds that greater religiosity increases it. Wong and Yung (2005) examine evidence for the Chinese zodiac's claims. Several other papers consider how superstitions, such as numerology, affect real estate and other prices (Bourassa and Peng 1999; Chau, Ma, and Ho 2001; Doucouliagos 2004; Ng, Chong, and Du 2009; Woo and Kwok 1999).⁵ But almost no work has used rational choice

³This view is the most natural one for a rational choice scholar to hold. Efficient criminal punishment imposes a high penalty on criminals with a low probability (Becker 1968; Friedman 1999). In the context of ordeals, that would mean one of two things. If the ordeal itself was supposed to be the punishment, it would mean applying ordeals infrequently and boiling/burning everyone they were applied to. But ordeals were used in exactly the opposite way: they were applied frequently and boiled/burned only a small percentage of those to whom they were applied. If the boiling/burning was supposed to be the punishment, it would mean boiling/burning only a small percentage of accused persons, but not going through the costly process of pretending to boil/burn every accused person, which is what ordeals did. Closely related, if boiling/burning was the desired punishment, ordeals were a highly inefficient way to administer it. Ordeals were multi-day undertakings that involved masses, endless rituals, and so on. It's much cheaper to just boil/burn persons instead. A third reason ordeals don't make sense as punishments is that they were applied indiscriminately (i.e., without regard to an accused person's guilt or innocence since this hadn't been determined yet). The theory of efficient punishment says something like: "boil every tenth *criminal*." But ordeals boiled every tenth *accused person*, which is very different. Finally, while punishments have the same expected cost for guilty and innocent persons, ordeals had different expected costs for them. Ordeals' features are consistent with the idea of ordeals as fact-finding procedures, not punishments.

⁴Though several authors have suggested that ordeals' physical aspects may have made it physiologically harder for guilty persons to pass them than innocent persons because of guilt-induced bodily stress. For instance, see Plucknett (1956) Roberts (1965), Colman (1974), Hyams (1981), Caenegem (1988), and Pilarczyk (1996).

⁵Peltzer and Renner (2003) ask how superstition affects driving in South Africa and find that more superstitious drivers drive less carefully and have more accidents.

theory to investigate superstition's persistence or relationship to the law.

Fudenberg and Levine's model of superstitious beliefs (2006) and Posner's (1980) study of the economics of legal systems in primitive societies are two important exceptions to this. Fudenberg and Levine consider how certain superstitions can persist even when individuals are patient, rational learners. They show how superstitions can influence rational actors' equilibrium behavior. In my theory of ordeals, superstition also determines individuals' decision making in equilibrium. Further, the superstition-supported equilibrium is self-confirming. This contributes to superstition's persistence. But superstition persists for another reason too: it's socially useful.⁶

This aspect of my analysis is most closely connected to Posner (1980).⁷ Posner notes superstition's prominence in primitive societies. He suggests that some of these societies' objectively false beliefs may actually promote their well-being. For instance, the belief that wealthy group members are witches helps some primitive societies enforce a norm of group sharing that permits social insurance.⁸ My analysis, which finds that medieval judicial ordeals accurately assigned accused criminals' guilt and innocence, complements Posner's suggestion that some superstitions are socially productive.

Most relevant to my argument, Posner (1980: 47) points out that certain societies' religious beliefs discourage criminals from concealing their crimes. For instance, if individuals believe it's unlucky to eat with the kin of men they've slain, to avoid this fate, they're encouraged to announce their deed when they've killed a stranger. Their religious belief facilitates legal fact finding where conventional fact-finding methods are prohibitively costly.

This insight is directly relevant to ordeals. Ordeals were an institution of "self-finding facts" where traditional fact-finding methods weren't helpful. Their beauty lay in the simple but ingenious way that they incentivized accused criminals to unwittingly reveal their guilt or innocence.

Finally, my paper is connected to the literature that explores the economics of European

⁶On the relationship between religious participation and beliefs, incentives, and economic growth in modern societies, see Barro and McCleary (2003, 2006), McCleary and Barro (2006), and McCleary (2007).

⁷My analysis is also connected to the law and economics literature on settlement pioneered by Landes (1971). For instance, see Easterbrook (1983), Grossman and Katz (1983), Baker and Mezzetti (2001), Bibas (2004), and Covey (2009).

⁸Also see Smith (1975: 742) who notes superstition's role in enforcing norms against over-hunting in primitive society.

legal traditions. Hayek (1960), La Porta et al. (1998), Glaeser and Shleifer (2002), and Djankov et al. (2003) consider the divergent legal institutions that emerged in England and continental Europe during the Middle Ages. They examine the implications of those institutions for economic outcomes today. I investigate the legal regime that prevailed in England and continental Europe before their institutions diverged and whose demise created the vacuum that precipitated this divergence: ordeals.

2 *Iudicium Dei*

The golden age of European unilateral judicial ordeals was the 9th through 13th centuries. Two types of ordeals flourished in this age: hot and cold.⁹ Hot ordeals included hot water and hot iron ordeals (*iudicium aquae fervantis* and *iudicium ferri*).¹⁰ Cold ordeals included cold water ordeals (*probatio per aquam frigidam*).¹¹

In the hot water ordeal, a priest boiled a cauldron of water into which he threw a stone or ring.¹² As Bishop Eberhard of Bamberg’s late 12th-century breviary instructed, the proband “shall plunge his hand into the boiling water” and recover the object. “[A]fterwards let [his hand] be immediately sealed up.”¹³ If he’s innocent, the proband will succeed in “bring[ing] forth his hand safe and unharmed from this water. But if he be guilty and presume to plunge in his hand,” it will show harm from burning on inspection three days later (Howland 1901: 7-9).

The hot iron ordeal worked similarly. Instead of plunging his arm into a cauldron of

⁹Reliance on judicial ordeals appears in the earliest of legal codes the world over. On ordeals’ ubiquity and varieties, see Gilchrist (1821), Groitein (1923), and Lea (1866).

¹⁰The hot water and hot iron ordeals sometimes came in “strengths” corresponding to the severity of the alleged crime or extent of the defendant’s disrepute. The “single” hot water ordeal involved the proband putting his arm into boiling water only up to his wrist. The “single” hot iron ordeal involved carrying a piece of hot iron that weighed only one pound. The “triple” hot water ordeal involved the proband putting his arm in boiling water up to the elbow. The “triple” hot iron ordeal involved carrying a piece of iron that weighed three pounds.

¹¹Hot water ordeals are older. They first appear in the *Lex Salica* circa 507-511. Cold water ordeals are a 9th-century invention.

¹²Ordeals’ particulars varied by time and place. But their basics were similar. Throughout ordeals’ existence, individuals invoked them for a variety of purposes ranging from political (Who is the rightful heir to this office?) to religious (Is this relic genuine?). I exclusively consider ordeals invoked for judicial purposes.

¹³The proband was the person who underwent the ordeal. Usually this was the defendant. Though occasionally plaintiffs were probands as well.

water, the proband carried a piece of burning iron nine paces.¹⁴ As King Æthelstan's 928 doom described it (Howland 1901: 12-13):

If any one shall have given pledge to undergo the ordeal of iron . . . let nine feet be measured off from the stake to the mark, by the feet of him who is to be tried . . . [and] let the iron lie on the coals . . . Let the nine feet that were measured off be divided into three sections. In the first division let him hold his right foot close to the stake. Then let him move his right foot across the second into the third division, where he shall cast the iron in front of him . . . Then let his hand be sealed up, and on the third day let examination be made whether it is clean or foul within the wrapper.

Ninth-century theologian Hincmar of Rheims described the cold water ordeal as follows: “he who is to be examined by this judgment is cast into the water bound, and is drawn forth again bound.” If he's guilty and “seeks to hide the truth by a lie, [he] cannot be submerged:” he'll float (Howland 1901: 11). If he's innocent, he can be submerged: he'll sink.

The law reserved ordeals for certain cases. England used them only in criminal cases—accusations of homicide, robbery, arson, and so on.¹⁵ Punishments for failing ordeals ranged from fines, to mutilation, to death.¹⁶ The rest of Europe used ordeals mostly in criminal cases, but sometimes in civil cases too.¹⁷

The law reserved ordeals for cases where judges couldn't confidently conclude defendants' guilt or innocence without them (Bartlett 1986; Bloomfield 1969; Davies and Fouracre 1986; Goitein 1923; Lea 1866; McAuley 2006; Miller 1988; Thayer 1898).¹⁸ According to 12th-century English law, “the ordeal of hot iron is not to be permitted except where the naked truth cannot otherwise be explored.” As 13th-century German law put it, “It is not right to

¹⁴On the continent, justice systems sometimes used another variety of hot ordeal—the hot ploughshares ordeal. The idea was the same as in the other hot ordeals. But the proband walked across hot ploughshares instead of thrusting his arm into boiling water or carrying burning iron.

¹⁵There are a few post-Norman conquest cases of English ordeals in civil cases. But they're rare.

¹⁶For example, in pre-11th century England, criminal punishment was financial (Klerman 2001: 5). Under the Assize of Clarendon, criminal punishment was mutilation. Under the Assize of Northampton, it was death. The Assizes of Clarendon and Northampton required defendants who passed the ordeal but whose community members considered them of “very bad repute” and were “evilly defamed by the testimony of many legal men” to “abjure the realm” (Howland 1901: 16).

¹⁷It's likely that part of the reason ordeals were more commonly used in criminal cases than civil ones is that evidence was typically harder to get in the former.

¹⁸Before the 13th century, a panel of judges, or “court presidents,” usually heard criminal cases. Depending on the court, judges included royal justices, clerics, counts, and local landowners. Judges decided whether an ordeal was required and, if so, which one. As I discuss below, clerics administered and officiated ordeals.

use the ordeal in any case, unless the truth may be known in no other way” (Bartlett 1986: 26; see also, 28; 135).¹⁹

If a defendant confessed or reliable witnesses testified against him, the court would convict him without an ordeal.²⁰ Where the court considered the accusation plausible but such evidence was lacking, it often permitted the defendant to exonerate himself by “swearing off” the accusation with an oath. The court could order defendants to take oaths alone or with a specified number of “oath helpers” to assist them.²¹

Oath swearing had limited usefulness. Certain defendants’ oaths were unacceptable, such as those of unfree persons who composed much of the medieval population. Foreigners, persons who perjured themselves, had failed in a legal contest, and those with tarnished reputations also had unacceptable oaths. In cases where oath-helping was used, defendants’ inability to produce the requisite number of compurgators created a similar problem. Justice systems unwilling to convict or exonerate accused persons indiscriminately when “regular” evidence was silent needed another way to determine defendants’ guilt or innocence.²² That way was ordeals.²³

Ordeals’ ostensible power to determine defendants’ guilt or innocence rested on the idea that they were *iudicia Dei*—judgments of God. Where man couldn’t correctly assign criminal status, he recruited the Lord. As a Carolingian capitulary put it: “Let doubtful cases be determined by the judgment of God. The judges may decide that which they clearly know, but that which they cannot know shall be reserved for Divine judgment” (Lea 1866: 176).

¹⁹According to Whitman (2008), witnesses or others with factual knowledge of defendants’ guilt often existed but didn’t come forward because they didn’t want blood on their hands if the persons they testified against were convicted and executed. For my purpose what matters is that judges didn’t have certain knowledge of defendants’ guilt in some cases, regardless of the reason.

²⁰The Assizes of Clarendon and Northampton required ordeals for all major crimes. However, in practice, courts didn’t order accused persons to ordeals if there was clear evidence of their guilt (Groot 1982). For a summary of some basic features of Anglo-Saxon law, see Pollock (1898) and Pollock and Maitland (1959).

²¹Other evidence was sometimes possible. Though not particularly useful for most criminal cases, medieval courts also considered written evidence when it was available, especially after the 11th century. On the role of oath-helpers in England see, for instance, Beckerman (1992).

²²Since evidence was absent for crimes involving unobservable acts or states of mind, ordeals were often used to try accusations of magic, idolatry, and heresy. Other crimes unlikely to produce evidence that ordeals were thus often used for include incest and adultery.

²³Another reason a court might order an ordeal was if the law prescribed judicial combat but one of the would-be combatants couldn’t fight (for instance, if she were a woman) and couldn’t find a champion to replace her, or if the defendant had no specific accuser to combat (because he had been accused on public suspicion).

According to medieval Christian belief, if priests performed the appropriate rituals, God would reveal individuals' guilt by letting boiling water/burning iron harm them (or making holy water reject their guilty bodies) and reveal their innocence by miraculously saving their limbs from harm (or accepting their guiltless bodies into his blessed pool).

3 Law, Economics, and Superstition

3.1 A Theory of Medieval Judicial Ordeals

There are two obvious alternatives to asking God to find facts in “doubtful cases.” Judges could ask accused persons if they're guilty. Alternatively, they could threaten to torture accused persons to encourage them to tell the truth. The trouble with these approaches is that they produce significant mistakes. Every accused person asked about his guilt proclaims his innocence. Torture has the opposite problem: if its threat is ominous enough to prompt guilty persons to confess, it's ominous enough to prompt innocent persons to confess too.

In contrast, ordeals could correctly identify defendants' guilt or innocence because they imposed different expected costs on guilty and innocent defendants. Consider how a medieval citizen's belief that ordeals were *iudicia Dei* influenced his incentive to undergo or decline an ordeal.

Suppose a medieval farmer accuses his neighbor, Frithogar, of stealing his beast. Frithogar denies it. The farmer has no witnesses but is well respected. Frithogar isn't. The court doesn't believe the farmer would accuse Frithogar for no reason. It orders Frithogar to the hot water ordeal.

Frithogar believes in *iudicium Dei*. He believes that by performing the appropriate rituals, priests can ask God to reveal his guilt or innocence through the hot water ordeal and that God will do so. To evidence his innocence, God will perform a miracle that prevents the boiling water from harming his arm. To evidence his guilt, God will let the boiling water harm him.

Below I consider what happens when Frithogar is a skeptic—when he believes the foregoing might be true, but his belief is incomplete. For now, assume his belief that ordeals are

iudicia Dei is complete. What will Frithogar do?

Suppose Frithogar stole the farmer's beast. He knows this. But nobody else knows. In this case, if Frithogar undergoes the ordeal, he expects to burn his arm. Moreover, by doing so, he expects to reveal his guilt and thus to suffer the legal punishment for stealing beasts: a large fine. Frithogar's other option is to decline the ordeal. He can avoid the ordeal by confessing his crime or settling with the farmer. Both alternatives "punish" him.²⁴ But neither is as punishing as the fine for stealing beasts. By declining the ordeal, Frithogar suffers less punishment than if he undergoes it.²⁵ He also saves his arm. Thus, if he's guilty, Frithogar will choose to decline the ordeal.

Now suppose Frithogar is innocent. The farmer's beast wandered off. Frithogar knows he didn't steal it. But nobody else knows. In this case, if Frithogar undergoes the ordeal, he expects to deliver his arm from the boiling water unharmed. Moreover, by doing so, he expects to reveal his innocence and thus to avoid legal punishment. If Frithogar declines the ordeal and confesses or settles instead, he suffers a punishment for a crime he didn't commit. Thus, if he's innocent, Frithogar will choose to undergo the ordeal.

The ordeal creates a separating equilibrium that sorts Frithogar by his guilt or innocence. It does this by satisfying the single-crossing condition: if he's innocent, Frithogar finds it cheaper to undergo the ordeal than if he's guilty. The ordeal leverages Frithogar's superstition—his objectively false belief that ordeals are *iudicia Dei*—to incentivize him to reveal his criminal status to the legal system.²⁶

3.2 *Iudicia Cleri*

In the equilibrium just described, guilty persons never undergo ordeals. Innocent ones always do. But what happens to them when they do? Ordeals only work if they don't injure the people who undergo them. They only exonerate probands they don't harm. Short of genuine

²⁴He can also avoid the ordeal by fleeing his town. But for this example I suppose that fleeing is more costly to Frithogar than confessing or settling. So Frithogar never considers this option.

²⁵Judges considered a person's refusal to undergo an ordeal evidence of guilt. For example, when Walicharius of Brion claimed a vineyard as his own against several monks and, failing to receive warranty from a man he alleged could warrant his claim, the court ordered him to an ordeal, Walicharius refused. When he later revived his claim in Angers and the court learned of his refusal to undergo the ordeal in Brion, it found against him (White 1995: 115-116).

²⁶For a discussion of the relationship between signaling, social norms, and the law, see Posner (2000).

iudicia Dei, how can boiling water be made innocuous to human flesh?

By *iudicia cleri*. Because of ordeals' sorting effect, priests who administer them learn defendants' guilt or innocence. Conditional on observing a defendant's willingness to undergo an ordeal, the administering priest knows the defendant is innocent. Knowing this, the priest can "fix" the ordeal to find the "correct" result. For example, if Frithogar chooses to undergo his ordeal, the ordeal-administering priest can lower the water's temperature so it doesn't boil him. Frithogar plunges his arm into the cauldron expecting to be unharmed. His expectation is fulfilled—not by God, but by the newly informed priest.

To accomplish this manipulation, priests required latitude in their administration of ordeals. Liturgical *ordines* and royal dooms prescribed ordeal instructions for clerical administrators. A striking feature of these instructions is the scope they created for priestly ordeal fixing. Ordeal instructions gave priests latitude to manipulate ordeals' physical aspects and to adjudge their outcomes. Consider the clerical instructions for the hot iron ordeal prescribed by a 10th-century English doom (Howland 1901: 12-13):

Concerning the ordeal we enjoyn in the name of God and by the command of the archbishop and of all our bishops that no one enter the church after the fire has been brought in with which the ordeal is to be heated except the priest and him who is to undergo judgment Then let an equal number from both sides enter and stand on either side of the judgment place along the church And no one shall mend the fire any longer than the beginning of the hallowing, but let the iron lie on the coals until the last collect And let the accused drink of the holy water and then let the hand with which he is about to carry the iron be sprinkled, and so let him go [to the ordeal].

Several features of these instructions stand out. First, only the priest and proband were initially allowed in the church after the priest made the ordeal fire. This gave the priest opportunity to manipulate the fire and thus the iron's temperature. The doom indicates that before the proband begins the ordeal, "two men from each side go in and certify that [the iron] is as hot as we have directed it to be." But the priest's isolation until this point allowed him to defraud the certifiers, for example by providing them with a different iron for inspection than he provided the proband.

Second, the ordeal ceremony forbade mending the fire after the communion consecration. It required the iron to remain on dying coals until the priest made his final prayer. If the

priest failed to manipulate the fire's temperature or switch the iron, he could let the iron cool before the proband handled it by delaying and drawing out the final prayer.

Third, the ordeal ceremony required observers to align along the church's walls for the ordeal's duration. In a reasonably sized church, this put them a considerable distance from the ordeal "stage." By diminishing observers' ability to observe, this facilitated priestly chicanery.

Finally, the ordeal instructions directed the priest to sprinkle the proband's hand with holy water immediately before he carried the iron. It's easy to imagine how sprinkling could become dousing under a manipulative priest's control. The water helped offset any injurious heat remaining on the iron that fire-fixing or iron-tampering failed to address.

Hot water ordeal instructions had the same features: only the priest and proband were allowed in the church after the fire for heating the water was made; observers lined the church walls to watch the ordeal; and the priest "sprinkled" holy water, in this case over the cauldron of ordeal water (Thorpe 2003: 96).

Hot iron and hot water ordeal formulae also granted clerics discretion in deciding ordeals' outcomes (see, for instance, Colman 1974; Brown 1975; Ho 2003-2004). They instructed the proband's "hand [to] be sealed up, and on the third day" for the priest to examine "whether it is clean or foul within the wrapper" (Howland 1901: 12-13). But they were silent about what it meant for a hand to be "clean or foul." The hand's state depended on the priest's judgment. If an officiating cleric failed to save his proband's arm from boiling water or burning iron, he nevertheless had the power to declare his innocence.

This power was limited.²⁷ A severely burned arm that when unwrapped three days later was covered in infected burn sores would certainly qualify as "foul" to any disinterested onlooker. In such cases the priest couldn't declare the proband's innocence. But for the many degrees of foulness short of this undeniably foul state, the priest had leeway to adjudge the ordeal's outcome as he saw fit.

Cold water ordeal instructions also gave priests opportunity for manipulation, albeit less amply than hot ordeal instructions. Unlike water's and iron's temperature, priests couldn't

²⁷In West Frisian Synod Law, in certain cases it was possible to appeal to the community to decide ordeal outcomes, which also curtailed priests' discretion (Colman 1974: 590).

manipulate water's specific gravity. Their ability to control success in cold water ordeals depended solely on their authority to grade passage or failure.

A Carolingian capitulary describing cold water ordeals required a knot to be made in the rope attached to the proband at a prescribed length from his body. The knot defined the depth to which the proband had to sink to prove his innocence (Rollason 1988: 13). The same capitulary required the proband to be lowered gently into the water to prevent splashing. But scope for priestly discretion remained. Whether a proband had indeed sunk to the "depth of innocence" could be ambiguous (Lea 1973: 72-73). Further, cold water ordeal formulae didn't specify how long the proband had to spend at that depth to prove himself.

Still, it's puzzling why legal systems interested in making ordeals work as well as possible would ever resort to cold water ordeals, which were less susceptible to priestly rigging, when hot ordeals were available.²⁸

Cold water ordeals are less puzzling if rigging hot ordeals was harder for some priests or in certain circumstances. Hot ordeals require a "miracle" to exonerate probands. Boiling water and burning iron really do boil and burn human flesh. If priests don't intervene to ensure that probands don't stick their arms in boiling water or carry burning iron, these ordeals backfire. In contrast, cold water ordeals can exonerate probands without priestly manipulation. People really can sink in water. In fact, as I discuss below, certain people almost always sink in water: lean men.

If hot ordeal rigging is harder for less skilled priests, or even for skilled ones under certain circumstances, such as when ordeal churches are small (and thus observers are closer to the "stage"), it may make sense to use an ordeal that produces a higher pass rate *without* priestly intervention, such as a cold water ordeal, even though it reduces priests' flexibility.

Whether priests believed ordeals were *iudicia Dei* or instead understood that they were really *iudicia cleri* is an interesting historical question, but unimportant for my theory. As long as priests manipulate ordeals to reflect the information they receive about defendants' guilt or innocence after defendants' decide to decline or undergo them, ordeals are effective.

²⁸Some legal systems gave the plaintiff the right to choose the kind of ordeal the defendant would undergo. Other systems gave the defendant the right to choose. But ordinarily the court chose. See Lea (1973: 45-46).

Priests' manipulation of ordeal outcomes isn't incompatible with the possibility that they believed ordeals were *iudicia Dei*. "Clergy were believed to possess special interpretive powers of God's law on earth" (Pilarczyk 1996: 101). They viewed themselves as worldly instruments of God's will. This view was the basis of priests' role in confession. It underlaid the developing doctrine of *in persona Christi*: the idea that priests acted in the person of Christ when they administered sacraments. Ordeals never achieved sacramental status. But they were sacral. Priests could've invoked an *in persona Christi*-like concept when they administered ordeals too. In the same way that God used priests as his vessels to absolve sinners, he used them as his vessels to judge persons accused of crimes.²⁹

On the other hand, priests may have appreciated that their intervention, not God's, determined probands' fate. The fact that priests said ordeals were *iudicia Dei*, perhaps even to one another behind closed doors, doesn't mean they believed this. There are plenty examples of medieval clerics behaving in ways that suggest they didn't take their professed beliefs seriously.

The evidence is unclear about what priests truly believed. But even if they believed ordeals could be genuine *iudicia Dei*, that doesn't mean they believed every ordeal outcome reflected God's judgment. Just as a corrupt cleric could abuse his powers of reconciliation to sell absolution, he could abuse his powers of ordeal administration to sell a judicial verdict. However, there was a check on priests' bribery in their judicial capacity: they worked for privately owned bishoprics whose owners' revenues depended on judicially honest priests.

Bishopric owners exercised the rights of local governments, including collecting taxes and tithes connected directly to local producers' productivity. When crime was higher, and thus resident productivity was lower, bishopric revenues suffered. Bishopric owners therefore had an incentive to limit productivity undermining activities, such as priestly ordeal corruption, where they could. Their ability to do so was imperfect. But by controlling the selection of bishops and other clerical administrators in their territories, and controlling these individuals'

²⁹Like some other persons of high-ranking status, in the rare situations in which they underwent hot ordeals, clerics often did so by proxy. (More often they used oath-swearing or ecclesiastic ordeals, such as the eucharist ordeal). The use of "champions" in unilateral ordeals was infrequent and in any event doesn't affect my argument. Even when champions were used, undergoing an ordeal remained more expensive for guilty persons than for innocent ones because the former expected to be convicted with a higher probability. Thus in situations where belief was imperfect, the use of champions could influence the optimal rate of proband condemnations (γ) discussed below. But sorting was unaffected.

finances, bishropic owners could control priests.

Because of priestly manipulation, the separating equilibrium that ordeals create is self-confirming when individuals start as certain that ordeals are *iudicia Dei*. Guilty persons always expect ordeals to harm them and find them guilty in the process. They always decline ordeals. So guilty persons' belief is never challenged. Innocent persons always expect ordeals not to harm them and to exonerate them in the process. They always undergo ordeals. Having observed their willingness to do so, ordeal-administering priests infer these persons' innocence. Priests fix ordeals to exonerate them. So innocent persons' expectation is always fulfilled. In equilibrium the only evidence that ordeals generate confirms the belief that they're *iudicia Dei*. Ordeals reinforce the superstition that makes them effective.

3.3 Skeptics

The equilibrium described above illustrates how ordeals work when individuals have complete faith in them. But it breaks down if we allow that faith to be incomplete. If instead of assuming that defendants never question ordeal outcomes, we allow defendants to update their beliefs about ordeals' legitimacy after observing the history these outcomes, just as we allow priests to update their beliefs about defendants' guilt or innocence after observing defendants' decisions to decline or undergo ordeals, this equilibrium might implode.

In that equilibrium everyone who undergoes an ordeal is exonerated. But a 100 percent acquittal rate may seem suspicious to persons whose belief that ordeals are *iudicia Dei* is incomplete.³⁰ Individuals may be skeptical about ordeals for other reasons too. The presence of ordeal observers suggests that medieval citizens at least entertained the idea that ordeal outcomes could reflect worldly influences in addition to otherworldly ones.

Skeptics pose a potential problem for ordeals. Innocent skeptics may decide they don't want to hazard ordeals because they fear the possibility that boiling water will boil them, burning iron will burn them, and so on. If everyone passes ordeals, innocent skeptics' fear disappears. But then the problem raised above emerges: guilty skeptics may decide they

³⁰Persons with complete belief totally discount the possibility that observed ordeal outcomes are anything other than God's work. They interpret a 100 percent acquittal rate as evidence that 100 percent of probands were innocent and thus saved by God.

want to hazard ordeals. In both cases pooling occurs, destroying ordeals' ability to distinguish guilty persons from innocent ones. How did ordeal-administering priests overcome this problem?

They condemned a positive proportion of probands. To see how this worked, consider a defendant, j , ordered to an ordeal. $j \in \{j_g, j_i\}$. When j is guilty of the crime he's been accused of, $j = j_g$. When j is innocent of the crime he's been accused of, $j = j_i$.³¹ j can undergo the ordeal or decline it. If j undergoes the ordeal and it finds him guilty, he earns β . If j undergoes the ordeal and it finds him innocent, he earns 0. If j declines the ordeal, he earns θ . As in Frithogar's case, $0 > \theta > \beta$.³²

j is a skeptic. He believes ordeals may be *iudicia Dei*, but also believes they may be a sham perpetrated by crafty priests. $\rho \in (0, 1)$ measures the strength of j 's belief that ordeals are *iudicia Dei*.³³ ρ is the probability j assigns to God revealing his guilt through the ordeal if $j = j_g$ or the probability he assigns to God revealing his innocence through the ordeal if $j = j_i$. j 's priest condemns a proportion of defendants who undergo ordeals equal to $\gamma \in (0, 1)$. j knows probands' historical success rate.

From j_g 's perspective, if ordeals are *iudicia Dei*, γ reflects guilty persons who underwent ordeals and God condemned, which would happen to him if he underwent the ordeal since he's guilty. If ordeals are a sham, γ reflects priestly condemnations of defendants who underwent ordeals and thus the probability that he'd be condemned if he underwent the ordeal. j_g therefore declines the ordeal if $\rho\beta + (1 - \rho)\beta\gamma < \theta$. This is true for any $\gamma > (\theta - \rho\beta)/(\beta - \rho\beta)$.

From j_i 's perspective, if ordeals are *iudicia Dei*, γ reflects guilty persons who underwent ordeals and God condemned, which wouldn't happen to him if he underwent the ordeal since he's innocent. If ordeals are a sham, γ reflects priestly condemnations of defendants

³¹I assume that although the legal system doesn't initially know whether j is guilty or innocent, j knows whether he's guilty or innocent. This is a reasonable assumption in most cases. Though it may not always hold. Suppose j 's legal system doesn't distinguish between justifiable homicide and ordinary murder. In this case, although j may know that he killed the person he's accused of killing, he may be uncertain about his guilt from God's, and thus the ordeal's, perspective.

³²In practice, different ordeal alternatives will have different prices. But for my purpose, which is to examine the decision to decline or undergo an ordeal, this is unimportant. I therefore treat all ordeal alternatives as requiring the defendant to pay the same price, θ .

³³I assume that j and the priest know j 's level of belief. Medieval priests knew how often their community members went to church, received communion, confessed, and practiced other religious rituals. So this assumption is reasonable. Others observe j 's level of belief imperfectly.

who underwent ordeals and thus the probability that he'd be condemned if he underwent the ordeal. j_i therefore undergoes the ordeal if $\rho\theta + (1 - \rho)\beta\gamma > \theta$. This is true for any $\gamma < \theta/(\beta - \rho\beta)$.

To ensure a separating equilibrium, the priest must condemn enough probands to deter guilty skeptics from wanting go undergo ordeals (which would create a pooling equilibrium that involved all defendants choosing to undergo ordeals), but not so many probands as to also deter innocent skeptics from wanting to do so (which would create a pooling equilibrium that involved all defendants declining ordeals). The priest must condemn $\theta/(\beta - \rho\beta) > \gamma > (\theta - \rho\beta)/(\beta - \rho\beta)$.

Since, where $\rho \in (0, 1)$ and $0 > \theta > \beta$, $\forall \rho : \theta/(\beta - \rho\beta) > (\theta - \rho\beta)/(\beta - \rho\beta) \Rightarrow \exists \gamma : \theta/(\beta - \rho\beta) > \gamma > (\theta - \rho\beta)/(\beta - \rho\beta)$. By adjusting the proportion of probands he condemns, the priest can use ordeals to support a separating equilibrium for any positive level of belief that ordeals are *iudicia Dei*.

The priest prefers not to condemn any innocent persons. Therefore he sets $\gamma = \gamma^* \equiv (\theta - \rho\beta)/(\beta - \rho\beta) + \varepsilon$. This minimizes the number of innocent probands he must condemn to ensure separation given the strength of individuals' belief that ordeals are *iudicia Dei*. From γ^* it's clear that the optimal proportion of probands the priest condemns falls as individuals' belief that ordeals are *iudicia Dei* rises. As ρ approaches θ/β , which is the lowest level of belief that prevents a pooling equilibrium in which both guilty and innocent persons choose to undergo ordeals without the priest condemning any innocent probands, γ^* approaches 0. As ρ approaches 0, γ^* approaches θ/β , which is the highest proportion of innocent probands the priest can condemn without driving all defendants into a pooling equilibrium in which both guilty and innocent persons decline ordeals.

When individuals' belief that ordeals are *iudicia Dei* is complete ($\rho = 1$), priests condemn no probands. The resulting separating equilibrium is self-confirming: every person who has experience with an ordeal has experience that confirms his belief that ordeals are *iudicia Dei*. This is also true when individuals are skeptics if their belief that ordeals are *iudicia Dei* is strong enough to produce a separating equilibrium without priests condemning any innocent probands. This is when $\rho \geq \theta/\beta$.

When individuals are skeptics and their belief falls below this threshold, things are slightly

different. Priests must condemn $\gamma^* > 0$ of probands. The separating equilibrium that emerges is semi-, but not completely, self-confirming. As when individuals' belief that ordeals are *iudicia Dei* is complete, in this case too, only innocent probands undergo ordeals. But now priests condemn some innocent probands. These individuals have experiences that contradict their belief that ordeals are *iudicia Dei* instead of confirm it.

The trouble these individuals pose for ordeals is small. Consider the kinds of problems that an innocent person who an ordeal condemns can create. He can proclaim his innocence and tell everyone that ordeals are a sham. But this is the same thing that a truly guilty person would do. So no one's belief is affected. Alternatively, he can exploit his knowledge that ordeals are a sham by committing crimes and hoping to be ordered to ordeals. But in this case he confronts the priest repeatedly. Suspicious of the repeat proband, the priest condemns him, foiling the proband's plan.³⁴

The real danger to ordeals when priests had to condemn innocent probands wasn't that condemned probands would tell others that ordeals were a sham or that they would exploit the system. It was that publicly observed events would contradict ordeal results, evidencing ordeals' illegitimacy. For example, one medieval defendant accused of murder underwent an ordeal, failed, and was hanged. A few weeks later the man he murdered came home (Bartlett 1986: 160).

Such incidents threatened to initiate a process that could destroy ordeals' operation. An occasional contradictory incident could be explained away. But if they happened frequently, individuals' belief that ordeals were *iudicia Dei* could weaken considerably. To ensure separation with weaker belief, priests would have to condemn a higher proportion of innocent probands. This would increase the chance of additional ordeal-contradicting incidents, weakening belief further, requiring priests to condemn more probands, and so on. Eventually ρ would reach 0. Ordeals would break down.

Fortunately for ordeals, instances like the murdered man returning home were rare

³⁴Before their ordeals, probands spent several days with the priests who officiated them, partaking in mass, prayer, and so on. This may have permitted priests to glean additional information about probands' guilt or innocence (Pilarczyk 1996: 98). Such information supplemented that which priests received from observing defendants' willingness to undergo ordeals, facilitating their ability to identify (and thus condemn) a guilty defendant who took his chances with the ordeal because γ had been set too low, because he had figured out that ordeals were a sham, or because some other imperfection prevented flawless separation.

(Bartlett 1986: 160). They were rare for two reasons. First, the cases in which judges used ordeals militated against such situations. Judges used ordeals when normal evidence was lacking. The prospect that evidence would come back later to contradict ordeal results was therefore slim. Second, for reasons I discuss below, medieval citizens' belief that ordeals were *iudicia Dei* was strong. So γ^* was positive but low: priests didn't have to condemn a high proportion of probands to produce separation. There were therefore few cases in which contradictory evidence was possible.

3.4 Accessing and Strengthening Belief

Ordeals are robust to skepticism, but not infinitely so. They break down when individuals have no faith in their legitimacy. Ordeals sort guilty and innocent persons for all positive levels of belief that they're *iudicia Dei*. But the lower that belief is, the higher is the proportion of innocent probands that priests must condemn, increasing the prospect that contradictory evidence will reveal ordeals as a sham. Further, since priests must condemn an increasing proportion of innocent probands as belief becomes weaker, as individuals' belief that ordeals are *iudicia Dei* declines, ordeals become an increasingly costly way to distinguish guilty persons from innocent ones.

Because of these factors, the stronger the belief that ordeals are *iudicia Dei*, the better ordeals work and vice versa. Ordeal ceremonies were therefore arranged to access and strengthen potential probands' belief in ordeals' legitimacy. They accomplished this in several ways.

First, they made ordeals explicitly religious, nearly sacramental, rituals. “[T]he Church . . . followed the policy of surrounding [ordeals] with all the solemnity which her most venerated rites could impart” (Lea 1973: 33). Priests administered ordeals, in churches, as part of ordeal masses. Besides the standard sacred mass rituals, such as communion, these masses involved sacred rituals specific to ordeals. Consider the following ceremonial instruction for the hot water ordeal prescribed in a medieval German liturgical (Howland 1901: 7-9):

Let the priest go to the church with the prosecutors and with him who is about to be tried. And while the rest wait in the vestibule of the church let the priest

enter and put on the sacred garments except the chasuble and, taking the Gospel and the chrismarium and the relics of the saints and the chalice, let him go to the altar and speak thus to all the people standing near: Behold brethren, the offices of Christian religion. Behold the law in which is hope and remission of sins, the holy oil of the chrisma, the consecration of the body and blood of our Lord Then he shall designate a spot in the vestibule where the fire is to be made for the water, and shall first sprinkle the place with holy water, and shall also sprinkle the kettle when it is ready to be hung and the water in it, to guard against illusions of the devil. Then, entering the church with the others, he shall celebrate the ordeal mass. After the celebration let the priest go with the people to the place of the ordeal, the Gospel in his left hand, the cross, censer and relics of the saints being carried ahead, and let him chant seven penitential psalms with a litany

[And let the priest pray:] O God, Thou who within this substance of water hast hidden. Thy most solemn sacraments, be graciously present with us who invoke Thee, and upon this element made ready by much purification pour down the virtue of Thy benediction.

Second, ordeal ceremonies reinforced guilty and innocent defendants' expectations about ordeal outcomes. They reminded guilty persons of the painful condemnation they would suffer by undergoing the ordeal and reminded innocent persons of the miraculous pain-free deliverance they would enjoy by doing so. Consider the prayer the priest made before the proband over the cauldron of ordeal water (Lea 1973: 34):

O holy water, O blessed water, water which washest the dust and sins of the world, I adjure thee by the living God that thou shalt show thyself pure to make manifest and reveal and bring to naught all falsehood, and to make manifest and bring light to all truth; so that he who shall place his hand in thee, if his cause be just and true, shall receive no hurt; but if he be perjured, let his hand be burned with fire, that all men may know the power of our Lord Jesus Christ.³⁵

Similarly, ordeal ceremonies reminded guilty probands of the spiritual punishment they would suffer if they underwent the ordeal. As the liturgical instructed the officiating priest to warn the proband:

Look that ye be not deprived of the heritage of such great blessing and of participation in it by implicating yourselves in the crime of another, for it is written, not only are they worthy of death who do these things, but they have pleasure in them that do them.

³⁵Also see Bartlett (1986: 1).

On this logic, ordeal ceremonies directed priests to command probands in the name of God to decline the ordeal if they were guilty:

Then let him [the priest] thus address the one who is to undertake the ordeal: I command thee, N., in the presence of all, by the Father, the Son, and the Holy Ghost, by the tremendous day of judgment, by the ministry of baptism, by thy veneration for the saints, that, if thou art guilty of this matter charged against thee, if thou hast done it, or consented to it, or hast knowingly seen the perpetrators of this crime, thou enter not into the church nor mingle in the company of Christians unless thou wilt confess and admit thy guilt before thou art examined in public judgment.³⁶

Third, ordeal ceremonies highlighted ordeals' religious foundations, reminding probands of their divine precedent and successful track record. Consider the following hot water ordeal prayer:

O God, just Judge, firm and patient, who art the Author of peace, and judgest truly, determine what is right, O Lord, and make known Thy righteous judgment. O Omnipotent God, Thou that lookest upon the earth and makest it to tremble, Thou that by the gift of Thy Son, our Lord Jesus Christ, didst save the world and by His most holy passion didst redeem the human race, sanctify, O Lord, this water being heated by fire. Thou that didst save the three youths, Sidrac, Misac, and Abednego, cast into the fiery furnace at the command of Nebuchadnezzar, and didst lead them forth unharmed by the hand of Thy angel . . . and, as Thou didst liberate the three youths from the fiery furnace and didst free Susanna from the false charge . . . so, O Lord, bring forth his hand safe and unharmed from this water [if he's innocent].

The "three youths" referenced here are the righteous boys God saves from the fiery death King Nebuchadnezzar orders in the Book of Daniel. "Susanna" is the woman sentenced to death in the same book. The prophet Daniel exonerates her in the last hour. His name means "judgment of God" in Hebrew.

The "mechanics" of the *iudicium Dei* in ordeals were also grounded in religious beliefs. According to Hincmar (Lea 1973: 36), in the hot water ordeal, "the guilty are scalded and the innocent are unhurt, because Lot escaped unharmed from the fire of Sodom, and the future fire which will precede the terrible Judge will be harmless to the Saints, and will burn

³⁶Or as an English cold water ordeal formula directed the priest to instruct the proband: "you should not presume to communicate nor to approach the altar if you committed or consented to know about the crime in question" (Rollason 1988: 14; see also Bloomfield 1969: 555-556; Radding 1979: 956).

the wicked as in the Babylonian furnace of old.” In the cold water ordeal, the guilty sink because

whoever . . . seeks to hide the truth by a lie, cannot be submerged in the waters above which the voice of the Lord God has thundered; for the pure nature of the water recognizes as impure and therefore rejects as inconsistent with itself such human nature as has once been regenerated by the waters of baptism and is again infected by falsehood (Howland 1901: 11).

Further, probands are bound in this ordeal because,

as we read [in the Bible,] . . . Lazarus, who had been dead four days (by whom is signified each one buried under a load of crimes), was buried wrapped in bandages and, bound by the same bands, came forth from the sepulchre at the word of the Lord and was loosed by the disciples at his command; so he who is to be examined by this judgment is cast into the water bound.

Religion’s importance to medieval judicial ordeals explains why medieval justice systems used these particular ordeals to determine defendants’ guilt or innocence and not others, especially when others were cheaper. For example, flipping a coin is cheaper than resorting to boiling water, burning iron, or submersion in pools of holy water. If medieval persons believed God revealed accused persons’ guilt or innocence through coin flipping, this could’ve been a successful ordeal.³⁷

But medieval persons didn’t believe this. There was no foundation for a belief in *iudicium Dei* through coin flipping. So coin flipping wouldn’t have worked as an ordeal. Ordeal ceremonies highlight that there was foundation for a belief in *iudicium Dei* through fire and water. So medieval legal systems used hot water, hot iron, and cold water ordeals.

As I discuss in Section 4, criticism of these ordeals’ religious foundations ultimately destroyed them. When high-ranking clerics denied the scriptural moorings of hot water, hot iron, and cold water ordeals and rejected their religious status, ordeals collapsed. But before that denial, widespread belief in hot water, hot iron, and cold water ordeals’ religious foundations is what permitted them to work.

Finally, ordeal ceremonies accessed and strengthened individuals’ belief that ordeals were *iudicia Dei* by reminding probands of God’s omniscience, omnipotence, and infallible power

³⁷This assumes priests could use unfair coins or that there’s enough ambiguity about coin flip results to permit priests to shade their outcomes.

to exculpate the innocent and condemn the guilty through trials of fire and water. Consider the benediction of the water the priest made in the hot water ordeal:

I bless thee, O creature of water, boiling above the fire, in the name of the Father, and of the Son, and of the Holy Ghost, from whom all things proceed; I adjure thee by Him who ordered thee to water the whole earth from the four rivers, and who summoned thee forth from the rock, and who changed thee into wine, that no wiles of the devil or magic of men be able to separate thee from thy virtues as a medium of judgment; but mayest thou punish the vile and wicked, and purify the innocent. Through Him whom hidden things do not escape and who sent thee in the flood over the whole earth to destroy the wicked and who will yet come to judge the quick and the dead and the world by fire. Amen.³⁸

These features of ordeal ceremonies tapped into and bolstered the belief that ordeals' success required. "In those ages of faith, the professing Christian, conscious of guilt, must indeed have been hardened who could undergo the most awful rites of his religion, pledging his salvation on his innocence, and knowing under such circumstances that the direct intervention of Heaven could alone save him from having his hand boiled to rags, after which he was to meet the full punishment of his crime, and perhaps in addition lose a member for the perjury committed" (Lea 1866: 257; see also Hyams 1981: 111).

Ordeal ceremonies' features suggest that medieval citizens believed ordeals were *iudicia Dei*, but that their belief was incomplete. Ordeal masses, priestly administration in churches, references to biblical stories, God's infallible powers of judgment, divine punishment (for the guilty), miraculous intervention (for the innocent), and even ordeals' specific forms (fire and water) make little sense unless individuals reposed some faith in ordeals as *iudicia Dei*. But neither do they make sense if that faith was perfect or inevitable.

4 Predictions and Evidence

My theory of medieval judicial ordeals generates several predictions. The evidence supports them.

1. *Most probands are exonerated.*

According to my theory, if individuals believe completely that ordeals are *iudicia Dei*, only innocent persons choose to undergo them. Knowing this, priests rig ordeals to find probands

³⁸Also note the biblical references again.

innocent. All probands are exonerated. If individuals are sufficiently skeptical, priests have to condemn a positive proportion of probands to support a separating equilibrium. However, in medieval Europe, where citizens' belief that ordeals were *iudicia Dei* was strong and ordeal ceremonies strengthened their belief, that proportion should be modest.

Because of this, it's possible to test my theory by considering the proportion of probands who pass their ordeals. If my theory is correct, the evidence should point to plenty of priestly ordeal fixing. Most probands should be exonerated.

The surviving records of ordeal outcomes support this prediction. As Robert Henry (1771-1793 II: 308-309) put it, "If we suppose, that few, or none escaped conviction who exposed themselves to these fiery trials, we shall be very much mistaken. For the histories of those times contain innumerable examples of persons plunging their naked arms into boiling water, handling red-hot balls of iron, and walking upon burning ploughshares, without receiving the least injury."

The surviving records of ordeal outcomes are from the early 13th century. They have two sources. The first source is the *Regestrum Varadinense*, an ordeal register from Varad, Hungary (modern-day Oradea, Romania) under the reign of King Andrew II, which Imre Zajtay (1954: 541-552) and R.C. van Caenegem (1991: 76) have analyzed. The *Regestrum* records hot iron ordeals that Hungarian clerics administered in the basilica of Nagyvárad between 1208 and 1235.

The *Regestrum* records outcomes for 308 cases involving ordeals. In 100 of these cases the ordeal was aborted before it produced a final result, typically because the parties settled.³⁹ My theory suggests that defendants in these cases were guilty. But, of course, there's no way to see if this was so.

Examining the outcomes of the 208 cases in which defendants underwent ordeals is more instructive. The data are telling: probands failed their ordeals in only 78 cases, or 37.5 percent of the time. Probands passed their ordeals in 130 cases, or 62.5 percent of the

³⁹75 cases were settled. The plaintiff withdrew his complaint in the other 25. Some of the withdrawals came after the defendant had already carried the hot iron but before his arm was unwrapped. It's very likely that these defendants were innocent. At the very least, we can conclude that their accusers thought the ordeal would find them so. This is the only reason they would've withdrawn their accusation: to avoid a possible perjury charge, which could result if the ordeal exonerated the defendant.

time.⁴⁰ Unless nearly two thirds of ordeal-officiating priests didn't understand how to heat iron, the data clearly evidence priestly rigging intended to exculpate probands. Ordeals exonerated the overwhelming majority of probands tried in the basilica of Nagyvárád.

The second source of records for ordeal outcomes finds this result more strongly still, but is based on fewer cases. This source is the plea rolls that English royal courts kept between 1194, the year of the first surviving roll, and 1219, when English courts stopped ordering ordeals. Kerr, Forsyth, and Plyley (1992: 580-581) uncovered 19 probands in these records for whom the rolls report ordeal outcomes.⁴¹ 16 probands underwent cold water ordeals. 3 underwent hot iron ordeals. 14 of the 16 probands who underwent cold water ordeals passed. All 3 probands who underwent hot iron ordeals passed. Based on these data, ordeals exonerated English probands 89 percent of the time (see also, Klerman 2001: 12).⁴²

Focusing on the probands who underwent hot iron ordeals, it again appears that priests didn't understand how to heat iron, or that they chose not to so as to exculpate probands. The sample is tiny. But, suspiciously, "red-hot" iron is *never* harmful to those carrying it. This is the opposite of what the evidence should show if the iron that probands carried was actually red hot. As eminent historians of medieval English law Frederick Pollock and Frederic Maitland (1959: 599) put it, the "evidence . . . we have seems to show that the ordeal of hot iron was so arranged as to give the accused a considerable chance of escape."⁴³

Turning to the cold water ordeal, things are slightly different. In this ordeal the priest's

⁴⁰62.5 percent is a conservative estimate of the proportion of probands who were unharmed by "red hot" iron in Varad. As indicated in the previous note, some plaintiff withdrawals came after the proband had carried the iron. It's quite certain that these probands, who aren't included in my calculation, were also unharmed. If their plaintiffs thought otherwise, they wouldn't have withdrawn their complaints.

⁴¹The plea rolls contain references to a similar number of ordeal outcomes. But since these rolls recorded only ordeal failures (this being the only instance in which ordeal outcomes had implications for the royal exchequer), we can't use data from these rolls to illuminate the proportion of probands who passed ordeals (Kerr, Forsyth, and Plyley 1992: 579).

⁴²As Maitland (1887 I: xxiv) put it, "success at the ordeal" was "far commoner than failure."

⁴³The hypothesis that priests were selling justice has difficulty explaining the ordeal data's notable feature: most defendants underwent ordeals. If priests routinely sold justice, most defendants facing ordeals would settle with their accusers. Accusers could extort no more from defendants than priests. And by bribing their accusers to drop their complaints, defendants could avoid undergoing ordeals. Faced with the prospect of having to bribe priests to secure their innocence, defendants would settle instead. If priests colluded with accusers to extort defendants, we would also expect settlements. By settling with their accusers, defendants could avoid ordeals, priests and accusers could divide the settlement price, and priests could avoid the labor of administering ordeals. Thus, if priests were selling justice, we should observe settlements, not defendants choosing to undergo ordeals and being exonerated. But the data show the opposite: most defendants underwent ordeals and were exonerated. Only a minority settled.

power to exonerate the proband derives from his ability to decide the ordeal outcome—whether the proband has sunk—rather than from his ability to influence the ordeal’s nature and to interpret its result, which he exercises in hot ordeals. But unlike in hot ordeals, priests could exonerate most probands in cold ordeals without intervening if the legal system used cold ordeals to try men exclusively. As Kerr, Forsyth, and Plyley (1992: 586) point out, because he has lower body fat, the average lean male has an 80 percent chance of sinking in water, compared to only a 40 percent chance for the average lean woman.

Based on the probability of exoneration in hot ordeals calculated above, this suggests that an average man had a similar chance of succeeding in a cold water ordeal *without* priestly fixing as an average proband had in a hot ordeal *with* priestly fixing.⁴⁴ Cold water ordeals could therefore be useful to clerics who weren’t skilled at rigging hot ordeals or in situations where clerics expected rigging hot ordeals to be unusually difficult. If this is how England’s legal system used cold water ordeals, it should’ve sent only men to them, since men would usually pass cold water ordeals, and sent women only to hot ordeals, since women would usually fail cold water ordeals.

The data support this prediction. 91 ordeals appear in England’s eyre rolls between 1194 and 1208. 84 of the probands are male. 7 are female. Judges ordered 79 of the men to cold water ordeals, 1 to the hot iron ordeal, and 4 to unspecified ordeals. They ordered all 7 women to hot iron ordeals (Kerr, Forsyth, and Plyley 1992: 581). Thus while judges ordered men to cold water ordeals between 94 and 98.8 percent of the time, they ordered women to cold water ordeals 0 percent of the time.

Two cases that involve a man and woman jointly accused of the same crime are particularly instructive. In one case the defendants were accused of burglary. In the other they were accused of murder. In both cases judges ordered the men to cold water ordeals and the women to hot iron ordeals (Maitland 1887 I: Nos. 12, 119). In a third case, a woman was accused of murder, ordered to the hot iron ordeal, and passed. A man was then accused of the same murder but ordered to the cold water ordeal (Maitland 1887 I: No. 101). These cases suggest that ordeal assignments weren’t random. The particular bias they display

⁴⁴This assumes the average medieval male was lean. That seems reasonable given the paltry diet of most medieval citizens.

suggests that judges sought to exonerate people who chose to undergo ordeals.⁴⁵

2. *Ordeals aren't used for defendants who are known non-believers.*

According to my theory, ordeals only inform priests about defendants' guilt or innocence if defendants' belief that ordeals are *iudicia Dei* is at least positive. Where priests condemn only a modest proportion of probands, as they did in medieval Europe, ordeals only inform priests if defendants' belief is significantly stronger than this. If my theory is correct, medieval legal systems should therefore have exempted non-believers (i.e., those for whom $\rho = 0$ or $0 < \rho < \rho^*$, the critical threshold required to ensure separation for a given γ^*) from ordeals.

The evidence supports this prediction. There was one major group of obvious non-believers in medieval Europe: Jews. Medieval judicial ordeals were intimately connected to and strongly dependent on Christian belief. Priests administered ordeals, in churches, as part of Christian mass, with all the attendant Christian ritual. Ordeals' Christian trappings were designed to access and strengthen individuals' belief that ordeals were *iudicia Dei*. But they were intended for, and only capable of having the desired effect on, Christians. The very mechanism that supposedly underlaid cold water ordeals, recall, was based on the proband having been baptized.

As Bartlett (1986: 54) puts it, "such a sacral proof" as ordeals, "so deeply hedged about with Christian liturgy and ritual, a proof which normally required a vigil in a church and prior communion, was so indelibly Christian that it would be . . . in Christian eyes, virtually meaningless to apply it to non-Christians." More important, it would be meaningless in non-Christian eyes to apply it to non-Christians. In contrast to Christians, for Jews, "[t]rials by ordeal . . . were totally alien to their nature and tradition" and belief (Eidelberg 1979-1980: 111).

Because of Jews' non-belief, we find a bifurcated medieval trial policy in "doubtful cases" involving Jews and Christians. If the defendant was Christian, he was tried by ordeal. If he was Jewish, he was tried by compurgation.⁴⁶ As Charlemagne's capitularies instructed (of

⁴⁵Twelfth-century Icelandic law required men to go to cold water ordeals and women to hot water ordeals. In 12th- and 13th-century England, where the data considered above come from, the law didn't make any provision for the differential treatment of men and women in terms of hot or cold ordeals. See Lea (1973: 46) and Kerr, Forsyth, and Plyley (1992: 581).

⁴⁶However, Jews were sometimes subjected to trial by combat (Lea 1866: 103). I discuss this medieval judicial institution below.

814 and 809 respectively): “If a Jew accuses a Gentile, the accused if need be, can prove his rightness by valid witnesses and an oath upon relics or by trial by ordeal involving glowing iron.” “[B]ut if a Gentile accuses a Jew, it suffices to bring two witnesses, Jew or Gentiles, and bear an oath” (Eidelberg 1979-1980: 112).⁴⁷

3. *Ordeals are abandoned when clerics stop administering them.*

Ordeals only sort accused persons by their guilt or innocence, and thus are only useful, if individuals believe they might be *iudicia Dei*, i.e., $\rho > 0$. Medieval persons’ belief that ordeals were *iudicia Dei* depended on ordeals’ religious status—a status dependent on priests’ central role in their administration. Only clerics could perform the religious rituals, such as mass, that invoked Godly intervention in judicial matters. My theory therefore predicts that when priestly involvement in ordeals ceased, so must have ordeals.

The history of ordeals’ demise supports this prediction. High-ranking ecclesiastics began seriously questioning ordeals’ relationship to their religion in the 12th century.⁴⁸ “[T]he twelfth century was the great age of [canonical] sifting, and the credentials of the ordeal were among the things sifted” (Bartlett 1986: 83).

According to ordeals’ ecclesiastic critics, ordeals had no scriptural sanction. Despite ordeal rituals’ allusions to Daniel, Susanna, and the fiery furnace, the Bible contains but one instance of what might be construed as an actual judicial ordeal. In the Book of Numbers (5:11-31) an accused adulteress undergoes an ordeal of bitter waters (poison ingestion) to prove her fidelity. Besides the fact that this is the lone potential case of scriptural sanction for judicial ordeals, medieval judicial ordeals weren’t ordeals of bitter waters.⁴⁹ They were ordeals of boiling water, burning iron, and dunking in pools, which had no scriptural support.

Ordeals’ detractors argued that ordeals had an even more severe problem that cast doubt

⁴⁷Some burgesses also received ordeal exemptions. Though this seems to have been the result of a political bargain with government authorities. In the 12th century, some clerics began seeking exemption from hot and cold ordeals. But they already used these to a very limited extent, relying heavily on compurgation instead. Clerical exemptions were based on the growing ecclesiastic concern that ordeals were uncanonical, which came to a head in 1215. I discuss this below. See Bartlett (1986).

⁴⁸Some high-ranking ecclesiastics questioned ordeals from their inception in Christendom. But these criticisms didn’t gain ground until the 12th century. When they did, ordeals began to disappear in some places toward the end of the 12th century (Caenegem 1991: 85-86). However, ordeals’ widespread disappearance didn’t occur until the 13th century after Pope Innocent III’s edict.

⁴⁹The next closest thing to a judicial ordeal in the Bible is the casting of lots that a crew of sailors undertakes to decide who offended God and caused a storm in the Book of Jonah (1:7).

on their canonical credentials. They violated an important Christian proscription with lots of scriptural support: “thou shalt not tempt the Lord thy God” (Deuteronomy 6:16; Matthew 4:7). Judicial ordeals required priests to command God to perform miracles at their whim, which the Bible forbids.

Together with the fact that there existed more papal decretals questioning ordeals’ religious status than supporting it, these factors led the Fourth Lateran Council to reject judicial ordeals’ religious legitimacy and to ban priests from participating in them in 1215. As the Council’s decree read: “let no ecclesiastic pronounce over the ordeal of hot or cold water or glowing iron any benediction or rite of consecration, regard being also paid to the prohibitions formerly promulgated respecting the single combat or duel” (Howland 1901: 16).⁵⁰

If ordeals didn’t depend on medieval citizens’ religious beliefs, the Church’s condemnation, and clerics’ withdrawal, shouldn’t have affected medieval judicial systems’ reliance on them. Although the religious trappings that formerly framed ordeals would no longer be involved, secular judicial systems could’ve continued to use boiling water, burning iron, and dunking in pools to decide defendants’ guilt and innocence in “doubtful cases.” If citizens’ superstition wasn’t important to ordeals’ functionality, these religious trappings wouldn’t have been missed. Ordeals would’ve continued as successfully as they did before.

But they didn’t. Instead, secular judicial systems abandoned ordeals where their traditional religious trappings evaporated. Denmark prohibited ordeals in 1216, England in 1219, and Scotland in 1230. Italy ended ordeals in 1231; though some Italian towns had already abandoned them by then. And Flanders’ criminal justice system dispensed with ordeals between 1208 and 1233 (van Caenegem 1991: 87). Shortly thereafter Norway, Iceland, Sweden, and others followed suit. France never formally abolished ordeals. But the last mention of them that historians can find is in 1218, just after the Church’s ban (van Caenegem 1991: 87).

Where priests defied the Council’s prohibition and continued to participate in ordeals,

⁵⁰There were other objections to ordeals. But those discussed above were the most important. The most significant objection not discussed above was the argument that clerics shouldn’t participate in activities that potentially involved the shedding of blood. For a detailed discussion of the theological issues driving the Fourth Lateran Council’s ordeal prohibition, see Baldwin (1961) and McAuley (2006).

places such as Germany, Greece, Hungary, Poland, and Croatia, ordeals lingered longer. But “[w]ith trifling exceptions, the ordeal could not continue without priests” (Bartlett 1986: 101; see also, Lea 1866: 267). So ordeals went extinct where clerics refused to officiate them.

Secular authorities understood the importance of priestly participation to ordeals’ operation. A decade before the Church’s ban, some clerics decided for themselves that ordeals were at odds with their religion. They stopped administering them. But secular authorities would have none of it. As Pope Innocent III complained: “Although canon law does not admit ordeal by hot iron, cold water and the like, unhappy priests are being compelled to pronounce the blessing and become involved in such proofs and are being fined by the secular officials if they refuse” (Bartlett 1986: 98). By denouncing ordeals’ canonical status and banning clerical participation in them, the Fourth Lateran Council’s decision “robbed the ordeal of all religious sanction” (Plucknett 1956: 118). Without the religious sanction on which the belief that ordeals were *iudicia Dei* rested, trial by fire and water became impotent—useless as tools to separate the guilty from the innocent.

Ordeals’ post-Church condemnation collapse stands in stark contrast to another popular medieval judicial process that the Fourth Lateran Council also condemned and prohibited priests from taking part in: judicial combat. Judicial combat was used for deciding property disputes and criminal cases.⁵¹ It provides a useful contrast to ordeals because, although “the moral influence of the ordeal depended entirely upon its religious associations,” that of judicial combat didn’t (Lea 1866: 272). For example, “while a duel may be fought without the aid of a priest[,] the efficacy of an ordeal depended wholly upon the religious rites which gave it the sanction of a direct invocation of the Almighty” (Lea 1973: 162-163; see also Bloomfield 1969: 555; Bartlett 1986: 120-121; Rollason 1988: 15; Palmer 1989: 1553).

This crucial difference between ordeals and judicial combat explains why, though the Church condemned and prohibited priestly participation in them both in 1215, judicial combat “survived for centuries the ordeal proper” (Thayer 1898: 39). In Spain judicial combat continued until the late 13th century. In Italy, Flanders, and Germany it continued until the 14th century. In Portugal, France, and Hungary it lasted until the 15th century. Even

⁵¹On the economics of judicial combat, see Leeson (2010).

England didn't see its last judicial combat until 1456 (Russell 1980: 154).⁵²

5 Concluding Remarks

After the Church withdrew its support from ordeals in the 13th century, ordeals died. Trial by jury replaced them in England. Trial by inquisition replaced them on the continent.⁵³ No one longs for ordeals' return. But as I explain below, if the appropriate belief structure existed to support them, perhaps they should.

My analysis of the law and economics of medieval judicial ordeals leads to several conclusions. First, though rooted in superstition, judicial ordeals weren't irrational. Fact finding in the Middle Ages was costly. Given technological limitations, it was often impossible. In an environment in which people assigned a high probability to the idea that priests could call on God to reveal accused persons' criminal status, guilty and innocent persons had different expected costs of undergoing versus declining ordeals.

Expecting to emerge from ordeals unscathed and exonerated, innocent persons found it cheaper to undergo ordeals than to decline them. Expecting to emerge from ordeals boiled, burned, or wet and naked and condemned, guilty persons found it cheaper to decline ordeals than to undergo them. Because of medieval persons' superstition, ordeals caused defendants to sort themselves, implicitly revealing their guilt or innocence to the judicial system.

If priests condemned the correct proportion of probands, they knew that only innocent persons would want to undergo ordeals. Conditional on observing this choice, priests therefore exonerated probands whenever they could. Since medieval citizens' belief that ordeals were *iudicia Dei* was strong, this was often. The overwhelming majority of individuals who underwent ordeals were exonerated. Ordeal ceremonies and administration gave priests ample latitude to fix ordeals to find the desired outcome. This outcome confirmed probands' expectation, strengthening the belief that allowed ordeals to work. Medieval judicial ordeals achieved what they sought: they accurately assigned guilt and innocence where traditional

⁵²According to Nielson (1891: 203), the last judicial combat fought in England was in 1492. England didn't abolish judicial combat formally until the 19th century.

⁵³On the evolution of trial by jury and inquisition in England and on the European continent respectively after the ordeal's demise, see, for instance, Goodhart (1965) and Pollock and Maitland (1959).

means couldn't.

Second, my analysis suggests that optimal legal institutions depend partly on the beliefs of the people they encompass. For example, the legal regime that's efficient in a society where people believe firmly that God curses cheaters is different from the legal regime that's efficient in a society where people don't believe this. In the former society, superstition does part of the work we normally ask state-made law and punishment to do. *Ceteris paribus*, the efficient legal regime in the latter society involves more state-made law and punishment than it does in the former. Similarly, in a society where citizens believe strongly that ordeals are *iudicia Dei*, such as medieval society until the 13th century, it's cheaper to use ordeals to establish accused persons' guilt or innocence in certain cases than it is to use other methods for this purpose that don't leverage these beliefs, such as trial by jury or inquisition.

The reason it doesn't make sense for modern society to use ordeals isn't that post-ordeal trial methods are inevitably superior. It doesn't make sense for modern society to use ordeals because (a) technological advance has made fact finding in the cases in which legal systems used ordeals infinitely cheaper than it once was; and (b) modern societies don't believe ordeals are *iudicia Dei*, which ordeals require to work. In a dramatically less technologically advanced state, such as that which prevailed in the Middle Ages, or even in a technologically advanced state where individuals believe strongly that ordeals are *iudicia Dei*, ordeals could again be the efficient option.⁵⁴

Finally, my examination of ordeals suggests that objectively true beliefs don't necessarily supplant objectively false ones. More important, it suggests that, in some cases at least, society is better off because of this. If institutions based on objectively false beliefs, such as the belief that God intervenes in man's judicial proceedings to ensure that the righteous party prevails, produce social outcomes that are as good, or better, than the social outcomes that institutions based on objectively true beliefs produce, there's no pressure for the former beliefs to give way to the latter. Ordeals are an example of this. This logic explains how a judicial institution based on objectively false beliefs could last for the better part of a millennium: superstition can be socially productive.

⁵⁴Where these conditions are satisfied in some developing countries, ordeals are still used to decide accused criminals' guilt or innocence. For example, although its government has criminalized the practice, a hot iron ordeal called "sassywood" remains popular in Liberia.

Perhaps surprisingly this means that societies composed of individuals who lack certain objectively false beliefs can be worse off than societies composed of individuals who believe deeply in objectively false propositions. To return to the example from above, holding other features and beliefs constant, a society in which no one believes in an invisible, omnipotent, and omniscient being who interferes with human affairs to ensure cosmic justice will have to devote more resources to addressing crime than a society in which every person believes firmly in such a being.⁵⁵ The superstitious society outperforms the scientific one.

⁵⁵Recent evidence from studies that examine the relationship between certain religious beliefs and economic outcomes supports this view. For instance, see Barro and McCleary (2003, 2006) and Shariff and Norenzayan (2007). Of course, the *ceteris paribus* part of my claim here is important. If some superstitions are socially productive and others are unproductive, and these beliefs are correlated with one another such that people who hold the former also tend to hold the latter, superstition can be a net wash from the perspective of social welfare, or even welfare reducing.

References

- [1] Adams, Henry, H. Cabot Lodge, Ernest Young, and J. Laurence Laughlin. 1905. *Essays in Anglo-Saxon Law*. Boston: Little, Brown, and Co.
- [2] Baker, Scott and Claudio Mezzetti. 2001. "Prosecutorial Resources, Plea Bargaining, and the Decision to Go to Trial." *Journal of Law, Economics, and Organization* 17: 149-167.
- [3] Baldwin, John W. 1961. "The Intellectual Preparation for the Canon of 1215 against Ordeals." *Speculum* 36: 613-636.
- [4] Barro, Robert J. and Rachel M. McCleary. 2003. "Religion and Economic Growth Across Countries." *American Sociological Review* 68: 760-781.
- [5] Barro, Robert J. and Rachel M. McCleary. 2006. "Religion and Economy." *Journal of Economic Perspectives* 20: 49-72.
- [6] Bartlett, Robert. 1986. *Trial by Fire and Water: The Medieval Judicial Ordeal*. Cambridge, UK: Cambridge University Press.
- [7] Becker, Gary S. 1968. "Crime and Punishment: An Economic Approach." *Journal of Political Economy* 76: 169-217.
- [8] Beckerman, John S. 1992. "Procedural Innovation and Institutional Change in Medieval English Manorial Courts." *Law and History Review* 10: 197-252.
- [9] Bibas, Stephanos. 2004. "Plea Bargaining Outside the Shadow of Trial." *Harvard Law Review* 117: 2463-2547.
- [10] Bourassa, Steven C. and Vincent S. Peng. 1999. "Hedonic Prices and House Numbers: The Influence of Feng Shui." *International Real Estate Review* 2: 79-93.
- [11] Bloomfield, Morton W. 1969. "Beowulf, Byrhtnoth, and the Judgment of God: Trial by Combat in Anglo-Saxon England." *Speculum* 44: 545-559.
- [12] Brown, Peter. 1975. "Society and the Supernatural: A Medieval Change." *Daedalus* 104: 133-151.
- [13] Caenegem, R.C. van. 1988. *The Birth of the English Common Law*. Cambridge: Cambridge University Press.
- [14] Caenegem, R.C. van. 1991. *Legal History: A European Perspective*. London: Hambledon Press.
- [15] Chau, K.W., Vincent S.M. Ma, and Daniel C.W. Ho. 2000. "The Pricing of Luckiness in the Apartment Market." *Journal of Real Estate Literature* 9: 31-40.
- [16] Colman, Rebecca V. 1974. "Reason and Unreason in Early Medieval Law." *Journal of Interdisciplinary History* 4: 571-591.

- [17] Covey, Russell D. 2009. "Signaling and Plea Bargaining's Innocence Problem." *Washington and Lee Law Review* 66: 73-130.
- [18] Davies, Wendy and Paul Fouracre, eds. 1986. *The Settlement of Disputes in Early Medieval Europe*. Cambridge, UK: Cambridge University Press.
- [19] Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2003. "Courts." *Quarterly Journal of Economics* 118: 453-517.
- [20] Doucouliagos, Hristos C. 2004. "Number Preference in Australian Stocks." *Applied Financial Economics* 14: 43-54.
- [21] Easterbrook, Frank H. 1983. "Criminal Procedure as a Market System." *Journal of Legal Studies* 12: 289-332.
- [22] Eidelberg, Shlomo. 1979-1980. "Trial by Ordeal in Medieval Jewish History: Laws, Customs and Attitudes." *Proceedings of the American Academy for Jewish Research* 46: 105-120.
- [23] Friedman, David. 1999. "Why Not Hang them All: The Virtues of Inefficient Punishment." *Journal of Political Economy* 107: S259-S269.
- [24] Fudenberg, Drew and David K. Levine. 2006. "Superstition and Rational Learning." *American Economic Review* 96: 630-651.
- [25] Gibson, William Sidney. 1848. *On Some Ancient Modes of Trial, Especially the Ordeals of Water, Fire, and Other Judicia Dei*. London: Printed by J.B. Nichols and Son.
- [26] Gilchrist, James P. 1821. *A Brief Display of the Origin and History of Ordeals . . .* London: Printed for the author by W. Bulmer and W. Nicol.
- [27] Glaeser, Edward L. and Andrei Shleifer. 2002. "Legal Origins." *Quarterly Journal of Economics* 117: 1193-1229.
- [28] Goodhart, Arthur L. 1965. "A Changing Approach to the Law of Evidence." *Virginia Law Review* 51: 759-784.
- [29] Groitein, H. 1923. *Primitive Ordeal and Modern Law*. London: George Allen and Unwin.
- [30] Groot, Roger D. 1982. "The Jury of Presentment Before 1215." *American Journal of Legal History* 26: 1-24.
- [31] Grossman, Gene M. and Michael L. Katz. 1983. "Plea Bargaining and Social Welfare." *American Economic Review* 73: 749-757.
- [32] Hayek, Friedrich A. 1960. *The Constitution of Liberty*. Chicago: University of Chicago Press.
- [33] Henry, Robert. 1771-1793. *The History of Great Britain, From the First Invasion of it by the Romans . . .* 6 vols. London: Printed for the author, and sold by T. Cadwell.

- [34] Ho, H.L. 2003-2004. "The Legitimacy of Medieval Proof." *Journal of Law and Religion* 19: 259-298.
- [35] Howland, Arthur C., ed. and trans. 1901. *Ordeals, Compurgation, Excommunications and Interdict*. Philadelphia: Department of History of the University of Pennsylvania.
- [36] Hyams, Paul R. 1981. "Trial by Ordeal: The Key to Proof in the Early Common Law." In Morris S. Arnold, Thomas A. Green, Sally A. Scully, and Stephen D. White, eds. *On the Laws and Customs of England*. Chapel Hill: University of North Carolina Press, pp. 90-126.
- [37] Kerr, Margaret H., Richard D. Forsyth, and Michael J. Plyley. 1992. "Cold Water and Hot Iron: Trial by Ordeal in England." *Journal of Interdisciplinary History* 22: 573-595.
- [38] Klerman, Daniel. 2001. "Settlement and the Decline of Private Prosecution in Thirteenth-Century England." *Law and History Review* 19: 1-65.
- [39] La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny. 1998. "Law and Finance." *Journal of Political Economy* 106: 1113-1155.
- [40] Landes, William M. 1971. "An Economic Analysis of the Courts." *Journal of Law and Economics* 14: 61-107.
- [41] Lea, Henry C. 1866. *Superstition and Force: Essays on the Wager of Law, the Wager of Battle, the Ordeal, Torture*. Philadelphia: Collins, Printer.
- [42] Lea, Henry Charles. 1973. *The Ordeal*. Philadelphia: University of Pennsylvania Press.
- [43] Leeson, Peter T. 2010. "Trial by Battle." Mimeo.
- [44] McAuley, Finbarr. 2006. "Canon Law and the End of the Ordeal." *Oxford Journal of Legal Studies* 26: 473-513.
- [45] McCleary, Rachel M. 2007. "Salvation, Damnation, and Economic Incentives." *Journal of Contemporary Religion* 22: 49-74.
- [46] McCleary, Rachel M. and Robert J. Barro. 2006. "Religion and Political Economy in an International Panel." *Journal for the Scientific Study of Religion* 45: 149-175.
- [47] Miller, William Ian. 1988. "Ordeal in Iceland." *Scandinavian Studies* 60: 189-218.
- [48] Morris, Colin. 1975. "Judicium Dei: The Social and Political Significance of the Ordeal in the Eleventh Century." *Studies in Church History* 12: 95-111.
- [49] Ng, Travis, Terence Chong, and Du Xin. 2009. "The Value of Superstitions." MRPA Working Paper No. 13575, University Library of Munich.
- [50] Nielson, George. 1891. *Trial by Combat*. New York: Macmillan.
- [51] Palmer, Robert C. 1989. "Review: Trial by Ordeal." *Michigan Law Review* 87: 1547-1556.

- [52] Peltzer, Karl and Walter Renner. 2003. "Superstition, Risk-Taking, and Risk Perception of Accidents among South African Taxi Drivers." *Accident Analysis and Prevention* 35: 619-623.
- [53] Pilarczyk, Ian C. 1996. "Between a Rock and a Hot Place: Issues of Subjectivity and Rationality in the Medieval Ordeal by Hot Iron." *Anglo-American Law Review* 25: 87-112.
- [54] Plucknett, Theodore F.T. 1956. *A Concise History of the Common Law*. 5th edition. Boston: Little, Brown, and Co.
- [55] Pollock, Frederick. 1898. "English Law Before the Norman Conquest." *Law Quarterly Review* 14: 291-306.
- [56] Pollock, Frederick and Frederic William Maitland. 1959. *The History of English Law*. 2 vols. Washington, D.C.: Lawyers' Literary Club.
- [57] Posner, Eric A. 2000. *Law and Social Norms*. Cambridge: Harvard University Press.
- [58] Posner, Richard A. 1980. "A Theory of Primitive Society with Special Reference to Law." *Journal of Law and Economics* 23: 1-53.
- [59] Radding, Charles M. 1979. "Superstition to Science: Nature, Fortune, and the Passing of the Medieval Ordeal." *American Historical Review* 84: 945-969.
- [60] Rollason, D.W. 1988. *Two Anglo-Saxon Rituals: Church Dedication and the Judicial Ordeal*. Vaughan Paper No. 33. University of Leicester.
- [61] Roberts, John M. 1965. "Oaths, Autonomic Ordeals, and Power." *American Anthropologist* 67: 186-212.
- [62] Russell, M.J. 1980. "II Trial by Battle and the Appeals of Felony." *Journal of Legal History* 1: 135-164.
- [63] Shariff, Azim F. and Ara Norenzayan. 2007. "God is Watching You: Priming God Concepts Increases Prosocial Behavior in Anonymous Economic Game." *Psychological Science* 18: 803-809.
- [64] Smith, Vernon L. 1975. "The Primitive Hunter Culture, Pleistocene Extinction, and the Rise of Agriculture." *Journal of Political Economy* 83: 727-756.
- [65] Thayer, James Bradley. 1898. *A Preliminary Treatise on Evidence at the Common Law*. Boston: Little, Brown, and Co.
- [66] Thorpe, Benjamin. 2003. *Ancient Laws and Institutes of England*. Clark, NJ: Lawbook Exchange.
- [67] Torgler, Benno. 2007. "Determinants of Superstition." *Journal of Socio-Economics* 36: 713-733.

- [68] Warren, W.L. 1973. *Henry II*. Berkeley: University of California Press.
- [69] White, Stephen D. 1995. "Proposing the Ordeal and Avoiding It: Strategy and Power in Western French Litigation, 1050-1110." In Thomas N. Bisson, ed. *Cultures of Power: Lordship, Status, and Process in Twelfth-Century Europe*. Philadelphia: University of Pennsylvania Press, pp. 89-123.
- [70] Whitman, James Q. 2008. *The Origins of Reasonable Doubt: Theological Roots of the Criminal Trial*. New Haven: Yale University Press.
- [71] Wong, Ka-Fu and Linda Yung. 2005. "Do Dragons Have Better Fate?" *Economic Inquiry* 43: 689-697.
- [72] Woo, Chi-Keung and Raymond H.F. Kwok. 1994. "Vanity, Superstition, and Auction Price." *Economics Letters* 44: 389-395.
- [73] Zajtay, Imre. 1954. "Le Registre de Varad. Un monument judiciaire de début du XIIIe siècle." *Revue historique du droit français et étranger* 32: 527-562.