Magna Carta

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Abstract

Magna Carta, a pivotal moment in history, institutionalized constraints on royal power. We model it as an optimal agreement between two coalitions capable of violence: the king's loyalists and the rebel barons. This agreement is more likely when the king extracts large rents; the distribution of rents among barons is egalitarian; and barons can move resources away from the king. Under these conditions, even the baron that enjoys the largest rents is willing to lead a rebel coalition that has sufficient resources to defeat the loyalists. We test predictions with data on the universe of barons in England in 1215.

JEL Codes: N00, N13, C72, C78, D74, N43

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> For rights that were not open to all alike would be no rights. If the people secured their end at the hands of one just and good man, they were satisfied with that; but when such was not their good fortune, laws were invented, to speak to all men at all times in one and the same voice

> Cicero (1913, Book II.xii)

> No Freeman shall be taken or imprisoned, or be disseised of his Freehold, or Liberties, or free Customs, or be outlawed, or exiled, or any other wise destroyed; nor will We not pass upon him, nor condemn him, but by lawful judgment of his Peers, or by the Law of the land

> Magna Carta, Clause 39

> Who were the barons that now impose limits on royal tyranny and placed themselves in the vanguard of liberty?

> Stubbs (1874, 539)

1 Introduction

Magna Carta was a critical juncture in the history of constitutional government (Fukuyama, 2011, 529), Acemoglu and Robinson (2012, 363), and Acemoglu and Robinson (2019, 174-177)). Issued in 1215 and later incorporated into law, it laid the foundations for the rise of Parliament and through this to the Glorious Revolution of 1688, and the American Declaration of Independence in 1776.

We investigate the origins of Magna Carta from a political economy perspective. While Magna Carta has been widely studied by historians and legal scholars (e.g., Holt (1992)), with the exceptions discussed below, it has received much less attention from social scientists. In this paper, we ask what made an *agreement* like Magna Carta feasible? That is, why in 1215 did the barons propose an agreement that sought to limit the king's future actions and why did King John accede to it?

To provide answers, we compile a unique dataset of all members of England's political elite from 1199 to 1215. We identify the relevant members of England's ruling coalition and assess why

they sought to limit monarchical power. To develop testable predictions, we model the political economy of a feudal society in which the monarch headed a coalition of elites – a "monarchy ruling through an oligarchy" (Syme (1939, 8)). The key feature is that members of the oligarchy each have their own economic and military resources, which they pledge to the monarch in exchange for a share in the rents of the realm.

We model the process of coalition formation in this feudal environment. Each elite can enter the monarch's coalition by pledging his resources to the monarch, but can also exit it by taking back his resources, albeit only those that are *movable*. This is tantamount to rebelling against the monarch, and elites who exit thus form a rebel coalition. The monarch can then attempt to suppress rebellion and forcibly recover the movable resources by assembling a loyalist coalition to fight against the rebels.

In the context of Magna Carta, English barons openly rebelled against King John to force him to accede to a new power-sharing arrangement that limited John's discretion over the rents of the realm and promoted equal treatment among his subjects. We incorporate this into our model by letting the rebel coalition propose this arrangement, and for the monarch to either accept it outright, or reject it by getting the loyalist coalition to fight the rebels. The arrangement is then implemented either peacefully, or after the rebel coalition wins in battle.

We uncover key structural factors that determine the likelihood that an agreement like Magna Carta is reached by the ruler and his elites. First, the ruler has to be sufficiently extractive, while the distribution of rents among the elites have to be sufficiently egalitarian. In such cases, even the most favored elite – the one who enjoys the largest rents, would still be willing to lead a rebellion if given the chance. Second, movable resources have to be sufficiently large, as these are the only resources that rebels can take back from the ruler and use to fight against loyalists. Large movable resources increase the fighting capacity of the rebel coalition, inducing more elites to join the rebel coalition, and hence improve their probability of winning in battle. Under all these conditions, the rebellion is sufficiently strong such that the ruler either avoids violent confrontation by accepting the rebels' demands outright, or is defeated in battle. Either way, the rebels' proposed power-sharing arrangement, e.g. Magna Carta, is implemented.

We provide evidence for these results. First, we show that King John extracted much more

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revenues than his predecessors, and that the distribution of land and resources among the barons was more egalitarian compared to earlier periods. Second, we estimate the probability that a baron is in the rebel coalition against King John in the run-up to Magna Carta. The hypothesis, implied by the model, is that a baron is more likely to join the rebels if their movable resources are large. As proxy for movable resources, we use the number of castles held by the rebels, as these are fortresses that barons can defend and withhold from the King. To get variation in the number of rebel castles across all barons, we construct a subset of the entire rebel coalition for each baron based on the latter's family network. That is, instead of using the number of castles held by all the rebels, we use, for each baron, the number of castles held by the rebels who are in the baron's family network. We find that the latter significantly increases the probability that the baron is also in the rebel coalition against John.

Finally, to alleviate endogeneity concerns, we use as instrument for the number of castles held by rebels who are in the baron's family network, the number of castles held by the ancestors of those rebels in the baron's (current) family network. Some robustness exercises we do include using different proxies for movable resources, such as the presence of markets and fairs in a barony, and constructing other kinds of networks to subset the entire rebel coalition for each baron.

Our study of Magna Carta relates to the literature on how constitutional rules are made and sustained, including Katznelson and Weingast (2005), Weingast (1997), and Mittal and Weingast (2013) and to the broader literature on the rise of self-governing institutions in medieval Europe (Stasavage, 2016; Abramson and Boix, 2019; Stasavage, 2020; Salter and Young, 2023). North (1990) argued that institutions that limited the power of the executive and granted political representation to property holders provide the best incentives for investment and trade. And this argument was taken up empirically by scholars such as Delong and Shleifer (1993), Greif (2006), Acemoglu, Johnson, and Robinson (2005a,b); Acemoglu and Robinson (2012), and Pascali (2017).[1] Congleton (2011, 119) considers Magna Carta as the most celebrated medieval tax constitution focusing in particular on its inclusion of enforcement mechanism in the form of a

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[1]Note that such institutions are not always associated with better economic outcomes. Ogilvie and Carus (2014) argue that parliaments representing only landed interests tended to grant rents to elites and this came at the expense of broad-based economic growth.

council of 25 barons.

Subsequent scholarship has documented the rise and fall of representative institutions (Zanden et al., 2012; Greif and Rubin, 2023; Henriques and Palma, 2023); and explored the link between parliaments and conflict (Becker, Ferrara, Melander, and Pascali, 2020; Dincecco, Cox, and Onorato, 2023), or towns (Abramson and Boix, 2019). Mokyr and Tabellini (2023), for example, link the rise of representative institutions in Europe (and their absence in China) to social organizations at the city-level. Similar to our use of individual data on English barons, Jha (2015) uses data on English MPs to study the formation of support for Parliament during the English Civil War.

In an important recent paper, Angelucci, Meraglia, and Voigtländer (2022) examine the role that self-governing towns played in the development of parliament and inclusive institutions in medieval and early modern England. They first examine the decision to grant merchants towns the right to raise their own taxes. They go on to establish a link between urban self-government and subsequent parliamentary representation before showing that these merchant towns were responsible for pushing for more constitutional and liberal reforms from the 17th century to the 19h century.

Magna Carta was also important for legal developments, particularly the emergence of the rule of law (see Berman, 1983; Ferández-Villaverde, 2016). Studies of the English common law tradition (see Porta et al., 1998; Shleifer et al., 2008) suggest that the common law tradition was better at constraining executive power and protecting property rights. Glaeser and Shleifer (2002), for instance, argued that the English and French legal systems diverged from the late 12th and early 13th century onwards. Absent Magna Carta legal developments in England would plausibly have gone in a different direction.

Lastly, this paper also contributes to the formal literature on coalition formation, especially on non-binding agreements in which members can enter, and exit out of, the coalition (see Ray (2007)). Our particular application to feudal history allows us to incorporate violence, or the potential thereof, into every entry and exit. To the best of our knowledge, this paper, along with Desierto and Koyama (2023), is the first to propose this framework to model the political economy of feudal societies.

2   Historical Background

Magna Carta exemplifies Acemoglu and Robinson's (2012) notion of a critical juncture: a point at which a particular institution can be decisively formed or shaped. And while they focus on later developments, they stress that Magna Carta matters because it "enacted some basic principle that were significant challenges to the authority of the king" and because even though King John reneged on it, "both the political power of the barons and the influence of the Magna Carta remained" marking England's "first hesitant steps towards pluralism" (Acemoglu and Robinson, 2012, 363). Acemoglu and Robinson (2019, 174) view Magna Carta as both "the foundation of England' political institutions and a critical example of society checking the state, setting in motion a "red queen" process that would given rise to both Parliament and a stronger monarchy.

Other leading accounts of the rise of liberalism foreground Magna Carta. For Fukuyama (2011, 529) Magna Carta was important because the "English barons claimed to speak on behalf of the whole national community, including the church and ordinary Englishmen, and demanded constitutional protections for their rights". Stasavage (2020) argues that the Magna Carta did not (at least initially) have the importance attributed to it by later scholars because kings prior to John had bargained with their nobles. Nonetheless, he agrees that "[u]ltimately, where Magna Carta was most important is in creating a focal point of agreement for future advocates of consensual government and the rule of law" (Stasavage, 2020, 203). Leon (2020) studies the relationship between the king and his barons using a formal model. He sees Magna Carta as part of a broader strategy pursued by English monarchies of collaborating with extending the size of the political elite.[2]

From a longer-run perspective, Magna Carta led to the rise of parliament: it "carried three most fundamental assumptions anticipating the cardinal principles on which the power of

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[2]Other studies of Magna Carta include several articles published in a special issue to commemorate the 800 year anniversary of its issuing. Koyama (2016) discusses the role of Magna Carta in the gradual evolution of liberal institutions. Rajagopalan (2016) focuses the role of the enforcement clause of Magna Carta (Chapter 61) which was jettisoned when the charter was reissued. Leeson and Suarez (2016) discuss Magna Carta as a self-enforcing constitution. They claim that self-reinforcing constitutions have to have clear public limits on government, provide mutual benefits such that they are self-reinforcing, and advance the interests of a citizen's politically important groups. This is this first paper to study Magna Carta informed by a formal model or from an empirical perspective.

Parliament was eventually founded" (Butt, 1989, 60). It implied that the king was subject to the rule of law, that taxes were to be granted with the consent of the governed, and that the ruled did not owe unconditional obedience to the crown. Its ideological significance was revived in the 17th century and played an important role in the conflict between the crown and Parliament that culminated in the English Civil War and the Glorious Revolution.

Precisely because Magna Carta marks the beginning of a process that laid the foundations for constitutional and limited government, understanding how it came into being requires an appreciation of the institutions that were in place prior to the rise of Parliament and the emergence of a limited monarchy. That is, we need to understand the institutions that characterized medieval England circa 1200. These institutions are typically labeled "feudal".[3]

2.1 A Feudal Political Economy

Following the Norman conquest in 1066, the kings of England were comparatively powerful but their power did not rest on their ability to tax or on the possession of a standing army. Rather, as military force was decentralized, the king's power rested on the fact that he was greatest landowner and that he was at the top of the feudal hierarchy i.e. on the fact that other lords owed him homage for their lands.

Feudalism imposed numerous restrictions on property rights. The king ultimately owned all land in England: in theory, land he granted to his nobles reverted to him on their deaths. Over time, hereditary possession had become a presumptive right, but this was still conditional on the discretion of the king.[4] For instance, the king could choose to charge the tenant a fee when he took possession of the land. Also, if an heir of a noble was a minor, he and his land could be taken into wardship by the king. Wardships could also be sold.[5] Similarly, the lands of widows could be reapportioned by the king. King John (r. 1199-1216), for example, sold the right to remarry his first wife (who he had set aside) Isabella of Gloucester to the Earl of Essex. All of

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[3]Historians have debated the value of the term "feudalism" (see Abels, 2009). However, it is hard to understand the demands made of the king without a term that describes the distinctive legal and military organization of England and France in the 11th to 13th centuries.

[4]This evolution is discussed by North, Wallis, and Weingast (2009, 79-82).

[5]Pollack and Maitland (1895, 343) report several examples: in 1193 the Bishop of Ely, William Longchamp, for 220 marks buys from the king, the wardship of Stephen Beauchamp and the right to marry him wherever he may please . . . Archbishop Hubert gives 4,000 marks for the wardship and marriage of Robert Stuteville, though the king reserves a certain veto on the choice of a bride".

these rights could be abused by a monarch in need of additional revenue. Complaints to this effect were growing during the reign of John's immediate predecessors.

Land ownership was tied to military service – lords who were granted a share of land by the king owed him military service. Military service was measured by the number of knights owed for 40 days per year (though in practice the 40 days was typically only upheld theoretically and not in practice).

Military service could also be substituted by a cash payment. By the late 12th century, these payments, known as scutage, were increasingly common (particularly for lords who were too old to service or lacked military age sons). But the cost of scutage was calibrated to be financially much more onerous than serving in the field.[6] Military service could not be partially commutated: tenants had the option of either providing their full military service (in terms of knights owed) or paying scutage.[7]

2.2   England under the Angevins

The direct male line of William the Conqueror ended in 1135 when Henry I (r. 1100-1135) died without a male heir. The throne passed to Stephen of Blois (r. 1135-1154) but this was contested by Matilda, Henry's daughter. The civil war that followed only ended with the accession of Henry II (r. 1154-1189), Matilda's son, count of Anjou, and Duke of Normandy. Through his marriage to Elenor of Aquitaine, Henry acquired vast territories in Western France, sometimes referred to as the Angevin "empire". In reality this term is misleading as it was a loose connection of realms lacking any unified apparatus of government.[8] The strenuous efforts made to retain this far-flung collection of territories during Henry's reign and that of his sons was a key background condition for Magna Carta.

Henry II greatly expanded the jurisdiction of royal courts. Both criminal law and civil, largely property disputes, came under royal purview. Royal judges began to tour the country. For this, his reign is widely viewed as the seedbed of the English common law (Berman, 1983). But this

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[6]Pollack and Maitland (1895, 271) note that "The appearance of small fractional parts of a knight's fee could hardly be explained, were it not that the king has been in the habit of taking money in lieu of military service, of taking scutage or escuage (*scutagium*), a sum of so much money per knight's fee".

[7]Over time inflation meant the costs of military service were increasing. The equipment required to outfit a knight also became more involved and expensive during the late 12th century (Painter, 1943).

[8]See Gillingham (2001, 2-5) for a discussion.

achievement also provoked a reaction as the system of royal courts could be abused. The legal system was costly to use. Barlow (1955, 264-265) notes that "Henry's willingness to take gifts in order to hasten the process of justice caused misgivings even in the faithful heart of Richard fitzNeal, his treasurer". These payments could be large. Richard of Clare, earl of Hartford paid King John £100 to judge a land dispute (Bartlett, 2000, 169).[9]

Henry II was widely seen as a successful king. But his reign also provoked rebellions among the aristocracy: Angevin rule was unpopular among English barons and many of complaints that led to Magna Carta were longstanding. These grievances intensified under his son, Richard I (r. 1189-1199). All Angevin monarchs sought to increase royal revenue in the face of inflation and struggled to tax a growing commercial economy. Barlow terms the entire period between 1189-1216 as the "Angevin Despotism".

Two examples of "despotism" mentioned in Magna Carta are the exploitation of moneylending by Jews through the Exchequer of the Jewry and the Royal Forest.

Jewish moneylending was not subject to usury restrictions (which prohibited lending at interest) and kings from Henry II onwards saw this as a lucrative source of revenue (see Koyama, 2010) . Lesser knights and even barons often became in debt to the Jewish moneylenders who were forced to call in their debts when the king taxed them. The Exchequer of the Jewry founded in 1194 codified this system of indirect taxation and patronage.[10]

The royal forest covered over one quarter of the kingdom (Rowberry, 2016, 518). It was an important fiscal resource whose "main purpose as not to provide kings with areas for hunting" but "to provide them with money" (Carpenter, 2015, 176-177). The fines and penalties associated with the royal forest and the discretionary powers granted to the chief foresters were a widespread source of discontent. The revenue from Royal Forest was considerable: the Forest Eyre of 1212 raised £4486 for example (Young, 1979, 39).[11]

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[9]This was a substantial amount of money. Using a real price index £100 in the 13th century was approximately £100,000 in 2022 terms.

[10]Numerous lords were in debt to the Exchequer. Gilbert de Gant, for example, owed the Exchequer of the Jewry £800 in 1211 (Holt, 1961, 27). The king's authority over the Jews meant that he could relieve individual debtors if he so wished (see Koyama, 2010).

[11]Individuals also paid large fines or gifts to the king to evade the forest law. The Abbot of Dore paid John more than £333 to exempt some land from the forest law. At a minor scale, Young (1979, 43) reports that "[m]oney could also be used to avoid an inquiry, as exemplified when a man paid a fine of twenty shillings in preference to allowing an inquest into whether he had bought the fresh skin of a buck which he had been caught

2.3 The reign of King John and the road to Magna Carta

When John became king in 1199, his claim was contested by his nephew Arthur of Brittany, and he was immediately embroiled in conflict in Northern France. This meant that John, like Richard, was absent from England for the early years of his reign. Unlike his brother, however, he was not fortunate in war. By 1204, he had lost Normandy to Philip Augustus of France. Many Norman nobles switched their allegiance to the French king. This was a major blow to John's authority directly (through the loss of land and vassals) and indirectly (as it reduced his abilities to offer patronage). He devoted the decade after 1204 to mustering resources to reconquer Normandy.

John intensified his exploitation of the feudal system to squeeze resources from the nobility. Wardships were used to generate revenue and heiresses sold in the marriage market for profit. Feudal rights, such as these, traditionally used by rulers to cement alliances within the ruling coalition, were exploited by John on an unprecedented scale. John became infamous for "selling" royal justice, extracting lavish gifts and fees in return for favorable legal decisions.[12]

Data also suggest that King John relied less on land rents compared to his predecessors. Figure 1a uses estimations from Barratt (1996, 1999) for Richard's and John's revenues in real terms (for the period 1190-1215 with revenue for 1180 as a benchmark). The composition of John's revenues changed: shifting away from land (both the income of the land directly managed by the crown or demesne income, and the income for the land tax farmed by sheriffs or farm income) towards non-landed sources of revenue, such as wardships and fees, the income from the legal system, from the forest, and from sources such as the Jews. In 1130 landed sources of income were responsible for 92% of royal revenue (Barratt, 1999, 77). This fell to around 65% by the beginning of Richard I's reign. It fell further in John's reign whereas non-landed sources of revenue rose in importance (Figure 2).

General taxes in the form of "aides" were imposed. The tax of 1207 "was to be paid by 'every layman of all England of whomsoever's fee he may be'. No lord's authority over his fee was thus to stand in its way" (Carpenter, 2015, 210). The barons in Magna Carta would insist that in future such taxes could only be raised with the consent of the kingdom.

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carrying as he alleged or whether he had killed a deer".

[12]It is important to note that these policies affected all barons. Many barons who would be loyal to King John in 1215 such as William Marshall had been subjected to fines and other fiscal exactions in previous years.

Figure 1: John's Extractiveness

(a) John's income in real terms

(b) Revenue from the royal forest
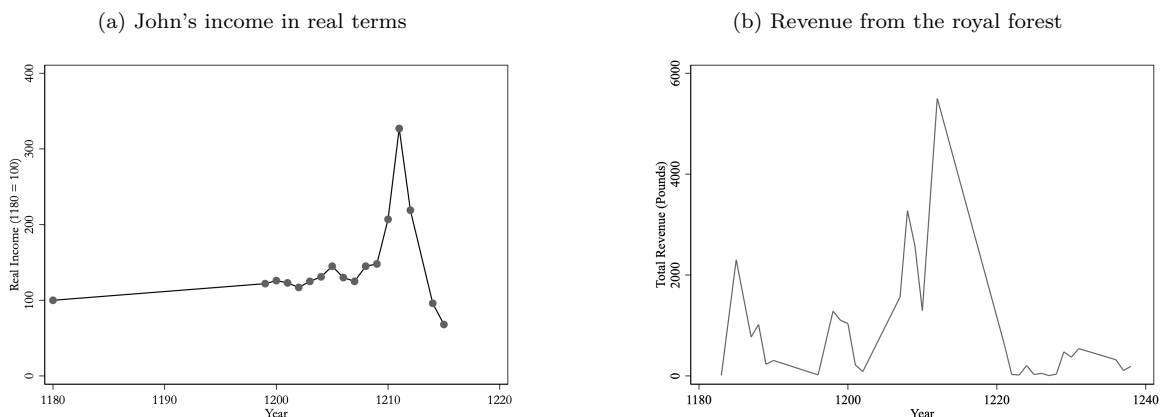
Revenue in 1180 = 100. Data Source: Barratt (1996).

Revenue from the royal forest. Data Source: Winters (1999).

Figure 2: The Shift to New Sources of Revenue
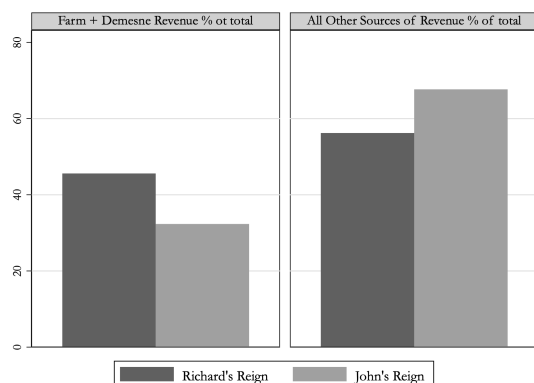
The composition of royal revenue in the reign of Richard I (r. 1189-1199) and John (r. 1199-1215). Other sources of revenue here references to feudal income, judicial income, debts owed to the King, income from the Exchequer of the Jewry and other miscellaneous sources of income. Data Source: Barratt (1996, 1999, 2001).

John's policies were also opposed by the Church. His desire to appoint his own bishops brought him into conflict with the papacy. This conflict resulted in John's excommunication and, though he was reconciled with Pope Innocent III in 1213, prominent clergymen, such as Stephan Langton, Archbishop of Canterbury, were foremost among his critics and played an important role in drafting Magna Carta.

In 1214 John attacked France. Had this succeeded, John might have possessed enough resources and prestige to cow all opposition. The defeat of the allied army that John had

Table 1: A Timeline of the Events Surrounding Magna Carta, 1199-1225

Year	Date	Event
1199		John becomes king.
1204		Loss of Normandy to Philip Augustus.
1212		Abortive baronial rebellion.
1214	February	Expedition to Poitou.
	27 June	Battle of Bouvines. Philip Augustus defeats Allied army.
		Spells the failure of John's attempts to retake his French lands.
1215	Easter	Barons rebel.
	27 May	John asks Stephen Langton to arrange a truce.
	15 June	John accedes to Magna Carta.
	Late August	John fails to meet the barons at Oxford.
	24 August	Pope annuls Magna Carta.
1216	May	Prince Louis of France invades
1216	October	John dies at Newark castle, succeeded by Henry III.
1216	12 November	Magna Carta reissued in Henry III's name.
1217	20 May	Second Battle of Lincoln, Prince Louis and rebel barons defeated.
1217		Treaty of Lambeth
1217	11 September	Reissuing of Magna Carta.
1225		Reissuing of Magna Carta.
1297		The Confirmatio Cartarum (Confirmation of Charters) Edward I reissued the 1225 version of Magna Carta in exchange for a tax and to prevent baronial unrest.

assembled at the Battle of Bouvines, however, spelled the failure of his efforts. Defeated and impoverished, he returned to England to confront his rebellious barons in the winter of 1214/1215.

Magna Carta The formation of the coalition that opposed John is not well documented.[13] By January 1215, several barons were in public opposition. As it became clear that discontent was growing, the rebellious barons openly rose in Spring 1215 gathering an army. John called on his supporters but, as the army he raised was not strong enough to overwhelm that of the barons, he came to terms with them. The result was the agreement made on June 15 1215 at Runnymede. This was issued on June 19 as a formal charter, the Great Carta or Magna Carta.

The resulting agreement was both a peace treaty and a statement of the demands of the baronial elite, a statement that contained within it the kernel of a much more general idea—that of subjecting the sovereign to the rule of law. These were 63 clauses and while many focused on specific injustices John had done to the barons, the charter also had clauses to protect freeholders

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[13]The chronicler Robert of Wendover suggested that a core opposition to John formed in October 1214 but "[w]e do not know any details of the meeting, or who was present" (Barratt, 2018, 272). Holt (1992, Appendix 1) is highly skeptical that such a meeting took place.

and the towns. In this sense it had a "comprehensive quality" and was "a grant to all free men throughout the realm" (Holt, 1992, 239). As Bartlett (2000, 65) writes: "it is much more than a political settlement and most of its clauses have a permanent and general character. The Charter is, indeed, in the form of a royal grant to all free men in perpetuity. In it the king promises to limit his authority and observe certain procedures" (Bartlett, 2000, 65).

John later reneged on this agreement. The barons rebelled again and this time supported a French invasion and civil war ensued. John died in 1216 and the rebellious barons were persuaded to accept his son Henry III (r. 1216-1274) as king and in return his advisors reissued a slightly modified version of Magna Carta in 1217 and again in 1225. This turned it into a "coronation charter for Henry III" (Vincent, 2012, 92). This reissued Magna Carta became a touchstone of baronial demands for reform throughout the 13th century before being incorporated into law by Edward I (r. 1274-1307).

Who Supported Magna Carta? We have a unique dataset on the universe of barons who were alive in 1215 and the characteristics of each of the baronies they held. There were 280 barons during the entire reign of King John, 186 of whom were alive during the period of Magna Carta and who constitute our sample.[14]

Many barons were not involved in the Magna Carta crisis (some where too old or too young; others did not wish to take a side). 55 barons actively rebelled, and 27 barons who fought against the rebels. The remaining 103 were inactive. Figure 3 depicts this data. Explaining the decision to rebel poses several puzzles. As Figure 3 indicates there was no geographical pattern to the rebellion. Similarly balance tests reported in the Appendix (Table A3) suggest only slight differences between rebels and loyalists on a range of metrics.

It is also important to note that the rebellion was not led by the most powerful barons or those close to the throne. In Appendix Table A13, we rank the top 10 barons (excluding the King) by how central they are to the entire network of barons using their eigenvector centrality (as used by Cruz et al. (2017)). Notably while there were three eventual rebels out of the top 10 most central barons, these barons were *not* among the rebel leaders. This contrasts with the

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[14]We believe dataset could only be compiled for England. To the best of our knowledge equivalent data on barons and baronies for other European countries does not exist.

Figure 3: Who Rebelled in 1215?

Individual Allegiance: ● Rebels ● Loyalists ● Neutral
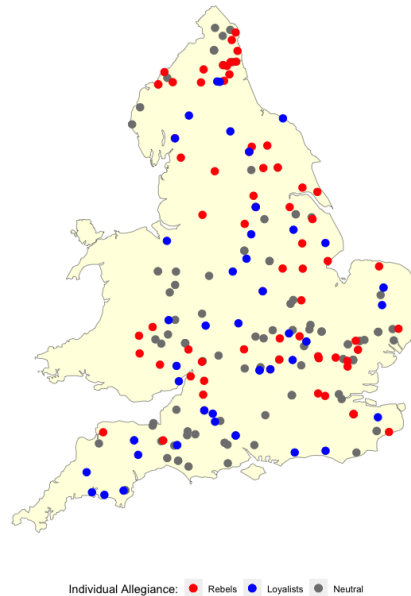
The geographical distribution of barons who rose in open rebellion, were loyal to John, or remained inactive in 1215.

findings of Naidu et al. (2021), who find that highly central elite were more likely to be involved in the Haitian coup of 1991.

Some barons rebelled because they had personal grievances against the King (see Figure A4). But these only explain a small proportion of the barons who eventually joined the Magna Carta rebellion. Indeed, each individual baron's decision to rebel against the King was not made in isolation. Rather it was a decision to join/form a coalition of barons in opposition to the King. Therefore we should expect individual level characteristics to only have limited explanatory power. Moreover, as this decision was a strategic one, to understand both why Magna Carta was proposed and why it was supported by individual barons, we need a game-theoretic framework to understand rebellion and coalition formation in a feudal society. We introduce such a framework next.

3 A Model of Feudal Rebellion and Institutional Change

To explain Magna Carta, one has to understand that the political economy of 13th century England was feudal. By this we mean, a la Bloch (1961), a decentralized system in which elites

of the realm each have economic and military resources, which they can pledge to a ruler in exchange for a share in the realm.

The resulting political and economic order is a coalition whose members can, at any point, rebel against the ruler, by taking back their resources and exiting the coalition by force. Similarly, the ruler can also force the (re-)entry of elites into the coalition through battle. This feudal process of coalition formation through repeated bargaining, possibly violent, is formally depicted in Desierto and Koyama (2023). The focus of that paper is the early stage of feudalism, and the outcome of interest is the consolidation of the realm. An important result is that large movable resources make consolidation more likely. When elites can easily reclaim resources that they have pledged to the ruler, rebellion is more costly to the ruler and makes the latter more likely to share more rents to keep the coalition together.

In contrast, the feudal realm during Magna Carta is consolidated. Elites still rebelled, but not in order to establish independent kingdoms. Instead, they took back their movable resources whenever they wanted to pressure the ruler to accede to some particular demand. In the case of Magna Carta, rebel barons demanded a more egalitarian allocation of rights in the realm and a more limited scope for the King's discretion.

We consider a feudal realm Π in which there is a set of barons $N = \{i\}$ and a King k. At every time period t, each $i \in N$ and k commands his own productive and military resources, respectively denoted as $\{e_i\}$ and e_k.[15] A portion of each of these respective resources, $\{n_i\}$ and n_k, are immovable, e.g. land. Thus, at every time period, $\{i\}$ and k have respective movable resources $\{(e_i - n_i)\}$ and $e_k - n_k$.

Each baron commits his resources to the King, according to some sharing arrangement with the barons (more below). However, if a baron is in rebellion, he takes back his *movable* resources from the King. As the King cannot rebel against himself, he always commits e_k to his use. Thus, at a single period t, the King has discretion over resources $E_t = e_k + \sum_{i \in R_t}(e_i - n_i) + \sum_{i \notin R_t} e_i$, where R_t denotes the coalition of rebels in that period, which may or may not be empty. Specifically, he allocates to himself share σ_k of E_t, and shares $\{\sigma_i\}$ to each baron $i \in N$, with $\sigma_k + \sum_i \sigma_i = 1$.

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[15]We capture a Malthusian economy in which per capita incomes were not growing over time. Therefore we assume that $\{e_i\}$ and e_k do not vary over time.

Meanwhile, the resources of the rebel coalition at a single period t consist of the pooled movable resources of its members, i.e. $E_{R_t} = \sum_{i \in R_t} (e_i - n_i)$, which the members allocate among themselves according to some sharing $\{\sigma_R\}_{i \in R_t}$. For concreteness, one can partition $\{\sigma_R\}_{i \in R_t}$ into share σ' which goes to a rebel leader, and $\{\sigma''\}$ which goes to every other member of R_t, where σ'' may or may not be the same for each one. (Naturally, the sum of shares is one.)

When there is rebellion, the King attempts to recover the resources that have been removed by the rebels by assembling a coalition of loyalists $K \subseteq N \setminus R$ who will use their combined resources to fight the rebel coalition. That is, the loyalist coalition's fighting capacity at t is $F_{Kt} = \sum_{i \in K_t} (e_i - c_i)$, with $\sum_{i \in K_t} c_i$ their cost of fighting. The rebel coalition's fighting capacity at t is their moved resources E_{Rt} less fighting costs, i.e. $F_{Rt} = \sum_{i \in R_t} (e_i - n_i - c_i)$.

Thus, at any time period, a feudal order can be succinctly described as a coalition structure and associated payoffs. It is a partition of the realm into a King, a coalition of rebels, a coalition of loyalists, and a set of 'inactive' barons who do not belong to either coalition, and the allocation of the total, i.e. movable and immovable, resources of the realm among them. More formally, at any time t:

Definition 1. *The **feudal order** of a realm is a pair $f = (\Pi, \sigma)$, with $\Pi = (k, K, R, \{N \setminus K \setminus R\})$ a partition of the realm into a king k, and coalition of loyalists K, a coalition of rebels R, and a set of inactive barons $N \setminus K \setminus R$; and $\sigma = (\sigma_k, \{\sigma_i\}, \{\sigma_R\})$ an allocation of the realm's total resources, both movable and immovable, where share σ_k of unmoved resources accrues to the King and shares $\{\sigma_i\}$ to each baron $i \in N$, and shares $\{\sigma_R\}$ of moved resources accrue to the rebels.*

Under feudalism, political power readily translates to economic power since there are no stable institutions that dictate the allocation of resources. A king whose share σ_k is close to one has a lot of political and economic power; likewise, a baron i who has high σ_i is more powerful than barons with smaller shares. The stability of the power-sharing arrangement depends on the continued consent of the barons, whose threat of rebellion acts as the main check to the King. The equilibrium allocation of political and economic power is thus a consequence of repeated bargaining, possibly violent, between the King and his barons, and the resulting rebel and loyalist coalitions that form.

To understand Magna Carta, we propose a bargaining game where the rebels can propose a

new arrangement. The rebels surrender back to the King the moved resources and, in exchange, the King commits to a new power-sharing arrangement under which his share of the realm shrinks to $\sigma_{k'} < \sigma_k$, while all the barons are given equal rights, i.e. $\frac{1-\sigma_{k'}}{N}$ $\forall i \in N$.

We interpret Magna Carta as an agreement that limited the ruler's ability to appropriate and made the realm more inclusive, a la (Acemoglu et al., 2005b; Acemoglu and Robinson, 2023). While many provisions of Magna Carta focused on specific issues, in its totality, as Stubbs (1874, 534) described it, Magna Carta was about "[t]he limitation of royal extraction".

Indeed, at the core of the many provisions of Magna Carta was the King's concession not to use the judicial system "as a means of extortion: not amercing (fining) even a villein so heavily that he had to sell his cart, his means of subsistence (cap. 20); not imprisoning, disseising, or exiling a free man 'except by the lawful judgment of his peers or by the law of the land' (cap. 39); and not selling or denying to anyone 'right or justice' (cap. 40)" (Harding, 2001, 139). For Barratt (2018, 282-283): "As a package, Magna Carta represented a fundamental change in the way the king was to operate in the future, placing clear boundaries around royal power".

Before presenting the bargaining game, we make two simplifying assumptions: first, in the initial time period, $t = 0$, the existing feudal order $f_0 = (\pi_0, \sigma_0)$ is in equilibrium and, therefore, the allocation of the realm's total resources is optimal for the King and the barons. Thus we can focus on two kinds of equilibrium outcomes – one in which the power-sharing arrangement remains as is, i.e. no institutional change, and another in which it changes to the rebels' proposed arrangement, i.e. to a more inclusive institution.

The second assumption is that from the moment the game is played until it ends, i.e. from $t = 1$ to $t = T$, the allocation of moved resources $\{\sigma_R\}_{i \in R_t}$ at each t is an equilibrium outcome of some other game simultaneously played among the rebels which we do not model. That is, we take $\{\sigma_R\}_{i \in R_t}$ as given and ignore the underlying process that determines it.

3.1 The game

At $t = 0$, the realm is united in a single coalition – there are no rebels nor loyalists. The initial feudal order $f_0 = (\Pi_0, \sigma_0)$ is in equilibrium, where $\Pi_0 = (k, K_0, R_0, \{N \setminus K_0 \setminus R_0\}) = (k, \{0\}, \{0\}, N)$ and $\sigma_0 = (\sigma_{k_0}, \{\sigma_i\}_0, \{\sigma_R\}_{i \in R_0 = \{\emptyset\}})$ is an optimal allocation of the realm's resources. The game is triggered by a random shock γ, which threatens the legitimacy of

the King and potentially shakes the loyalty of the barons. In the case of the period just before Magna Carta, γ can capture the grievances that some barons have over the abuses of King John or John's defeat at the Battle of Bouvines.

At the same time, a baron p is randomly drawn from N, who will be the leader, and the first member, of the rebel coalition. This also captures the specific situation prior to Magna Carta, where there was no obvious rival to the throne or natural leader of the baronial opposition. The rebel leader was Robert Fitzwalter, but it could easily have been another baron.

Then, steps (1) and (2) occur repeatedly from $t = 1$ until some end period $t = T$.

1. A baron 'follower' q is randomly drawn, without replacement, from the set of inactive barons $N \setminus R_{t-1} \setminus K_{t-1}$, and decides whether to join R_{t-1} or K_{t-1}.[16]

2. p decides whether or not to propose to the King a new arrangement in which k gets a smaller share of total resources, while the rest are shared equally by all the barons. That is, p decides whether or not to propose allocation $\sigma_p = (\sigma_{k'}, \{\frac{1-\sigma_{k'}}{N}\})$, where $\sigma_{k'} < \sigma_k$. If p chooses not to propose, repeat (1) and (2); otherwise go to step (3).

3. At T, if no proposal has been made, rebels return to the realm and the rebellion ceases. If a proposal has been made, the King k decides whether to accept or reject the proposal. If he accepts, the game ends and the proposal is implemented indefinitely. If he rejects, the king's loyalist coalition K_T and the rebel coalition R_T fight, incurring respective costs of fighting $\sum_{i \in K_T} c_i$ and $\sum_{i \in R_T} c_i$. If R_T wins, p's proposal is implemented indefinitely. If K_T wins, the original sharing is implemented indefinitely. R_T wins with probability ρ_T (specified below).

Note that since one baron-follower is drawn at each $t = 1, 2, ...T$ without replacement, the number of draws of q and, hence, the terminal time period T cannot be more than the number of barons less the rebel leader p. That is, $T \leq (N - 1)$. Let $T \subseteq (N \setminus p)$ also denote the set of baron-followers drawn.

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[16]Either p approaches a member of $N \setminus R_{t-1} \setminus K_{t-1}$ and asks him to be part of R_{t-1}, or k approaches a member of $N \setminus R_{t-1} \setminus K_{t-1}$ and asks him to be part of K_{t-1}. In any case, refusal of the offer is equivalent to joining the other group. The draw is random in that the order by which p or k approaches any member is random.

At T, the game ends in either of two ways. One, it may end with some or all barons having joined the rebel or loyalist coalition, and where fighting may occur, i.e. at step (3) with $R_T \cup K_T \subseteq N$ and, if there is fighting, with R_T winning with probability ρ_T. Two, the game may end at step (2) with $R_T \cup K_T = N$, and p choosing not to propose.[17]

If there is fighting at T, the probability ρ_T that R_T wins against K_T depends on their relative fighting capacities. Recall that $F_{RT} = \sum_{i \in R_T}(e_i - r_i - c_i)$ is the fighting capacity of R_T, which consists of the moved resources at T, net of fighting costs they have to incur at T. The fighting capacity of K_T is $F_{KT} = \sum_{i \in K_T}(e_i - c_i)$, since none of their resources are moved from the coalition, but they also have to incur fighting costs at T. If R_T and K_T fight at T, R_T wins if $F_{RT} \geq F_{KT} + \gamma$, where γ is randomly drawn from distribution G with density g. Let g exist everywhere, be differentiable, single-peaked and symmetric around zero.[18]

The players of the game are k and each baron $i \in (T \cup p) \subseteq N$ drawn to play as rebel leader p at $t = 0$ or follower q at each $t = 1, 2, ..., T$. A strategy profile thus specifies a chosen action of the King, and those of the barons drawn to play either as leader p or follower q. Let α_k denote the probability that the king accepts the proposal, μ_p the probability that the rebel leader p makes the proposal, ψ_q the probability that a responder q drawn at t joins existing rebel coalition R_{t-1} (and $1 - \psi_q$ the probability he joins existing loyalist coalition K_{t-1}). A strategy profile is thus $\Sigma = \{\alpha_k, \mu_p, \{\psi_q\}_{i \in T \subseteq (N \setminus p)}\}$, where $\{\psi_q\}_{i \in T \subseteq (N \setminus p)} = (\psi_{q_1}, \psi_{q_2}, ..., \psi_{q_T})$ is the collection of baron-follower actions, with ψ_{q_1} denoting the action of the baron-follower drawn at $t = 1$, ψ_{q_2} the action of the baron-follower drawn at $t = 2$, etc. These actions specify the composition of the rebel and loyalist coalitions at each time period. That is, $\{\psi_q\}_{i \in T \subseteq (N \setminus p)}$ maps on to $\{(K_t, R_t)\} = \Big((K_1, R_1), (K_2, R_2), ..., (K_T, R_T)\Big)$. A strategy profile Σ induces respective expected payoffs $V^k(\Sigma), V^p(\Sigma), \{V^q(\Sigma)\}_{i \in T \subseteq (N \setminus p)}\}$ for the King k, a proposer p and each responder q.

3.2 Equilibrium

Our solution concept is subgame perfect equilibrium. In what follows, we present smaller results (Lemmas) obtained through backward induction, which are used to prove the main results,

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[17]Since proposing may lead to fighting, and fighting is costly, in equilibrium, p can assemble a rebel coalition and not propose.

[18]Acemoglu and Robinson 2022 use the same specification for the probability of winning in conflict. This is more general than contest-success functions that is widely used in conflict models.

Theorem 1 and Corollaries 1 and 2, in section 4. Of particular interest is Lemma 4, which we empirically test in section 5. The proofs of the Lemmas are in the Appendix.

At T, if no proposal has been made, the game ends and the realm returns to its initial feudal order $f_0(\pi_0, \sigma_0)$. If a proposal has been made, the King k compares his expected payoffs from accepting and rejecting p's proposal, expecting that p makes the proposal with probability μ_p, and taking as given the composition of the rebel and loyalist coalitions at each time period $t = 1, 2, ...T$. Accepting the proposal is his optimal choice if $V^k(\alpha_k = 1, \mu_p = 1, \{(K_t, R_t)\}) \geq V^k(\alpha_k = 0, \mu_p = 1, \{(K_t, R_t)\})$.

The following result is obtained.

Lemma 1. *In equilibrium, the King is more likely to accept a rebel leader's proposal the more of the following conditions hold:*

1. *the rebel coalition has large movable resources and low fighting costs*

2. *the loyalist coalition has small resources and high fighting costs*

Also at T, the rebel leader p compares his expected payoffs from proposing the new arrangement or not, expecting that k accepts with probability α_k, and taking as given the composition of the rebel and loyalist coalitions at each $t = 1, 2, ..., T$. Proposing is p's optimal choice if $V^p(\alpha_k, \mu_p = 1, \{(K_t, R_t)\}) \geq V^p(\alpha_k, \mu_p = 0, \{(K_t, R_t)\})$.

This gives the following result.

Lemma 2. *In equilibrium, a rebel leader p is more likely to propose to the King the more of the following conditions hold:*

1. *the rebel leader is not too powerful in the realm*

2. *the rebel coalition has large moveable resources and low fighting costs*

3. *the loyalist coalition has small resources and high fighting costs*

Expecting that a proposal is made by p with probability μ_p and that it is accepted by k with probability α_k, the last baron-follower drawn (at T) compares his expected payoffs from joining the existing rebel coalition R_{T-1} and those from joining the existing loyalist coalition K_{T-1},

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taking as given the composition of these coalitions from $t = 1, 2, ..., T - 1$. The optimal choice of this T^{th} baron is to join R_{T-1} if $V^q(\alpha_k, \mu_p, \psi_{qT} = 1, \{(K_{t-1}, R_{t-1})\})_T \geq V^q(\alpha_k, \mu_p, \psi_{qT} = 0, \{(K_{t-1}, R_{t-1})\})_T$ (and K_{T-1} otherwise), with subscript T indexing the Tth baron.

Moving backward, the baron follower drawn at $T - 1$ compares his expected payoffs from joining R_{T-2} and those from joining K_{T-2}, expecting μ_p, α_k and ψ_T, taking as given the composition of these coalitions from $t = 1, 2, ...T - 2$. His optimal choice is to join R_{T-2} if $V^q(\alpha_k, \mu_p, \psi_{qT}, \psi_{qT-1} = 1, \{(K_{t-2}, R_{t-2})\})_{T-1} \geq V^q(\alpha_k, \mu_p, \psi_{qT}, \psi_{qT-1} = 0, \{(K_{T-2}, R_{T-2})\}_{T-1} = 0$ (and K_{T-2} otherwise), with subscript $T - 1$ indexing the $(T-1)^{th}$ baron.

We iterate backwards until the first baron drawn at $t = 1$ who, expecting μ_p, α_k, and $(\psi_{qT}, \psi_{qT-1}, ..., \psi_{q2})$, compares his expected payoffs from joining p in forming R_1 (that is, with p already in R_1), and those from being the first loyalist to form K_1, taking as given $\{(K_0, R_0)\} = \{(\{0\}, \{0\}\}$. Note, then, that $R_1 = \{p, q_1\}$ and $K_1 = \{0\}$ if the first baron joins the rebel coalition; otherwise, $R_1 = \{p\}$ and $K_1 = \{q_1\}$.

This gives the following result.

Lemma 3. *In equilibrium, a baron-follower $i = q$ is more likely to be in the rebel coalition the more of the following conditions hold:*

1. *the baron-follower is not very powerful in the realm, has large movable resources, and low fighting cost*

2. *the rebel coalition has large movable resources and low fighting costs*

3. *the loyalist coalition has small resources and high fighting costs*

This result is easily modified when barons are myopic. In particular, suppose a baron-follower $i = q$ can only see, i.e. with probability 1, the actions of a subset $S_{i=q}$ of other baron-followers, and sees, with probability 0, the actions of baron-followers not in $S_{i=q}$. To motivate this, consider that in the medieval world, communications are so costly that information is more reliably obtained from one's family network. Baron $i = q$'s family network could then constitute $S_{i=q}$.

This readily obtains the following.

Lemma 4. *In equilibrium, a myopic baron-follower $i = q$ who only sees the actions of a subset $S_{i=q}$ of other baron-followers is more likely to be in the rebel coalition the more of the following conditions hold:*

1. *the baron-follower is not very powerful in the realm, has large moveable resources, and low fighting cost*

2. *the rebel coalition in $S_{i=q}$ has large moveable resources and low fighting costs*

3. *the loyalist coalition in $S_{i=q}$ has small resources and high fighting costs*

4 Patterns of Institutional Change

Taken together, Lemmas 1 to 4 imply that there are several (minimum) threshold values for rebels' moveable resources and loyalist fighting costs and several (maximum) threshold values for rebels' fighting costs and loyalist resources that together determine the relative sizes of the rebel and loyalist coalitions, whether a proposal is likely made and, if it does, whether it is likely to be accepted. These thresholds can then be used to construct equilibrium outcomes in which Magna Carta is implemented, i.e. in which institutional change occurs. We demonstrate it here as proof of our main result, Theorem 1.

Denote as $\mathcal{E}_R \equiv \sum_{i \in R_T}(e_i - n_i)$ the one-period movable resources of the full coalition of rebels, and $\mathcal{K}_R \equiv \sum_{i \in R_T} c_i$ its cost of fighting. Similarly, let $\mathcal{E}_L \equiv \sum_{i \in K_T} e_i$ be the one-period resources of the full coalition of loyalists, and $\mathcal{K}_L \equiv \sum_{i \in K_T} c_i$ its cost of fighting.

Lemma 1 makes possible the existence of a collection of such threshold values for the King for a given γ, denoted as $\{\underline{\mathcal{E}}_R^k, \bar{\mathcal{K}}_R^k, \bar{\mathcal{E}}_L^k, \underline{\mathcal{K}}_L^k\}$, such that if $\mathcal{E}_R \geq \underline{\mathcal{E}}_R^k$, $\mathcal{K}_R \leq \bar{\mathcal{K}}_R^k$, $\mathcal{E}_K \leq \bar{\mathcal{E}}_L^k$, and $\mathcal{K}_L \geq \underline{\mathcal{K}}_L^k$, then the King accepts the proposal.

Note that Lemma 1 does not guarantee that the proposal is accepted when only one of the conditions therein are met; it simply says it becomes more likely as more of these conditions are met. However, for a given γ, one can construct minimum values $\underline{\mathcal{E}}_R^k$ and $\underline{\mathcal{K}}_L^k$ and maximum values $\bar{\mathcal{K}}_R^k$ and $\bar{\mathcal{E}}_L^k$ which, when taken all together, are just sufficient to meet all four conditions. These values are different from other threshold values that enable just one condition to be met one at a time. For instance, consider the value of $\mathcal{E}_R$ that would be sufficiently large to induce

the King to accept, *even with* high rebel fighting costs, high loyalist resources, or low loyalist fighting costs. This $\mathcal{E}_R$ would have to be larger than $\bar{\mathcal{E}}_R$ to compensate for the countervailing effect of the other variables. Thus, the thresholds $\{\underline{\mathcal{E}}_R^k, \bar{\mathcal{K}}_R^k, \bar{\mathcal{E}}_L^k, \underline{\mathcal{K}}_L^k\}$ are what would be together just sufficient to induce the King to accept.

Now define indicator variable T_k to be equal to one if $\mathcal{E}_R \geq \underline{\mathcal{E}}_R^k$, $\mathcal{K}_R \leq \bar{\mathcal{K}}_R^k$, $\mathcal{E}_K \leq \bar{\mathcal{E}}_L^k$, and $\mathcal{K}_L \geq \underline{\mathcal{K}}_L^k$; and zero otherwise. Then the King accepts the proposal when $T_k = 1$.

Similarly, one can define a collection of threshold values for a rebel leader p for a given γ which, when all met, induce him to make a proposal. Because there can be as many as N barons that can be drawn to be the rebel leader, there are as many as N sets of threshold values. Among these, the most restrictive would be the thresholds of the most powerful baron in the realm. In order for a baron with very high share $\sigma_{i=q}$ to propose, $\mathcal{E}_R, \mathcal{K}_L$ must be very high, and $\mathcal{K}_R, \mathcal{E}_L$ very low, to compensate for the high $\sigma_{i=q}$ (by Lemma 2). If these are met, then the thresholds for all other, less powerful, barons are met. This means that given γ, any baron drawn to be a rebel leader will propose.

Thus, let $\{\underline{\mathcal{E}}_R^p, \bar{\mathcal{K}}_R^p, \bar{\mathcal{E}}_L^p, \underline{\mathcal{K}}_L^p\}$ be the threshold values for the most powerful baron, and indicator variable T_p be equal to one if $\mathcal{E}_R \geq \underline{\mathcal{E}}_R^p$, $\mathcal{K}_R \leq \bar{\mathcal{K}}_R^p$, $\mathcal{E}_K \leq \bar{\mathcal{E}}_L^p$, and $\mathcal{K}_L \geq \underline{\mathcal{K}}_L^p$, and zero otherwise. Then, *any* rebel leader $p \in N$ proposes if $T_p = 1$.

Lastly, one can list the baron-followers in $T \subseteq \{N-1\}$ in ascending order according to their share or power in the realm. Denote as i^n the nth baron-follower in this list. Then, given γ, one can construct threshold values for this baron: $\{\underline{\mathcal{E}}_R^n, \bar{\mathcal{K}}_R^n, \bar{\mathcal{E}}_L^n, \underline{\mathcal{K}}_L^n\}$ and indicator variable T_n that is equal to one if $\mathcal{E}_R \geq \underline{\mathcal{E}}_R^n$, $\mathcal{K}_R \leq \bar{\mathcal{K}}_R^n$, $\mathcal{E}_K \leq \bar{\mathcal{E}}_L^n$, and $\mathcal{K}_L \geq \underline{\mathcal{K}}_L^n$, and zero otherwise. The nth baron-follower joins the rebel coalition if $T_n = 1$.

Note, then, that if $T_n = 1$, then baron-followers $i^{n-1}, i^{n-2}, ..., i^1$ who are less powerful in the realm than i^n are certainly also in the rebel coalition. Those who are more powerful than i^n, however, may still be in the rebel coalition, as $\mathcal{E}_R$ or $\mathcal{K}_L$ may be very large and $\mathcal{K}_R$ or $\mathcal{E}_L$ be very small such that they compensate for the sizeable power of the other barons. Thus, $T_n = 1$ implies that there are at least n members in the rebel coalition. Meanwhile, $T_n = 0$ implies that there are at most $n - 1$ members in the rebel coalition. Note, then, that T_n can also indicate whether the rebel coalition is approximately large or small. In fact, if $n = \frac{T}{2}$, then T_n indicates

whether the rebel coalition is larger than the loyalist coalition.

The above is true for any set $T \subseteq \{N - 1\}$ of baron-followers drawn to play from $\{N - 1\}$. One simply lists them in ascending order of power in the realm, and construct threshold values for the nth baron in this list, and corresponding indicator variable T_n. Setting $n = \frac{T}{2}$, the rebel coalition is larger than the loyalist coalition if $T_n = 1$.

We can construct different equilibria based on the values of T_k, T_p, and T_n. The outcomes of these equilibria describe the different patterns of institutional change. For instance, when $T_k = 1$, $T_p = 1$, and $T_n = 0$, any rebel leader proposes with a rebel coalition that is relatively small, and the King accepts the proposal. The outcome is, thus, peaceful institutional change led by a small rebel coalition. If $T_k = 0$, $T_p = 0$, and $T_n = 1$, no institutional change occurs even with a large rebel coalition. There are six equilibrium outcomes, four of which depict institutional change (peaceful or otherwise). The table below summarizes.

$(T_k = 1, T_p = 1, T_n = 1)$	peaceful institutional change, large rebel coalition
$(T_k = 1, T_p = 1, T_n = 0)$	peaceful institutional change, small rebel coalition
$(T_k = 0, T_p = 1, T_n = 1)$	violent institutional change, large rebel coalition
$(T_k = 0, T_p = 1, T_n = 0)$	violent institutional change, small rebel coalition
$(T_k = \{0, 1\}, T_p = 0, T_n = 1)$	no institutional change, large rebel coalition
$(T_k = \{0, 1\}, T_p = 0, T_n = 0)$	no institutional change, small rebel coalition

These equilibrium outcomes show that sufficient for institutional change to occur is that $T_p = 1$. If this holds, then from $T + 1$ onward, the realm is guaranteed to be once again unified into a single coalition and to have a more inclusive power-sharing arrangement σ_p. Recall that $T_p = 1$ requires that the thresholds for rebels' movable resources, loyalists' resources, rebels' and loyalists' fighting costs are all met for the baron with the largest σ_i in the realm.

The above thus constitutes the proof of our main result:

Theorem 1. *The feudal order $f_0 = (\Pi_0, \sigma_0)$ is guaranteed to change to $f = (\Pi_0, \sigma_p)$ from $T + 1$ onwards if, following some random event γ, the most powerful baron in the realm can potentially assemble a rebel coalition with sufficiently large movable resources and sufficiently low fighting costs, i.e. such that $T_p = 1$.*

Note that this is a sufficiency condition, as the thresholds for movable resources and low fighting costs for the most powerful baron are more restrictive than for other barons. Thus, it can happen that the thresholds for a less powerful baron are met, e.g. movable resources are large enough for this baron, but not for a more powerful baron. In this case, institutional change would occur if the less powerful baron were to lead the rebellion, but not if the more powerful one did.

The theorem thus reveals how *difficult* it is to *guarantee* institutional change. It becomes inevitable only if the rebel coalition's movable resources are so large and their fighting costs so low such that even the most 'favored' in the realm – the baron with the largest share σ_i, would be willing to lead a rebellion to change the status quo.

In practice, these conditions may rarely hold. The fact that the crisis in 1215 resulted in lasting institutional change under the leadership of a baronial coalition who were not the most powerful barons implies that Magna Carta might have been a highly contingent phenomenon. As we document in Table A13 neither Robert Fitzwalter, nor the other baronial leaders were economically prominent or central to the network of barons. Robert Fitzwalter himself controlled no baronial castles or nor any markets or fairs. For these barons, the rebel coalition's movable resources happened to be large enough (and fighting costs small enough) to induce them to lead the fight for Magna Carta.

That the size of movable resources was a crucial determinant of institutional change is supported with historical record. England in 1215 was a prosperous medieval economy. Although we lack estimates for per capita GDP in 1215 – the earliest comprehensive estimates are for 1270, Broadberry (2022) nonetheless suggests considerable growth on both the extensive and intensive margin between 1086 and 1215, with population increasing from 1.71 million in 1086 to 4.36 million by 1270 and per capita GDP remaining roughly constant or perhaps increasing slightly. Within the constraints of a Malthusian economy, this suggests considerable market development and technical progress. In turn, a more commercially driven realm has relatively more movable resources than one that relies on rents from land which are less movable.

Two corollary results are readily implied by Theorem 1. One is that, for a given set of resources, movable and immovable, and the set of fighting costs of each baron, a realm that

starts off with a very extractive ruler, i.e. very large σ_k, is more likely to experience institutional change, than a realm with a less extractive ruler. The proof is that when σ_k is close to one, the share of even the most powerful baron would be small, which makes the thresholds for this baron more easily met. Thus:

Corollary 1. *The more extractive the feudal order, i.e. $f_0 = (\Pi_0, \sigma_0)$, $\sigma_k \to 1$, the more likely it undergoes institutional change following some random event γ.*

The other implication is that, given the set of movable and immovable resources, set of fighting costs, and the extractiveness σ_k of the King, institutional change is more likely to occur when the allocation of power among the barons is more egalitarian. For proof, note that since the share of the most powerful baron is constrained to be similar to others' shares, it cannot be very large. This, then, makes it easier for $T_p = 1$ to hold. Thus:

Corollary 2. *The more egalitarian the feudal order, i.e. $f_0 = (\Pi_0, \sigma_0)$, $(\max\{\sigma_i\} - \min\{\sigma_i\}) \to 0$, the more likely it undergoes institutional change following some random event γ.*

The foregoing results suggest that the feudal order just before Magna Carta was extractive and egalitarian. These predictions have empirical support. By medieval standards, John was a highly extractive ruler (see Figure 1a). Stasavage (2020, 204-205) notes that while "John was not especially extractive in a global context, compared to the Song rulers of China or the Abbasid caliphs . . . he was, however, highly extractive relative to prior feudal rulers." In the years between 1204 and 1214 he acquired tremendous revenues.

The distribution of land and resources among the baronage was relatively egalitarian compared to earlier and later periods of English history. Evidence for this comes from data on baronial incomes c. 1200 from Painter (1943) and 1436 from Gray (1934). Systematic data on baronial incomes is scarce, but Painter (1943) estimated the baronial income for 54 barons who he suggests are "a fair sample" of the baronial at this period. This data suggests a fairly even distribution of income: the average income of the barons was £202 (median income £115). Seven barons earned over £400. The richest baron had an income of £800 (Figure 4a). Overall, the level of inequality was fairly modest: we report both the generalized entropy index and Gini coefficients in Table 4.

Painter (1943) also provides suggestive evidence that baronial incomes later became more unequal over the course of the 13th century. The average income he calculates for this period is £668 with a median of £339. In other words, the median as a proportion of the mean fell from 57% to 50%.[19] Inequality among the elite likely reduced over the course of the 14th century. Nonetheless, the tax data compiled by Gray (1934) suggests that the distribution of incomes among elites was still more concentrated in 1436 than it had been in 1200. Our preferred measure of inequality – the GE(2) index, increased from 0.397 to 0.479, whereas the Gini coefficient increased from 0.455 to 0.469 (Figure 4).

Figure 4: The Distribution of Baronial Income
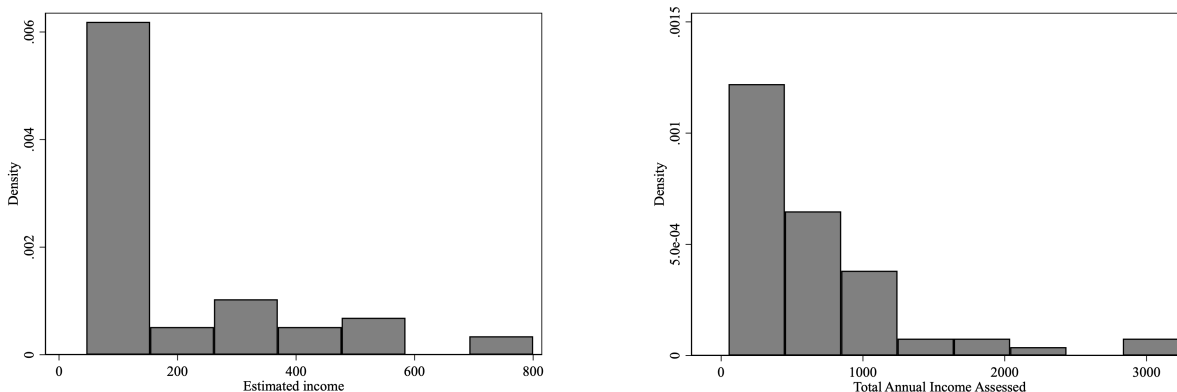
(a) The distribution of baronial incomes c. 1200. Data source: Painter (1943).

(b) The distribution of lords incomes in 1436. Data source: Gray (1934).

	Time Period	GE(2)	Gini	90/10 ratio
Estimates of Baronial Income	c. 1200	0.397	0.455	10
	1436	0.479	0.469	11.11

Notes: This table reports estimates for the distributional of baronial income in c. 1200 and in 1436. We report three measures (i) the generalized entropy index, parameterized at $\alpha = 2$; (ii) the Gini coefficient; and (iii) the 90/10 ratio. Data for c. 1200 are from Painter (1943). Data for 1436 are from Gray (1934).

As a final note about the model, recall the importance of exogenous shocks that occur at the start of the game. John's defeat in Normandy can be interpreted as a particular draw of random variable γ that triggers the formation of the rebel coalition in the Spring of 1215, eventually

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[19]This is consistent with Turchin and Nefedov (2009) who argue that elite competition intensified after 1300 and finds that the number of elites significantly fell by 15th century with elite wealth becoming more concentrated. Using data from Painter (1943), they note that in 1200, the "ratio of maximum to average income among the barons was only 4:1" but 100 years later "The maximum to average income ratio was 16:1" (Turchin and Nefedov, 2009, 57-58).

culminating in John's acquiescence to the terms of Magna Carta in June 1215. Shortly thereafter, however, another shock occurs— another draw of γ, which is the decision of Pope Innocent III in late August 2015 to render Magna Carta illegal. This prompted another play of the game: open war ensues between another set of loyalists and another set of rebel barons, and the latter. Then other shocks occurred – the French invaded and King John died. New loyalist and rebel coalitions formed, and eventually Magna Carta was reissued in Henry III's name.

The model thus applies whenever a shock provides an opportunity for the institutional status quo to change. Since, after each particular shock, particular loyalist and baron coalitions can form, an institution such as Magna Carta can be upheld for a stretch of time, until another shock occurs that provides impetus for change under a possibly different rebel coalition, against a possibly different loyalist coalition. The English experience reveals that Magna Carta was initially the equilibrium outcome (i.e. after John's defeat in Normandy), then it was not (after Pope Innocent III's annulment thereof). It was only during Henry III's reign that it became the equilibrium outcome for a very long time period thereafter.

5   Econometric Analysis

Theorem 1 points to movable resources as an important determinant of institutional change in a feudal realm. Intuitively, barons can reclaim movable resources to fund rebellion, encouraging individual barons to join the rebel coalition, and emboldening the rebel leader to make demands from the King. With a strong rebellion, the King is likely to accede to these demands, or be defeated in battle. Either way, the rebels' demands are eventually met.

Indirect evidence for Theorem 1 can be obtained by testing whether the underlying lemmas hold. If at least one does not, then Theorem 1 cannot hold. Whether the optimal actions of the King or the rebel leader follow our model, i.e. Lemmas 1 and 2, cannot be systematically tested as this would require data on multiple instances of institutional change. We can test whether barons behave as predicted by our model during the Magna Carta crisis, i.e. Lemmas 3 and 4. We predict that a baron is more likely to be in the rebel coalition if the latter has large movable resources. We focus on identifying this in our empirical analysis, although in many specifications we also control for the other conditions – loyalist resources and fighting costs, and the baron's

role in the realm.

There are two main challenges to identification. In equilibrium, there is only one rebel coalition (and one loyalist coalition). Thus even if data on movable resources for this coalition can be constructed, there is no variation across barons. For each baron, the size of the movable resources of the rebel coalition is the same. To solve this problem, we use Lemma 4, rather than 3, to derive the alternative hypothesis that a baron is more likely to join the rebel coalition if the rebel coalition *in his particular subset* $S_{i=q}$ has large moveable resources. This solution is not merely mechanical, since the barons would have largely relied on their family network – a particular kind of $S_{i=q}$, for reliable information. It would have been difficult, if not altogether impossible, to ascertain if some baron outside of their network had joined the rebels or otherwise pledged their loyalty to King John. By Lemma 4, it is the movable resources of the rebels in the baron's family network – a subset of the entire rebel coalition, that influences the likelihood that the baron joins the rebel coalition.[20] Since each baron has a different family network, there is baronial-level variation in the movable resources of the (subset of) rebel coalition.

There is still the issue, however, of the possible endogeneity of such network-specific rebel movable resources. In the first place, many marriages were strategic alliances. This means that if a baron's family network is not a random assignment of barons, but rather one that is entered into by barons for considerations of, for instance, wealth, then the size of the movable resources of that network is also non-random. Second, even if family networks are exogenous, movable resources themselves may be related to other reasons that would make a baron want to rebel. The King may have been more abusive to barons who have less, or more, movable resources. While we control for a baron's personal grievances against King John, this may not capture all possible grievances a baron could have had.

To alleviate such concerns, we thus use as an instrument for network-specific rebel movable resources the baron's ancestor-specific rebel movable resources. We construct, for each baron, an ancestor network, which consists of the fathers or grandfathers of each member of the current family network. We then use data on the movable resources of these ancestors in the network to construct our instrument for the moveable resources within baron's family network in 1215.

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[20]This would not be inconsistent with the conjecture by Painter (1949) that blood relationships among barons was an important factor in the formation of the rebel coalition.

5.1 Data

Our main source of information on barons is the Oxford Dictionary of National Biography (ODNB). We relied on the ODNB, supplemented with other sources described in Appendix A, to gather personal and political characteristics about each baron alive during John's reign. We also collected data on each land held by each baron from Sanders (1960). Specifically we can associate each baron with caput of one or more baronies (the exact borders of medieval baronies are unknown). Appendix A provides more details on all our sources.

We collect a host of baron and barony-level covariates. Baron-level characteristics include their age; the year they attained their barony; their gender; their past military experience; whether or not a baron had a personal grievance against King John (or to the contrary had good relations with him prior to 1215); and whether they had refused to serve in John's Poitou campaign in 1214. We also know which baronial castles a baron was in possession of in 1215. Our barony level characteristics include a host of geographic variables such as ruggedness, soil quality, proximity of a river, Roman road or sea coast and variable that reflects its economic importance such as the presence of markets and variables, its "knights fee" which was an estimate of how many knights it could support; and a measure of its least-cost travel path to London. We also create fixed effects for the county or region a barony was in. We report summary statistics in Table A2. Details of these variables and how they were constructed is provided in Appendix A. We also report balance on these variables in Table A3.

Our main measure of moveable resources is the number of castles owned by a baron. This was an important determinant of his ability to defend his land. As Brown (2004, 123) observed "the military role of the castle was not just defensive but also offensive". Indeed, the latter was more important as "it was the offensive capacity of the castle, its function as a base, heavily defended, for active operations by means of which the surrounding countryside could be controlled, that gave it much of its value in war, made it the prized object of attack". In "the minds of contemporaries control of England consisted in the mastery of its more important castles" (Pounds, 1990, 114-115). Specifically, in the context of our model, castles, and the land around them, are movable in the sense that they can be defended and thus removed from the control of the King. Indeed, the "pretensions of the barons hinged on their control of castles"

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Figure 5: The Spatial Distribution of Our Variables

(a) The Location of Castles

(b) The Location of Markets & Fairs

Castle Owner's Allegiance: ● Rebels ● Loyalists ● Neutral/Unknown Ownership

Allegiance ● Rebel ● Loyal ● Neutral

Number of Markets and Fairs · 0.0 ● 2.5 ● 5.0 ● 7.5
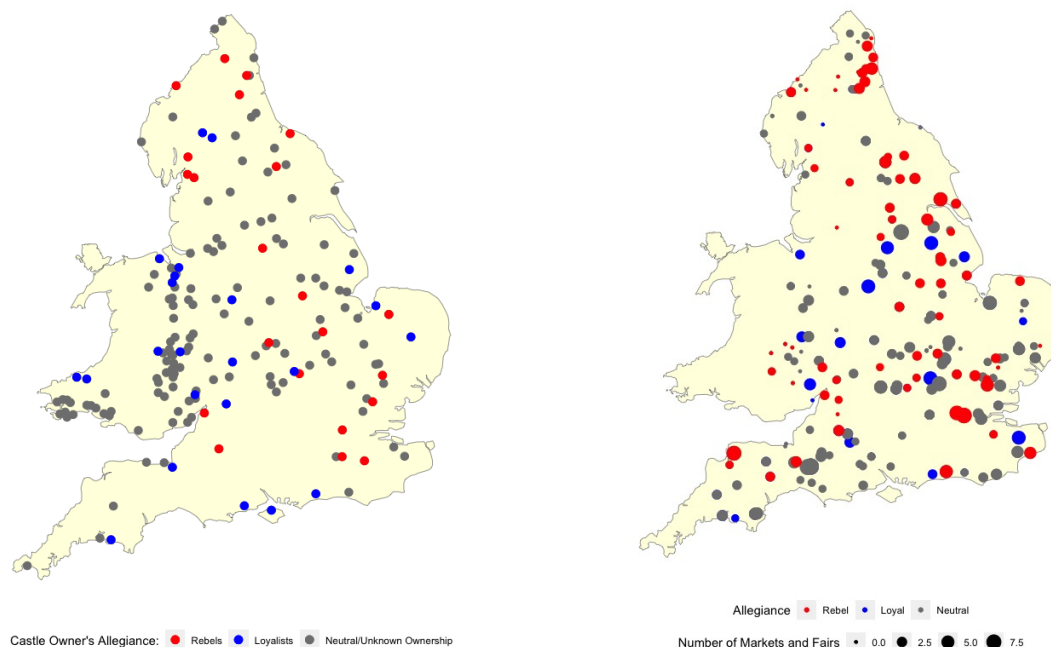
The location and allegiances of the castles in England in 1215.

The location by allegiance of the markets and fairs in England in 1215.

Data sources: see main text and Appendix A.

(Pounds, 1990, 117). We collected data on all baronial castles in early 13th century England from Brown (1959). We geolocated these and matched them to the list of English baronies in Sanders (1960) by baron. The location of these baronial castles is provided in Figure 5a. For further details on these baronial castle see Appendix A.

Our second measure of moveable resources are the number of markets and fairs in 1215. Markets and fairs are matched to baronies using a buffer of 10km radius around the barony caput. We depict this data in Figure 5b.

We also collected information on whether a baron had a specific personal grievance against King John. Our analysis will focus on structural factors but historians have long emphasized the importance of personal grievances. In the context of our model, these can be collectively captured by random event γ preceding a rebellion. Specifically, grievances against King John came in three categories: (i) barons who John had taken hostages from; (ii) barons in debt to John; and (iii) grievances that concerned the king's loose sexual mortality. Appendix Figure A2

depicts the geographical distribution of these personal grievances.

To construct each the baron's family network (subset $S_{i=q}$ in Lemma 4), we use information from the *ONDB* and *Wikitree*. In order to implement our instrumental variable strategy we perform the same exercise for the fathers and grandfathers of each baron in our dataset. Family networks were of critical importance in a feudal society. Contemporaries were acutely aware of the blood relations that bound them. Answering his own question about the importance of family relationships under feudalism, Painter (1961b, 219) concluded that "family alliances thus formed played a part, at times, an important part, in English feudal politics."[21] To construct a baron's family network, we allow up to 16 connections between barons. For each of the barons in a network, we note whether the baron was a rebel or a loyalist. Figure 6a depicts the entire network.
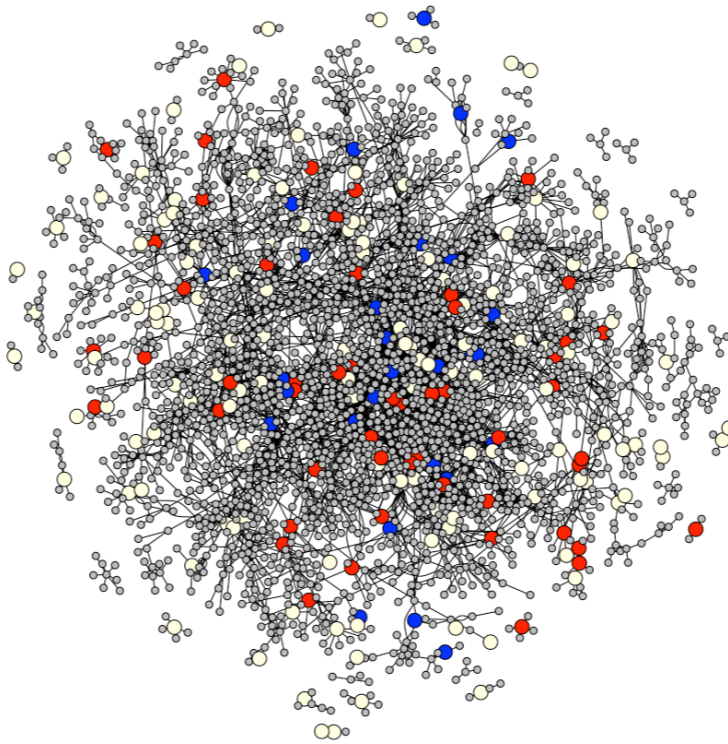
(a) The complete network of elites by allegiance in 1215. Filed circles are barons in our dataset. Small grey circles are family members (wives, siblings, children).

Figure 7a depicts the specific geography of the network of William Marshall, a leading loyalist,

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[21]Indeed, in an earlier study of Magna Carta, Painter (1949, 291) notes that "[a]n examination of the list of rebellious barons indicates that fairly distant blood relationship may have played a part in forming the baronial party".

denoting rebel and loyal barons within his family network (in black and white respectively). This figure indicates that baronial families were closely intertwined and that there were no obvious geographical patterns to either a baron's family network or his choice of allegiance. Figure 7b depicts the network of Eustace de Vesci, a leading rebel. To construct our independent variable of interest – Castles in Rebel Network—our main proxy for the movable resources of the rebels in the baron's network—we add all the castles that each rebel baron in the network had.

Figure 7: The family networks of selected barons

(a) The family network of William Marshall, a leading loyal baron. (b) The family network of Eustace de Vesci, one of the rebel leadership.

5.2 The Effect of Moveable Resources on Opposing John

We have a cross-section of all barons alive in 1215. To construct our binary dependent variable, Opposed John in 1215, we assign a value of one if the baron is in the list of those who actively rebelled and zero otherwise. The 103 inactive barons are included in the sample and assigned a zero. We use this variable in all the reported regressions in the main text. For robustness, we reconstruct Opposed John in 1215 by assigning a value of one if the baron is in the list of active rebels, and zero if he is in the list of active loyalists. This drops the inactive barons from the

sample. Results using this variable are reported in the Appendix.

Our main proxy for the independent variable of interest — the network-specific rebel movable resources, is the number of castles of the rebels in the baron's network. We estimate regressions of the following form:

$$\text{Opposed John in } 1215_i = \alpha + \beta(\text{Rebel Moveable Resources in Family Network})_i + \mathbf{X}_i\mathbf{\Omega} + \gamma_c + \epsilon_i ,$$

(1)

where our main proxy for Rebel Moveable Resources in Family Network$_i$ is the number of castles held by all the rebel barons in baron i's family network. Vector $\mathbf{X}_i$ includes a vector of baron and barony-level characteristics. Table 2 reports our preferred specifications where we sequentially introduce a host of baron-level characteristics, geographical and economic characteristics and county-level fixed effects. Baron-level characteristics include indicators for whether they had personal grievances against King John and whether a baron was already in public opposition to John by January 1215. Geographical controls include average ruggedness, soil quality, and whether a barony was coastal, had a river, or had a Roman road passing through it. Economic controls are the total number of markets and fairs in a barony and that baron's assessed knight's fee. Note that we find no strong associations between other immovable resources at the coalition level such as soil quality or measures of trade connectivity and joining the rebel coalition.

Conventional approaches to clustering standard errors may be unreliable in a network setting (Leung, 2023). We therefore follow Naidu et al. (2021) and implement a fast-greedy community detection algorithm that uses the structure of our network to estimate natural clusters. We report standard errors clustered by the network neighborhood in squared brackets alongside robust standard errors.[22] We also use this algorithm to construct alternative network fixed effects for some specifications.

Consistent with our theory, we find that the number of castles belonging to the rebels in the baron's family network is robustly associated with opposing King John in 1215. To gauge magnitudes we report beta coefficients. A one standard deviation increase in the number of castles among rebels in a baron's family network is associated with a 63% increase in the probability of the baron joining the Magna Carta rebellion (column 5).

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[22]There are 88 clusters.

Table 2: Who Joins the Rebel Coalition? The Role of Movable Resources: Castles

| | Opposed John in 1215 | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Castles in Rebel Network	0.0463***	0.0409***	0.0386***	0.0381***	0.0417***	0.0504***
	(0.00165)	(0.00269)	(0.00352)	(0.00351)	(0.00355)	(0.00514)
	[0.00172]	[0.00263]	[0.00360]	[0.00357]	[0.00343]	[0.00543]
β Coefficient	0.70	0.62	0.58	0.58	0.63	0.58
Personal Grievances		0.310***	0.311***	0.289***	0.238***	0.212*
		(0.0906)	(0.0935)	(0.0912)	(0.101)	(0.0921)
		[0.0899]	[0.0889]	[0.0857]	[0.0966]	[0.107]
Constant	0.149***	0.123***	0.142*	0.144*	0.0549	0.0814
	(0.0282)	(0.0256)	(0.0948)	(0.0976)	(0.107)	(0.104)
	[0.0303]	[0.0244]	[0.0850]	[0.0886]	[0.106]	[0.103]
Baron Controls			✓	✓	✓	✓
Geographical Controls			✓	✓	✓	✓
Economic Controls			✓	✓	✓	✓
Military Experience				✓	✓	✓
County FE					✓	
Fast-Greedy Community FE						✓
Observations	186	186	185	185	185	185
Adjusted R^2	0.492	0.539	0.541	0.538	0.569	0.573

Tables Notes: This table studies the relationship between moveable resources and personal grievances on the probability of rebellion. Castles in Rebel Network is the number of potential rebel castles in a baron's network. In columns (3)-(6), we include the following baron controls: whether a baron was in public opposition by January 1215, the number of castles in their barony, and the number of baronies the baron held land in. Columns (3)-(6) include geographical and economic controls at the barony level. Geographical controls include average ruggedness, average soil quality, the presence of any Roman roads, any coastline, and any rivers. Economic controls include the number of markets, and the knight's fee. In columns (4)-(6) we also control for military experience. We include county-level fixed effects in column (5). We employ fast-greedy community-level fixed effects in column (6). Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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In Table 3 we report similar results using an alternative proxy for movable resources: Markets and Fairs in Rebel Coalition. This is constructed similarly to our measure of castles in the rebel coalition. We interpret this as an alternative measure of moveable resources as the resources a baron got from markets and fairs in his barony were transportable and highly fungible. Our results are consistent with the predictions of the model, though the magnitudes are somewhat smaller (β coefficient of 0.24).[23]

In Appendix Table A12 we include the resources of the loyalists in a baron's family network. These are associated with greater loyalty to John as predicted. Including them strengthens the coefficient on rebel resources. In Appendix Table A6, we show that our results are robust

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[23]Note that our two measures of movable resources pick up the same variation and when we include them together in a single "horserace" only Castles in Rebel Network$_i$ retains its size and significance (Appendix Table A15). Table A15 also suggests that non-movable resources in the rebel coalition such as high quality agricultural land or geographical features that supported commerce are not associated with the decision to rebel.

when we drop (i) the top 5, 10, 15, and 20 barons as measured by the number of knights they owed the king; (ii) the earls; (iii) the barons with multiple baronies; and (iv) barons who had refused to serve with John in Poitou in 1214. As we have a large number of covariates and limited power, we also report results with a lasso specification in Appendix Table A8. The lasso consistently retains our main explanatory variable. Finally, we report results where we drop inactive barons and estimate a Heckman selection model to alleviate potential concerns about selection (Appendix A17).

What about alternative explanations? An important alternative hypothesis to consider is the direct role of family networks. Indeed Table A5 suggests that there is a strong relationship between various network measures and the probability of joining the Magna Carta rebellion. Barons who have a closer network distance to the King were more loyal as were barons who had higher measures of network (both degree and eigenvector centrality). Loyal barons also were, as expected, more connected to one another and rebellious barons also shared greater network connections (Appendix Table A5). To account for this alternative set of explanations, in Table 4, we control sequentially for each of these measures of network connectivity. Our preferred proxy of the rebel coalition's movable resources, Castles in Rebel Network, remains large in magnitude and precisely estimated. This suggests that movable resources played a role in the Magna Carta rebellion that was independent of simple family networks.

In Appendix Table A11 we explore the robustness of our results by varying the size of the family network. As expected, the magnitude and precision of our estimates somewhat decrease as the network becomes small. Overall, our results are highly robust.

5.3   *Instrumenting Movable Resources*

There is a concern that the distribution of moveable resources among the barons may be endogenous. As we discuss in Appendix A the distribution of castles was largely determined by factors such as strategic geography and the presence of past fortification but in some cases, King John was able to influence which barons were allowed to build, fortify or maintain their own baronial castles.

We address this by instrumenting the movable resources within each baron's family network by the moveable resources of previous generations. Specifically, for our main explanatory variable,

Table 3: Who Joins the Rebel Coalition? The Role of Movable Resources: Markets and Fairs

| | Opposed John in 1215 | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Markets and Fairs in Rebel Network	0.00278***	0.00238***	0.00165*	0.00176**	0.00267***	0.00257**
	(0.000841)	(0.000766)	(0.000812)	(0.000843)	(0.00107)	(0.000993)
	[0.000954]	[0.000882]	[0.000836]	[0.000852]	[0.000993]	[0.00159]
β Coefficient	0.24	0.21	0.14	0.15	0.24	0.23
Personal Grievances		0.572***	0.525***	0.485***	0.434***	0.464***
		(0.0806)	(0.0893)	(0.0914)	(0.111)	(0.0689)
Constant	0.205***	0.138***	0.112	0.0917	0.140	0.140
	(0.0378)	(0.0349)	(0.116)	(0.119)	(0.178)	(0.191)
Baron Controls			✓	✓	✓	✓
Geographical Controls			✓	✓	✓	✓
Economic Controls			✓	✓	✓	✓
Military Experience				✓	✓	✓
County FE					✓	
Fast-Greedy Community FE						✓
Observations	186	186	185	185	185	185
Adjusted R^2	0.0559	0.240	0.303	0.310	0.306	0.306

Tables Notes: This table studies the relationship between moveable resources and personal grievances on the probability of rebellion. Markets and Fairs in Rebel Network is number of potential rebel castles in a baron's network. In columns (3)-(5), we include the following baron controls: whether a baron was in public opposition by January 1215, the number of castles in their barony, and the number of baronies the baron held land in. Columns (3)-(5) include geographical and economic controls at the barony level. Geographical controls include average ruggedness, average soil quality, the presence of any Roman roads, any coastline, and any rivers. Economic controls include the number of markets, and the knight's fee. In columns (4)-(5) we also control for military experience. We include county-level fixed effects in column (5). We consider fast-greedy community-level fixed effects in column n6. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Castles in Rebel Network, we reconstruct the number of castles owned by the baron's family members as the number of castles owned by that family members' fathers or grandfathers. While the distribution of baronial castles in 1215 might have been affected by personal relationships between John and his barons, the distribution of castles in the previous generation or two generations was unlikely to be affected by these factors.

In other words, the exclusion restriction requires the distribution of castles in the previous generation to only affect the loyalty of barons through its effects on the distribution of castles in 1215. This assumption might be violated if there were a variable jointly determining both the past distribution of castles and the loyalty of barons in 1215—for example if there were strong hereditary patterns of loyalty to the crown. Fortunately, in our setting we have evidence that this was not the case. The Angevin royal family frequently fought against one another. Therefore barons with ties to Henry II or Richard I were not necessarily likely to be loyal to John.

Table 4: Who Joins the Rebel Coalition? Robustness to Controlling for the Network

	(1)	(2)	Opposed John in 1215 (3)	(4)	(5)	(6)
Castles in Rebel Network	0.0444***	0.0426***	0.0432***	0.0341***	0.0423***	0.0425***
	(0.00357)	(0.00343)	(0.00394)	(0.00422)	(0.00380)	(0.00347)
	[0.00346]	[0.00316]	[0.00342]	[0.00472]	[0.00321]	[0.00320]
Personal Grievances	0.222**	0.260**	0.270**	0.214**	0.271**	0.259**
	(0.102)	(0.104)	(0.109)	(0.0826)	(0.109)	(0.105)
	[0.0938]	[0.0920]	[0.0929]	[0.0729]	[0.0923]	[0.0917]
Network Measure	0.00740**	-0.000304	0.00153	-0.0111***	-0.0000002	-0.303
	(0.00348)	(0.00371)	(0.00244)	(0.00271)	(0.0000004)	(1.077)
	[0.00380]	[0.00366]	[0.00235]	[0.00308]	[0.00000]	[1.671]
Constant	-0.213	0.0642	0.0110	0.421***	0.0524	0.0528
	(0.203)	(0.138)	(0.166)	(0.141)	(0.144)	(0.141)
Baron Controls	✓	✓	✓	✓	✓	✓
Geography Controls	✓	✓	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓
Network Measure	Ego Distance to King	Degree Centrality	Min Distance to Loyalist	Min Distance to Rebels	Betweenness Centrality	Eigenvector Centrality
Adjusted R^2	0.586	0.568	0.617	0.707	0.616	0.568
Observations	186	186	151	151	151	186

Tables Notes: Castles in Rebel Network is number of potential rebel castles in a baron's network. In all columns (3)-(5), we include baron controls, geography controls, economic controls, and county fixed effects as described in Table 2. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For our second measure of moveable resources, markets and fairs, we use the distribution of markets and fairs in 1190 and 1165 as instruments for their distribution in 1215. The logic is similar, the granting or withdrawal of the right to hold and market or fair could be affect by other factors related to a baron's decision to oppose or support John in 1215. But the distribution of markets and fairs in the past is much less likely to be so affected.

Table 5 reports the results of our instrumental variable analysis. Columns (1)-(4) report the instrumented estimates for our main explanatory variable, Castles in Rebel Network. The second stage coefficients are similar though slightly small in magnitude than our OLS estimates both when we use a baron's father's castles or his grandfather's castles. The first stage reported in Panel B suggests that our instruments are strong with Kleibergen-Paap F-statistics ranging between 40-62.

In Columns (5)-(8) we instrument Market & Fairs in Rebel Network by the distribution of markets and fairs in first 1165 and in 1190. The coefficients we obtain are very similar to the OLS coefficients. Overall, this analysis confirms our initial OLS results. Rebel moveable

Table 5: Who Joins the Rebel Coalition? IV Analysis

Panel A: Second Stage

	(1)	(2)	(3)	Opposed John in 1215 (4)	(5)	(6)	(7)	(8)
Castles in Rebel Network	0.0177**	0.0254***	0.0175**	0.0274***				
	(0.00781)	(0.00727)	(0.00817)	(0.00791)				
	[0.00676]	[0.00617]	[0.00702]	[0.00662]				
Markets & Fairs in Rebel Network					0.00154*	0.00241***	0.00157*	0.00246***
					(0.000806)	(0.000865)	(0.000814)	(0.000863)
					[0.000662]	[0.000736]	[0.000684]	[0.000740]
Constant	0.104	0.0523	0.104	0.0480	0.0750	0.0827	0.0746	0.0823
	(0.0950)	(0.0941)	(0.0950)	(0.0937)	(0.107)	(0.113)	(0.107)	(0.113)
	[0.0902]	[0.0930]	[0.0902]	[0.0920]	[0.101]	[0.118]	[0.101]	[0.118]
Baron Controls	✓	✓	✓	✓	✓	✓	✓	✓
Geography Controls	✓	✓	✓	✓	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓	✓	✓	✓	✓
County FE		✓		✓		✓		✓
Observations	186	186	186	186	186	186	186	186
Adjusted R^2	0.494	0.558	0.492	0.566	0.345	0.368	0.345	0.368

Panel B: First Stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Father's Castles Network	0.117***	0.129***						
	(0.0208)	(0.0249)						
	[0.0209]	[0.0258]						
Grandfather's Castles Network			1.729***	1.823***				
			(0.329)	(0.379)				
			[0.352]	[0.413]				
Markets & Fairs (1190)					1.639***	1.637***		
					(0.00551)	(0.00760)		
					[0.00660]	[0.00896]		
Markets & Fairs (1165)							2.004***	2.000***
							(0.0102)	(0.0137)
							[0.0118]	[0.0143]
Baron Controls	✓	✓	✓	✓	✓	✓	✓	✓
Geography Controls	✓	✓	✓	✓	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓	✓	✓	✓	✓
County FE		✓		✓		✓		✓
Observations	186	186	186	186	186	186	186	186
Kleibergen-Paap F-statistic	59.31	47.13	51.96	37.55	124492.4	84391.5	61645.1	40558.3

Tables Notes: This paper conducts an IV-analysis. We instrument for Castles in Rebel Network by the rebel castles in the family network of each baron's father and grandfather. We instrument for Markets & Fairs in Rebel Network by using the markets and fairs in the network of each baron in 1190 and 1166. The controls are the same as Table 2. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

resources within a baron's family network strongly predict joining the rebellion and supporting Magna Carta.

6 Conclusion

This article provides the first formal and empirical study of Magna Carta, a critical landmark in the historical development of inclusive institutions. We model Magna Carta as an optimal contract between the King and his barons and we ask how such a contract could emerge from a feudal environment in which military power was decentralized. Specifically, we uncover conditions under which a rebel coalition of barons can form and propose a new arrangement to the King and the conditions under which the King will accept these conditions.

Scholars have often speculated about the origins of Magna Carta. In particular, they have asked why, despite John later reneging on it, it lasted (in slightly modified form) and became integrated into English law. They have also explored how it differed from other agreements made between feudal monarchs and their nobility, such as the Golden Bull of Hungary (e.g. Fukuyama, 2011, 378-380).

Our analysis suggests that Magna Carta depended on a fairly narrow set of conditions. It required the conjunction of both a highly oppressive monarch and a fairly egalitarian baronial elite. While it was important that there was no obvious alternative king waiting in the wings (John had no close relatives apart from very young children), above all else Magna Carta required the formation of a strong rebel coalition.

Specifically, our model shows that a rebellion by a group of barons is more likely to result in a self-reinforcing contract between the King and the barons when the King is highly extractive, while the remaining rents are more or less evenly distributed among the barons; when the leader of the rebel coalition is not too powerful in the realm, and when the rebel coalition's fighting capacity is sufficiently larger than that of the King's loyalists. In turn, the latter is more likely if (among the other reasons) the rebels' movable resources are large.

We provide evidence using a newly constructed dataset of English barons and baronies and other data on the distribution of wealth among the barons and the fiscal exactions of the King. Our findings show that prior to Magna Carta, there was unprecedented fiscal extraction by the King and a comparatively even distribution of wealth and power among the English barons. At the micro-level, we show that while idiosyncratic personal factors that generated grievances against King John increased the probability that a baron becomes a rebel, the relative strength of

the rebel and loyalist coalitions, especially captured by the rebels' movable resources, also greatly influenced this decision. Together this novel quantitative evidence supports the qualitative arguments of prior scholars that constraints on the rulers and ultimately the rise of representative institutions were a product of European feudalism.

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Online Appendix

A Data Appendix

A.1 Main Sources

We compile a unique dataset on the universe of barons alive in 1215 and the characteristics of their baronies. In this section we describe our main sources of data.

Sander's Baron-Barony Data   Sanders (1960) provides the known population of barons and their respective baronies from 1066 to 1327. Yielding a total of 2,714 owners over 210 baronies during the entire period, including baronies in the king's possession. The data details each individual owner's tenure and the percentage of the barony owned in the case of ownership split. Of the 280 barons who were alive during the reign of King John (r.1199-1217), our main sample comprises the 186 barons active in 1215.

Wikitree Network Data   Wikitree.com is an online repository of genealogical data. We rely on its "Early English Feudal Baronies" category. The genealogical data is based on Sanders (1960), Keats-Rohan (2002), Cokayne (2000), and Burke (1883), in addition to numerous other one-off sources. Our data is similarly sourced to that used by Cummins (2017). The "Early English Feudal Baronies" wikitree project is largely spearheaded by Andrew Lancaster, a historian of medieval genealogy (2007; 2009; 2010; 2019; 2020). We hand match our barons collected from Sanders (1960) to their respective Wikitree entry, allowing us to map out the elite kinship network during John's reign.

Oxford Dictionary of National Biography   The Oxford National Dictionary of Biography (ONDB) contains 54,000 biographies of major British figures from prehistorical times until the present day. It is a standard reference work that was first published in 1885. The version we used is the updated or new edition, published in 2004, which was drawn from the contributions of over 10,000 historians. Each entry is by a recognized expert in the field and draws the full range of existing primary and secondary sources. For this reason, the ONDB is recognized as a major resource for historians. However, it has not yet been used systematically to study broader trends in political and economic life. This is largely because the information contained within each biography has not been stored in a way that facilitates the use of empirical tools such as regression analysis.

We rely on the ODNB, supplemented with other sources described in Appendix A, to gather personal and political characteristics about each baron alive during John's reign. Most importantly, we gather information on their political allegiance to John at the moment of Magna Carta: rebel, loyalist, or inactive.

A.2 Main Dependent and Explanatory Variables

In this section we describe our main explanatory variables and important control variables.

Political Allegiance: Our main variable of interest is the political allegiance of a baron. A baron could either have been a rebel, a loyalist, or inactive. Of the 185 barons alive in 1215, 55 barons rose up in rebellion, 27 remained loyal, and 103 remained inactive. Figure 3 in the main text depicts this data.

Personal Grievances Historians have long argued that personal grievances against King John were of paramount importance. Holt (1961) for instance, writes that the "chief motivates behind this rebellions are to be found elsewhere, in the litigation in which royal influence told against them, in office which was refused them, in disseisins and monetary penalties inflicted on them, and in speculative proffers and costly compositions which led them deep into debt, sometimes to the verge of disinheritance or to a degrading dependence on the whims of the King" Holt (1961, 18). Figure A4 depicts the geographical distribution of these personal grievances.

Number of Castles As noted in the main text, for our main explanatory variable, we collect data on all baronial castles in early 13th century England from Brown (1959). While there were around 1000 archaeologic sites of castles or other similar fortifications dating from the Norman period, many of these castles were not extant around 1215, either because they had been demolished or had fallen into disrepair (Liddiard, 2012, 18). Therefore, we rely on Brown (1959) who compiled a list of all royal and baronial castles attested to in the documentary evidence between 1154-1216 and who they belonged to. According to his calculations in 1216, there were 93 royal castles and 179 baronial castles. We geolocated all of these castles and assigned them to the barons in our main dataset based on the information that Brown provided.

In a non-experimental setting, it is natural to be concerned about the location and distribution of castles. The location of individual castles reflected several factors. According to Brown (2004,

164) "[t]he distribution of English castles (as of castles elsewhere) in any given period ... is chiefly the arbitrary result of innumerable local plans and ad hoc decisions". Indeed, there is no consensus about the determining factors behind the geographical distribution of castles. A traditional view attributed the locational decisions of the majority of castles to the Norman conquest. A revisionist position suggests that many castles may have been build on sites that were important in Anglo-Saxon times (Liddiard, 2012, 2-425). There is consensus, however, the location of castles was uncorrelated with population density or economic development (Liddiard, 2012, 25).[24] Nonetheless, whether an individual baron was in possession of castle might be endogenous to political economy considerations. Brown (2004, 166), for instance, argues that '[a]ny king worth his salt ... would look to the castles of his realm, look after his own, seek to ensure, by the exercise of his huge power of patronage, that as many castles as possible were in the hands of those he could trust". There are examples of this: Baynard Castle which belonged to the rebel leader Robert Fitzwalter was demolished by King John in 1212 (Brown, 1959). Nonetheless, the king could not deprive a lord of a baronial castle without good reason (Painter, 1961a, 135). Overall, while there were incentives for the king to ensure that important castles were in the possession of his friends and allies, he only could only do this (at low cost) for royal castles. As Painter explains: "feudal custom limited a surerain's control over property which he had granted to a vassal as a fief. Thus for practice purposes a lord may be said to have owned what he held in demesne. The castles situated on the king's demesne were royal and those on the demesne of his barons baronial" (Painter, 1961a, 135). A king could only dispossess a baron of a castle on his own demesne in the case of outright treason.

Another major factor determining whether a castle was in existence in 1215 was the cost of maintenance (Painter, 1961a, 127).[25] Castles were extremely costly to maintain. Over time, the number of castles declined from a peak around 1150. Fortifications that were no longer necessary or up to date were allowed to fall into disrepair. There was therefore an exogenous component to the distribution of castles in 1215.

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[24]Historians note that "there is no straightforward correlation between castle-building and population density" (Liddiard, 2012, 25).

[25](Painter, 1961a, 127) notes by far "the larger number were simply abandoned by their lords. The maintenance of a castle was expensive and could only be justified by great necessity. The stern peace enforced by the Angevin kings made baronial castles less vital to their masters' safety".

Table A1: Determinants of Baronial Castles

| | Number of Castles | | | | |
	(1)	(2)	(3)	(4)	(5)
Coastal	0.105	0.0699	0.0688	0.0597	0.173
	(0.0903)	(0.0935)	(0.0919)	(0.0910)	(0.169)
Riverine	0.0955	0.107	0.106	0.0934	0.111
	(0.0895)	(0.0908)	(0.0926)	(0.0909)	(0.106)
Roman Road	0.146	0.187	0.186	0.180	0.0882
	(0.141)	(0.136)	(0.136)	(0.135)	(0.159)
Average Ruggedness		0.00478*	0.00479*	0.00623**	0.000966
		(0.00247)	(0.00245)	(0.00302)	(0.00362)
Markets and Fairs			0.000948	0.000439	−0.000831
			(0.00873)	(0.00881)	(0.00821)
Mean Travel Cost to London				−0.0403	0.0633
				(0.0309)	(0.116)
County FE					✓
Constant	0.0275	−0.116	−0.117	−0.0216	−0.259
	(0.144)	(0.150)	(0.151)	(0.137)	(0.233)
Observations	279	279	279	279	279
Adjusted R^2	0.000466	0.0143	0.0107	0.0125	0.0580

Table notes: This table reports the correlates of baronial castles at the barony-level. The only variable correlated with the presence of a baronial castles is average ruggedness. We report robust standard errors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Nonetheless, due to possible endogeneity concerns, in our empirical analysis we first focus not on whether an individual baron possessed a castle, but on the number of prospective rebel or loyalist castles in a baron's extended family network. And second, we implement an instrumental variables strategy based on the distribution of castles in previous generations.

To investigate whether the distribution of castles was associated with observables, in Table A1 we report the relationship between the geographical characteristics of a barony and the number of castles in a barony. In general, the presence of castles was unrelated to any geographical variable apart from ruggedness. The relationship between ruggedness and castle location unsurprising as the lands along England's western and northern frontiers with Wales and Scotland were more rugged than the lowlands. When we include county fixed effects, this relationship weakens significantly.

Markets and Fairs   The late 12th and early 13th centuries were a period of commercialization and economic growth (Miller, 1971). Almost one third of all new towns founded in the medieval

period were established in the fifty years spanning 1180 and 1230 (Masschaele, 2010, 156). A large number of markets and fairs were also established, many based on the wool trade that flourished between England and Flanders. We use data on the location and foundation date of markets and fairs in medieval England from Britnell (2009) and Letters et al. (2003). Letters et al. (2003) provides data on the locations of English markets and annual fairs, sourced directly from the English charter rolls. The distribution of markets (by barony) is shown in Figure 5b. On average, barons loyal to King John had more markets and fairs in their territories.

.

Additional Control Variables

Age of the baron in 1215 and Attainment Year   We collect data on the age of each baron in 1215 and the year they attained their barony. This is motivated by the suggestion that if a baron attained his barony, likely from his deceased father, during the reign of king John, he may have found it difficult and costly to acquire his full ownership rights. According to feudal custom, upon death of the vassal the land returns to the liege until. Strapped for finances, the king utilized this fact to hold the baron's inheritance hostage for a price. Sanders (1960) reports the year the baron attained full possession over his land. Also, using the Wikitree data, we can determine the baron's birth year, and thus his age in 1215.

Opposition to Scutage in 1214   Barons were expected to provide military service to the king in periods of war. By John's reign, however, that obligation could be fulfilled by a monetary payment, scutage. Many of the barons who rebelled against King John in 1215 had refused to pay scutage for John's campaign in Poitou in 1214. This variable thus sheds light on nascent formation of a coalition to resist King John, as "there is no better witness to rebellious instincts then rebellion itself" Holt (1961, 19).

Travel Costs to London and Location on the Transport Network: Travel cost to London represents the ability of the king or his men to visit a given baron/barony. Travel costs to London is calculated for every barony using least cost travel path distance. In calculating least cost travel path, we assume the traveler from London can travel along the Roman roads and/or navigable rivers.

Prior Military Experience: We code whether or a baron was mentioned as serving in armed conflict in their biography. We include conflicts in France, Ireland, Scotland or on Crusade. Military experience simply means that a baron served on campaign. It did not necessarily correspond to that baron's perceived military worth or ability.

Network Measures: The network data allows us to construct measures of connectivity, centrality, and influence. For all barons, we calculate the minimum distance to the rebel and loyalist groups, which provide a sense for how well close a baron was with the members of both coalitions. Also, for all barons, we calculate a measure of network influence, an individual's eigenvector centrality. Eigenvector centrality is a measure of network centrality that accounts for a node's number of connections as well as their quality. A baron with high score are connected to many barons who themselves have high scores.

Geographic Controls We also create a number of economic geography variables such as whether a barony is situated on a road, river, or coast. These are important proxies for the trade connectivity of a barony. Finally, we measure the terrain ruggedness of a barony using Nunn and Puga (2012). To measure the agriculture productivity of the barony, we use the Food and Agriculture Organization (FAO)'s Global Agro-Ecological Zones (GAEZ) data on wheat suitability under rain fed irrigation and low capital intensity (Fischer et al., 2002). We calculate a barony's wheat suitability each using a 10km buffer around the barony caput.

Knights Fees Under the feudal system operational in 12th and early 13th century England, barons were categorized according to the number of knights they could provide to the king. The land that a baron were assessed on included both the land he owned directly and the land he provided to his knights, followers, and peasants. We view this as a measure of economic power (as it did not correspond with the actual military forces at the disposal of the barons). We collect the reported magnitude of knights fee owned by the king. The data collected by in the ODNB is supplemented with Keefe (1983). We depict this data in Figure A1.

A.3 Personal Grievances Against King John

As discussed in the main text, many contemporary chroniclers, notably Ralph of Coggeshall, Roger of Wendover, and Matthew Paris, emphasized the importance of the personal grievances

Figure A1: Knights Fees Assessed.

Feudal Assessments ● 250 ● 500 ● 750 ● 1000 ● 1250

Data source: see text.
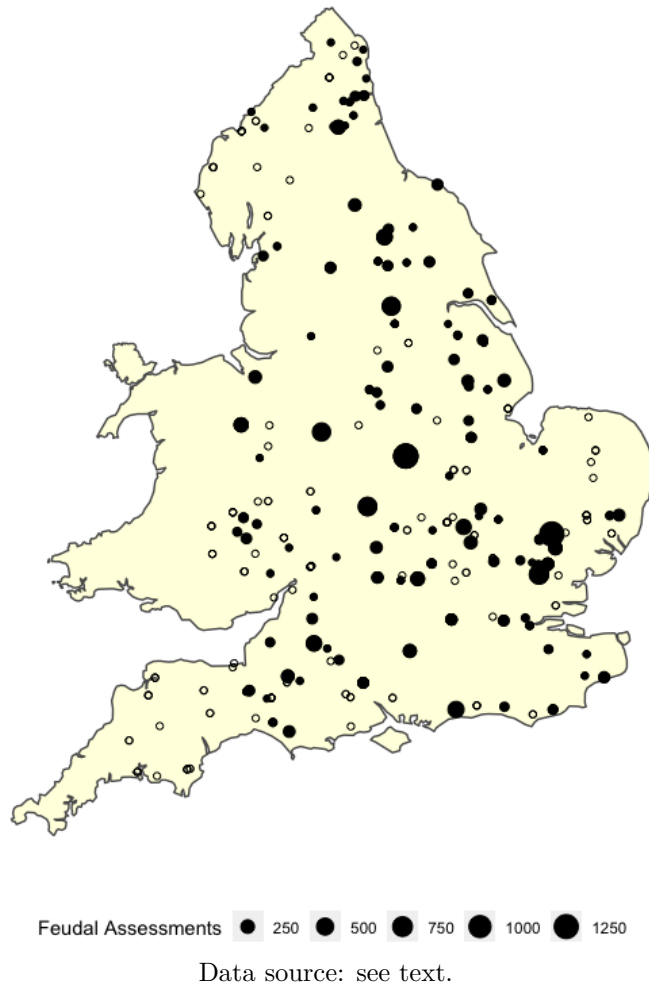
that many of the rebels had against King John.

Historians have, to varying degrees, endorsed the importance of some of these factors. For example, Geoffrey de Mandeville, Earl of Essex had had to pay John 20,000 marks to marry Isabel of Gloucester. Lloyd (1972, 263) notes "[i]t my have delighted him to gain possession by marriage of most of that broad shire, but the reckoning had followed with a vengeance. The revenue from the territory provide quite inadequate to meet the terms of repayment. He did not even repay the first installment".

John was accused of seducing Robert Fitzwalter's daughter and Eustace de Vesci's wife and some historians such as Barratt (2018, 259) view these as credible motivations for their antipathy

to the king. Other historians dismiss them as ex post rationalizations of their disloyalty by scurrilous medieval chroniclers.

In Table A4 we regress individually and then collectively the separate types of grievances that individual barons had with King John. Overall, they robustly predict joining the rebellion against him. This is inline with what historians have long argued. Nonetheless, personal grievances alone are not solid grounds for rebellion. Otherwise, many of the individual barons would have rebelled before 1215. Each aggrieved baron had a personal motivate to oppose John but on their own they faced the "paradox of rebellion": it was not in their interests to act given the diffused nature of the benefits resulting from their action and the concentrated costs and risks involved. The formation of a rebel coalition was the critical factor that made the rebellion in 1215 possible as indicated by the results we report in the main paper.

Importantly, our results are also robust when we exclude those barons who had personal grievances with King John (Table A9).

Personal Issue with the king: ● Yes ● No
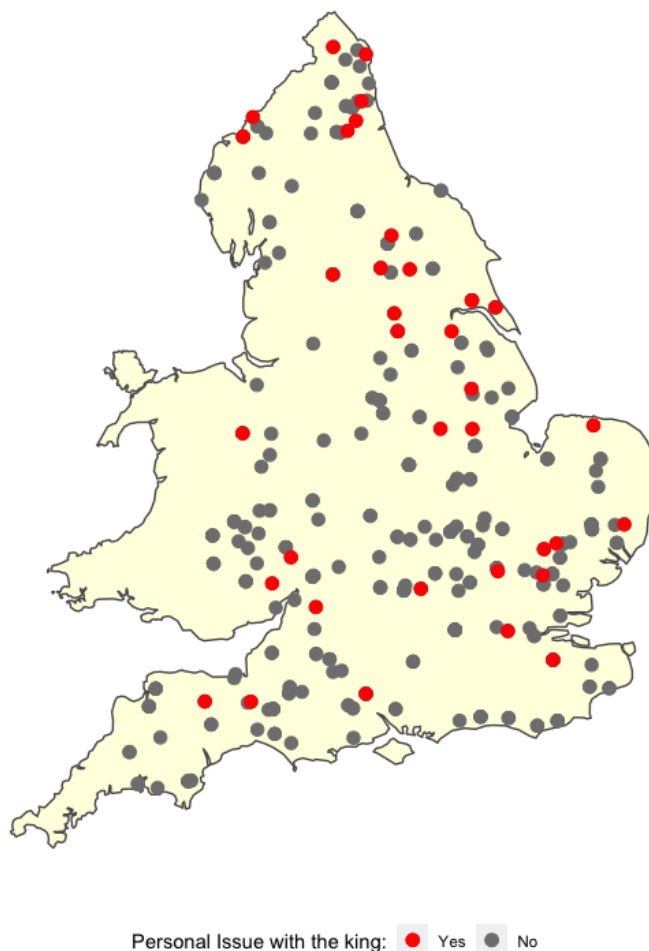
Figure A2: The distribution of personal grievances against John in 1215

B   Summary Statistics and Additional Econometric Results

We report our summary statistics in Table A2. Table A3 reports balance on observables for three groups: inactive barons (n = 103, col. 1); loyal barons (n = 28, col. 2); and rebel barons (n = 55, col. 3). In general, as one would expect there are differences between inactive barons and both loyalists and rebels. The main differences between active rebels and active loyalists, however, are personal grievances against the King and other good relations with the king. Otherwise, loyalist barons had somewhat more markets and fairs then rebels and were located in lands with slightly better soil quality.

B.1   Additional Empirical Results

In this section, we provide a series of additional empirical results in support of Proposition 3.

Table A2: Summary Statistics

	N Observations	Mean	SD	Min	Max
Opposed to John in 1215	186	0.30	0.46	0	1
Supported John in 1215	186	0.15	0.36	0	1
Inactive in 1215	186	0.55	0.50	0	1
Earl	186	0.10	0.30	0	1
N. Baronies	186	1.17	0.56	1	5
Hostages to John	186	0.07	0.26	0	1
In debt to John	186	0.06	0.24	0	1
Fined by John	185	0.06	0.24	0	1
Rumors About Wife	186	0.01	0.10	0	1
In Public Opposition by Jan 1215	185	0.04	0.20	0	1
Opposed Scutage/Service in 1214	186	0.03	0.18	0	1
Served in Poitou in 1214	186	0.16	0.37	0	1
Held lands in Normandy	186	0.13	0.34	0	1
Number of Castles	186	0.34	0.83	0	5
Military Experience	185	0.15	0.35	0	1
Notable Warrior	185	0.03	0.16	0	1
Knights Owed	186	79.53	180.35	0	1536
Average Ruggedness	186	25.55	21.54	0	100
Average Soil Quality	186	4.41	2.31	0	20.26
Mean Travel Cost to London	186	2.84	1.68	0	7.53
Coastal	186	0.52	0.50	0	1
Riverine	186	0.47	0.50	0	1
Roman Road	186	0.91	0.29	0	1
Markets and Fairs	186	2.43	2.21	0	11

Table Notes This table reports summary statistics for our main covariates. We exclude all baronies controlled by the King.

First, we establish that our main results are not driven by a specific subset of barons. In Table A6, we show that our results are robust when we drop (i) the top 5, 10, 15, and 20 barons as measured by the number of knights they owed the king; (ii) the earls; (iii) the barons with multiple baronies; and (iv) barons who had refused to serve with John in Poitou in 1214. The results in columns (1)-(6) suggest that the factors we identity were not specific to larger or more powerful barons. The reason in column (7) suggest that they were not driven by a subset of barons with a track record of opposing King John.

As we have a large number of covariates and a limited number of observations, we also report

Table A3: Balance Table

Variable	(1) Mean Inactive	(2) Mean Loyalist	(3) Mean Rebels	(4) Rebels vs Others	(5) Rebels vs Loyalists
In debt to John	0.010	0.000	0.182	(0.001)***	(0.001)***
Fined by John	0.010	0.037	0.164	(0.004)***	(0.046)**
Rumors About Wife	0.000	0.000	0.036	(0.154)	(0.158)
Hostages to John	0.019	0.071	0.164	(0.012)**	(0.195)
Good Relations with John	0.049	0.407	0.091	(0.509)	(0.003)***
Fought with John	0.078	0.407	0.400	(0.001)***	(0.950)
Network Distance to the King	10.602	9.964	11.109	(0.610)	(0.478)
Average Soil Quality	4.262	5.406	4.188	(0.392)	(0.072)*
Average Ruggedness	25.251	28.659	24.530	(0.675)	(0.380)
Coastal	0.505	0.571	0.527	(0.919)	(0.706)
Riverine	0.417	0.571	0.509	(0.468)	(0.595)
Roman Road	0.903	0.821	0.964	(0.040)**	(0.070)*
Markets and Fairs	2.049	3.929	2.382	(0.842)	(0.011)**
Underage or Female in 1215	0.097	0.036	0.018	(0.032)**	(0.662)
Earl	0.010	0.286	0.164	(0.085)*	(0.226)
Number of Baronies	1.049	1.396	1.222	(0.253)	(0.276)
Mean Travel Cost to London	2.576	2.970	3.260	(0.032)**	(0.419)
Number of Castles	0.136	0.893	0.436	(0.285)	(0.122)
Knights Owed	53.056	103.239	117.023	(0.176)	(0.779)
Barony Attained After 1199	0.563	0.679	0.473	(0.154)	(0.071)*
Notable Warrior	0.010	0.074	0.036	(0.643)	(0.511)
N. Baronies	1.049	1.464	1.255	(0.219)	(0.222)
Barony Attained After 1204	0.388	0.357	0.345	(0.640)	(0.917)
Age	40.040	41.731	41.024	(0.890)	(0.857)
Observations	103	28	55	186	83

Table Notes: This table reports balance on observables for across three categories of barons: inactive (col 1.); loyalist (col. 2) and rebels (col .3). In column 4 we compare rebels to all other barons. In column 5 we compare rebels to active loyalists.

results with various lasso specifications in Appendix Table A8. These specifications always select *Castles in Rebel Network* as the most important predictor of opposition to King John in 1215.

Table A13 ranks the top 10 barons (excluding the King) by how central they are to the entire network of barons using their eigenvector centrality. We find that the main rebel leaders were not among the most central barons.

To investigate the characteristics of the rebels further, we look at the three rebel leaders, Saer de Quincy, Robert Fitzwalter, and Eustace de Vesci and at the barons who were known to be in public opposition to John by January 1215. Overall, these barons were not particularly central to the network (de Quincy was the most central with a ranking of 13, but de Vesci's ranking

Figure A3: Individual-Level Predictors of Supporting Magna Carta
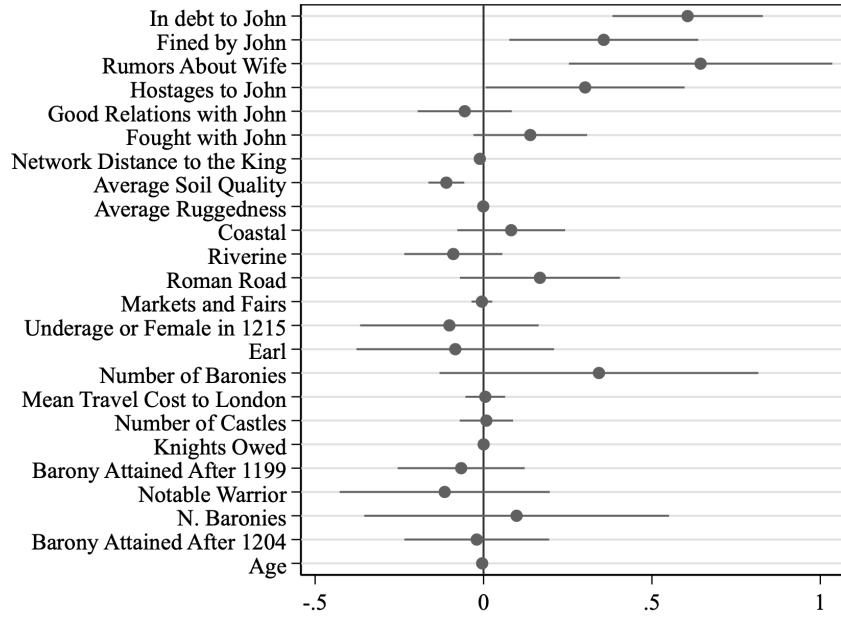
Figure A4: Individual-Level correlates of opposing King John in 1215. This plot reports the results from a regression at the baronial level of individual covariates on the decision to rebel in 1215: Opposed to John in $1215_i = \alpha +$ **Baron Characteristics**$_i + \epsilon_i$ where **Baron Characteristics**$_i$ is a vector of baron and barony level characteristics. Robust standard-errors are clustered at the baron level. Confidence intervals are constructed at 95% percent level using robust standard errors.

Table A4: Personal Grievances and Opposition to King John in 1215

| | Opposed John in 1215 | | | | |
	(1)	(2)	(3)	(4)	(5)
Hostages to John	0.426***				
	(0.133)				
In debt to John		0.652***			
		(0.0933)			
John Rumors Wife			0.712***		
			(0.0336)		
Personal Grievances				0.595***	0.499***
				(0.0842)	(0.104)
Constant	0.266***	0.257***	0.288***	0.213***	0.167
	(0.0338)	(0.0332)	(0.0336)	(0.0325)	(0.169)
Geography Controls	✓	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓	✓
County Fixed Effects					✓
Observations	186	186	186	186	186
Adjusted R^2	0.0516	0.109	0.0206	0.200	0.242

Table Notes: This table reports the correlation between various personal grievances and the decision to rebel against King John in 1215. We report robust standard errors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Network Connections and Opposition to King John in 1215

			Opposed John in 1215			
	(1)	(2)	(3)	(4)	(5)	(6)
Network Distance to King	0.00184					
	(0.00360)					
Min Distance (Loyalists)		-0.00613***				
		(0.00230)				
Min Distance (Rebels)			-0.0176***			
			(0.00155)			
Degree Centrality				0.00167		
				(0.00534)		
Betweenness Centrality					7.01e-09	
					(0.000000767)	
Eigenvector Centrality						-3.646***
						(0.704)
Constant	0.276***	0.439***	0.583***	0.327***	0.340***	0.345***
	(0.0498)	(0.0586)	(0.0499)	(0.0567)	(0.0408)	(0.0394)
Adjusted R^2	-0.00424	0.0349	0.345	-0.00617	-0.00676	-0.000472
Observations	186	150	150	150	150	150

Table A6: Who Joins the Rebel Coalition? Robustness to Dropping Selected Barons

			Opposed John in 1215				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Castles in Rebel Network	0.0425***	0.0426***	0.0424***	0.0416***	0.0396***	0.0381***	0.0397***
	(0.00347)	(0.00348)	(0.00365)	(0.00394)	(0.00378)	(0.00376)	(0.00387)
	[0.00323]	[0.00323]	[0.00347]	[0.00357]	[0.00376]	[0.00384]	[0.00367]
Personal Grievances	0.254**	0.253**	0.266**	0.267**	0.301***	0.276**	0.294***
	(0.110)	(0.111)	(0.113)	(0.113)	(0.105)	(0.112)	(0.102)
	[0.103]	[0.102]	[0.104]	[0.104]	[0.0992]	[0.118]	[0.0943]
Constant	0.100	0.0974	0.103	0.112	0.235**	0.351**	0.0619
	(0.109)	(0.111)	(0.118)	(0.121)	(0.115)	(0.155)	(0.0992)
	[0.106]	[0.107]	[0.112]	[0.115]	[0.103]	[0.138]	[0.0978]
Dropping	Top 5 Knights Fee	Top 10 Knights Fee	Top 15 Knights Fee	Top 20 Knights Fee	Earls	Multiple Baronies	Refused to Serve
Adjusted R^2	0.566	0.559	0.544	0.535	0.485	0.495	0.513
Observations	183	180	176	173	167	164	169

Table A7: *Table notes:* This table replicates the main specification in Table 2 sequentially dropping the barons with the highest knights fees (cols. (1)-(4)); the earls (col. 5), barons with multiple baronies (col. 6), and those barons who refused to serve in Poitou in 1214 (col. 7). Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

was 65).[26] Overall, the early rebels were less central than the average baron. Nor were the rebel leaders ranked especially highly in economic terms as measured by the number of markets and fairs (with the exception of Geoffrey de Mandeville, Earl of Essex. This is consistent with Proposition 2: a important feature of the 1215 rebellion was that it was not led by a close rival

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[26]According to Painter (1961c, 239) writing of the de Quincy family "their feudal power was never sufficient to place them in the top rank of the English baronage". Eustace de Vesci, we are told, "was a second-ranker, for all his notoriety" (Lloyd, 1972, 261).

Table A8: Who Joins the Rebel Coalition? Lasso Regression

| | Opposed John in 1215 | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Castles in Rebel Network	0.0369	0.0381	0.0355			
Markets and Fairs in Rebel Network				0.00109	0.000907	0
Personal Grievances	0.258	0.250	0.161	0.465	0.450	0.354
Average Ruggedness	0	0	0	0	0	0
Average Soil Quality	−0.00451	0	0	0	0	0
Coastal	0	0	0	0	0	0
Riverine	0	0	0	0	0	0
Roman Road	0	0	0	0.00721	0	0
In Public Opposition by Jan 1215	0	0	0	0.369	0.315	0.259
Markets and Fairs	0	0	−0.0113	0	0	−0.0250
Number of Castles	0	0	0	0	0	0
underagein1215	0	0	0.0549	0	0	0
N. Baronies	0	0	0	0	0	0
Mean Travel Cost to London	0.00432	0	0	0.00830	0	0
Fought with John	0.0275	0.0282	0	0.0671	0.0270	0
Good Relations with John	0	0	−0.0397	−0.0707	0	−0.111
Knights Owed	0	0	0	0	0	0
Military Experience	0	0	0.0487	0	0	0
Eigenvector Centrality			0			0
Degree Centrality			−0.00756			0
Ego Distance to King			0.0138			0
Min Distance Loyal			0			0
Min Distance Rebel			−0.0126			−0.0144
Constant	0.147	0.143	0.225	0.105	0.116	0.568
Regional FE			✓			✓
County FE			✓			✓
Observations	185	185	150	185	185	150

to King John. This distinguishes it from earlier or later rebellions in English history such as the revolt of the Young King (1173/74), John's own rebellion against Richard (1192/94), Simon de Montfort's rebellions against Henry III (1258-1265), Henry Bolingbroke's rebellion against

Table A9: Testing Proposition 3: Coalitional Analysis for Barons with No Grievances Against King John

	(1)	(2)	(3)	(4)	(5)	(6)
			Opposed John in 1215			
Castles in Rebel Network	0.0480***	0.0463***	0.0445***	0.0485***	0.0495***	0.0494***
	(0.00162)	(0.00291)	(0.00332)	(0.00263)	(0.00257)	(0.00300)
	[0.00155]	[0.00284]	[0.00304]	[0.00222]	[0.00242]	[0.00298]
Constant	0.107***	0.0816	0.0392	0.00463	0.0102	-0.136
	(0.0254)	(0.0915)	(0.112)	(0.00986)	(0.0913)	(0.188)
	[0.0239]	[0.0870]	[0.0813]	[0.00822]	[0.0922]	[0.172]
Baron Controls		✓	✓	✓	✓	✓
Geography Controls		✓	✓	✓	✓	✓
Economic Controls		✓	✓	✓	✓	✓
County FE				✓	✓	✓
Observations	160	160	160	160	160	160
Adjusted R^2	0.491	0.497	0.512	0.556	0.548	0.550

Table Notes: This table replicates the main specification in Table 2 where we drop all barons with personal grievances against John.

Richard II (1199) or Richard of Yorke's rebellion against Henry VI (1459/1460). As Holt (1961, 1) observed: "Hitherto, if civil wars had been fought for any positive end, they had been fought on behalf. of an individual, a Robert Curthose or a young King Henry, or in the interests of participants in seeking land, office, and power. Now a civil war was being fought for a cause, not for one individual or even several, but for a document, a simple piece of parchment".[27]

B.2   Family Networks

As discussed in the main text, family networks played a critical role in early 13th century England. Historians concur that family networks played a role in the formation of the rebel and loyal coalitions in the lead-up to Magna Carta and specifically that "[f]amily allegiances in a closely interrelated aristocracy extended the ranks of the malcontents" (Lloyd, 1972, 263).

We manually constructed each baron's family network using the Wikitree data described in Appendix Section A.1. That is, for every baron, we identify the other barons that are within 16 network connections, where connections are direct blood ties. We call the barons within 16 connections of the target baron, the target baron's family network.

We divide the baron's family network by allegiance (rebel, loyalist, and inactive), and construct the total number of resources within the family network by allegiance. The main resources we

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[27]In 1215, there was no single baron with more than 5 castles. In contrast, John of Gaunt (father of Henry Bolingbroke) possessed 30 castles during the reign of Richard II (Pounds, 1990, 137).

Table A10: Who Joins the Rebel Coalition? Weighted Network, Robustness

| | Opposed John in 1215 | | | | |
	(1)	(2)	(3)	(4)	(5)
Castles in Rebel Network	0.0738***	0.0653***	0.0621***	0.0614***	0.0673***
	(0.00267)	(0.00427)	(0.00585)	(0.00586)	(0.00568)
	[0.00281]	[0.00410]	[0.00572]	[0.00579]	[0.00569]
Personal Grievances		0.306***	0.306***	0.290***	0.234**
		(0.0903)	(0.0928)	(0.0904)	(0.101)
		[0.0892]	[0.0883]	[0.0847]	[0.0965]
Constant	0.147***	0.122***	0.115	0.113	0.0369
	(0.0278)	(0.0253)	(0.0945)	(0.0960)	(0.104)
	[0.0298]	[0.0241]	[0.0838]	[0.0865]	[0.106]
Baron Controls	✓	✓	✓	✓	✓
Geographical Controls		✓	✓	✓	✓
Economic Controls		✓	✓	✓	✓
Military Controls				✓	✓
County FE					✓
Observations	186	186	186	186	186
Adjusted R^2	0.497	0.542	0.542	0.539	0.575

Tables Notes: This table studies the relationship between moveable resources and personal grievances on the probability of rebellion using unweighted networks of varying size. Our explanatory variable is the number of rebel castles in a baron's network. Baron controls include whether a baron was in public opposition by January 1215 and the number of baronies the baron held land in. Geographical controls include average ruggedness, average soil quality, the presence of any Roman roads, any coastline, and any rivers. Economic controls the number of markets and fairs, the baron's knights fee, and the number of castles Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

are interested in are moveable resources, specifically, the number of castles and the number of markets and fairs within a baron's family network.

For an illustrative example, we can consider Nicholas I de Stuteville. He was a rebel against John in 1215, but not a rebel leader. The baronial network is a fairly dense one, so he has 94 other barons within 16 connection of himself. 29 of them rebelled in 1215, 19 of them remained loyal, and 46 were inactive. One of those rebels in his family network was Eustace de Vesci, who was a 2 connections away from him. On the loyal side, William Marshal, the Earl of Pembroke and loyalist leader, was 12 connections away. Within his family network, Stuteville had 17 rebel castles and 21 loyalist castles, and 80 rebel associated markets and 89 loyalist associated markets.

Figure A5 depicts the entire elite network in 1215. Large red circles denote the barons in our dataset. Small circles denote their family members.

In Table A5 we simply explore the relationship between various measures of network centrality and opposition to King John in 1215. As expected, barons who were closely connected to the

Table A11: Who Joins the Rebel Coalition? Unweighted Network, Robustness by Network Size

	(1)	(2)	(3)	Opposed John in 1215 (4)	(5)	(6)	(7)	(8)
Castles in Rebel Network	0.0452***	0.0422***	0.0853***	0.0808***	0.0948***	0.0863***	0.133***	0.114***
	(0.00265)	(0.00350)	(0.00579)	(0.00815)	(0.0132)	(0.0143)	(0.0185)	(0.0205)
	[0.00244]	[0.00336]	[0.00580]	[0.00746]	[0.0165]	[0.0141]	[0.0230]	[0.0208]
Personal Grievances		0.255**		0.257**		0.322***		0.295***
		(0.103)		(0.104)		(0.108)		(0.111)
		[0.0970]		[0.0967]		[0.0912]		[0.0954]
Constant	0.0155	0.0705	0.0192	0.0879	0.0236	0.0882	0.504	0.184
	(0.0175)	(0.101)	(0.0212)	(0.108)	(0.0302)	(0.113)	(0.438)	(0.183)
	[0.0151]	[0.0969]	[0.0204]	[0.105]	[0.0313]	[0.112]	[0.146]	[0.185]
Baron Controls		✓		✓		✓		✓
Geographical Controls		✓		✓		✓		✓
Economic Controls		✓		✓		✓		✓
County FE		✓		✓		✓		✓
Network Connections	16		13		9		7	
Observations	186	185	186	185	186	185	186	185
Adjusted R^2	0.537	0.575	0.508	0.545	0.409	0.469	0.381	0.425

Tables Notes: This table studies the relationship between moveable resources and personal grievances on the probability of rebellion when using a series of randomly seeded networks. The main explanatory variable is the number of rebel castles in a baron's network. Baron controls include whether a baron was in public opposition by January 1215 and the number of baronies the baron held land in. Geographical controls include average ruggedness, average soil quality, the presence of any Roman roads, any coastline, and any rivers. Economic controls the number of markets and fairs, the baron's knights fee, and the number of castles Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
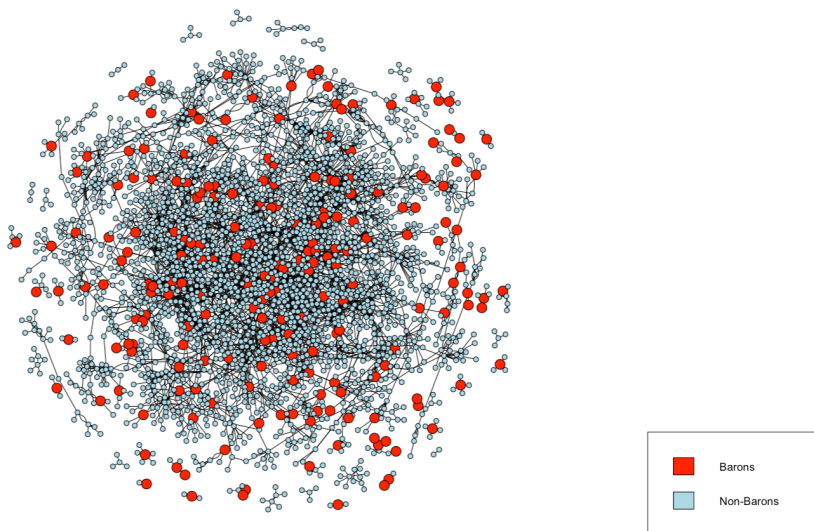

Figure A5: The Elite Network in 1215. Data source: see main text and Appendix.

Table A12: Who Joins the Rebel Coalition? Robustness to Controlling for Loyalist Resources

| | Opposed John in 1215 | | | |
	(1)	(2)	(3)	(4)
Castles in Rebel Network	0.0400***	0.0445***	0.0447***	0.0437***
	(0.00325)	(0.00318)	(0.00315)	(0.00323)
	[0.00334]	[0.00307]	[0.00305]	[0.00312]
Castles in Loyal Network	-0.00615***			
	(0.00152)			
	[0.00139]			
Soil Quality in Loyal Network		-0.000497***		
		(0.000127)		
		[0.000114]		
Markets & Fairs in Loyal Network			-0.000747***	
			(0.000182)	
			[0.000166]	
Total Resources in Loyal Network				-0.0000582***
				(0.0000180)
				[0.0000165]
Constant	0.159*	0.168*	0.168*	0.160*
	(0.0978)	(0.0986)	(0.0983)	(0.0991)
	[0.0906]	[0.0910]	[0.0908]	[0.0914]
Baron Controls	✓	✓	✓	✓
Geography Controls	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓
County Fixed Effects	✓	✓	✓	✓
Observations	185	185	185	185
Adjusted R^2	0.552	0.552	0.553	0.549

Tables Notes: Castles in Rebel Network is number of potential rebel castles in a baron's network. Castles in Loyal Network is number of potential loyal and inactive castles in a baron's network. We define Soil Quality in Loyal Networks and Markets & Fairs in Loyal networks similarly. In all columns we include county fixed effects. All columns include the controls described in Table 2, column 4. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

king (column 1) or highly central to the network (columns (4)-(6)) were less likely to join the rebellion. Barons more closely related to other loyalists were likely to stay loyal (column (2); barons more closely related to other rebels were more likely to rebel (column 4).

Next, we demonstrate that our main results are robust to different ways of constructing the family network. In our main analysis we use an unweighted family network. This is for simplicity and to avoid the need of additional assumptions. Nonetheless, it is natural to suppose that closer family ties were of greater importance and that the resources of a brother might have have greater weight than those of a cousin. Therefore, we follow Jackson (2008) in using a distance-based utility model: $R_{i,A} = \sum_r (Resource_{j,r})^{1/\lambda}$, where A is political allegiance, and λ is the number of connections between baron i and baron j. That is, the baron's total network resources is the sum total of the resources held by members of his kinship network, where each

Table A13: The Characteristics of the Rebel Leadership

Baron	Network Rank	Opposed John in 1215	Castles	Markets & Fairs
Panel A				
William Longespee	1		0	6
Richard I de Chilham	2		0	6
William IV de Warenne	3		0	1
Roger II Bigod	4	✓	1	0
William I Marshal	5		0	1
Henry Fitzcount	6		4	8
William I Briwerre	7		0	11
William I de Beauchamp	8	✓	3	2
Richard Briwerre	9		0	9
Roger II Bertram	10	✓	1	2
Average	0.00286	30%	1	4.45
		Early Rebels & Rebel Leaders		
Panel B				
Saer de Quincy	13	✓	0	2
Geoffrey de Mandeville	21	✓	1	6
William Mowbray	39	✓	1	1
Richard de Percy	40	✓	0	4
Robert Fitzwalter	44	✓	0	0
Robert de Ros	57	✓	0	2
Eustace de Vesci	65	✓	0	3
Roger de Montbegon	115	✓	1	1
Average	0.000004	100%	0.375	2.375
Average for all barons	0.0013	66%	0.338	2.43

Table Notes:. Panel A lists the top 10 barons in 1215 after the King by their network centrality as measured by eigenvalue centrality. While 3/10 eventually joined the rebellion, none of the rebel leaders were among these elite barons. Panel B lists the early rebels who were in opposition to John by January 1215 as well as the three main rebel leaders (in bold). As measured by their network connectivity, number of castles and number of markets and fairs, these rebels were drawn from the middle ranks of the baronage. They were less central to the network than the average baron in the sample but comparable to them in terms of their number of castles and markets. Data sources: see main text and Appendix A.

individual j's contribution is weighted by the distance to baron i.

Table A10 reports our main results using this weighted network. Overall our results are robust and the coefficient on our variable of interest is larger in magnitude.

We also demonstrate that our results are robust when we vary the size of the network. In our main analysis we allow family networks to include up to 16 degrees of connectivity. In Table A11 we consider family networks based on 9, 13, and 7 degrees of connectivity. Our results remain robust and indeed become larger when we include smaller family networks.

Table A14: Who Joins the Rebel Coalition? Dropping Inactive Barons

| | | Opposed John in 1215 | | | | | |
		(1)	(2)	(3)	(4)	(5)	(6)
Castles in Rebel Network		0.0299***	0.0274***	0.0233***	0.0216***	0.0274***	0.0501***
		(0.00376)	(0.00374)	(0.00411)	(0.00426)	(0.00736)	(0.00833)
		[0.00454]	[0.00410]	[0.00484]	[0.00485]	[0.00787]	[0.00982]
β Coefficient		0.565	0..518	0.444	0.412	0.522	0.955
Personal Grievances Personal Grievances			0.223***	0.249***	0.239***	0.155	0.123
			(0.0833)	(0.0873)	(0.0894)	(0.113)	(0.0939)
			[0.0920]	[0.0862]	[0.0930]	[0.125]	[0.116]
Constant		0.451***	0.407***	0.373*	0.404*	0.192	-0.235
		(0.0695)	(0.0705)	(0.212)	(0.210)	(0.233)	(0.218)
		[0.0855]	[0.0899]	[0.207]	[0.208]	[0.238]	[0.239]
Baron Controls				✓	✓	✓	✓
Geographical Controls				✓	✓	✓	✓
Economic Controls				✓	✓	✓	✓
Military Experience					✓	✓	✓
County FE						✓	
Fast-Greedy Community FE						✓	✓
Observations		83	83	82	82	82	82
Adjusted R^2		0.311	0.346	0.399	0.429	0.460	0.688

Tables Notes: This table studies the relationship between moveable resources and personal grievances on the probability of rebellion. It replicates Table 2 but drops all inactive barons. Castles in Rebel Network is number of potential rebel castles in a baron's network. In columns (3)-(5), we include the following baron controls: whether a baron was in public opposition by January 1215, the number of castles in their barony, and the number of baronies the baron held land in. Columns (3)-(5) include geographical and economic controls at the barony level. Geographical controls include average ruggedness, average soil quality, the presence of any Roman roads, any coastline, and any rivers. Economic controls the number of markets, and the knight's fee. In columns (4)-(5) we also control for military experience. We include county-level fixed effects in column (5) and fixed effects at the fast-greedy community level in column (6). Standard errors clustered at the baron level are in parentheses. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B.3 Inactive Barons

One might be concerned about selection. In our main analysis, we focus on the barons who joined the rebel coalition treating the other barons as loyal (both those who fought for John and those who were inactive).

In this section we take two separate approaches to dealing with inactive barons. First, in Tables A14, and A16, we replicate our main analysis but drop all inactive barons from the sample. Our results remain very similar to in our main analysis.

The second approach we take is to model selection explicitly. That is, we specify the dependence of the relationship decision of the King or rebels to approach a baron and that baron's decision to choose a side. This is known as the "control function" approach to identification

Table A15: Who Joins the Rebel Coalition?: A "Horserace" Between Coalitional Resources

| | Opposed John in 1215 | | | | | |
| | OLS | | | | Lasso Regression | |
	(1)	(2)	(3)	(4)	(5)	(6)
Castles in Rebel Network	0.0440***	0.0447***	0.0444***	0.0464***	0.0409	0.0396
	(0.00336)	(0.00342)	(0.00434)	(0.00763)		
	[0.00342]	[0.00357]	[0.00398]	[0.00818]		
Markets & Fairs in Rebel Network	-0.0227	-0.0224	-0.0300	-0.0259	0	0
	(0.0139)	(0.0140)	(0.0187)	(0.0231)		
	[0.0149]	[0.0149]	[0.0182]	[0.0241]		
Roads, Rivers, & Coasts in Rebel Network	0.0224	0.0219	0.00838	-0.0101	0	0
	(0.0147)	(0.0148)	(0.0216)	(0.0187)		
	[0.0154]	[0.0153]	[0.0200]	[0.01960]		
Soil Quality in Rebel Network	0.00274	0.00258	0.0129*	0.0135	-0.000282	0
	(0.00540)	(0.00545)	(0.00665)	(0.0141)		
	[0.00542]	[0.00556]	[0.00625]	[0.0172]		
Constant	0.131	0.154	-0.0274	0.101		
	(0.101)	(0.103)	(0.116)	(0.530)		
	[0.102]	[0.103]	[0.116]			
Baron Controls	✓	✓	✓	✓	✓	✓
Geography Controls	✓	✓	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓	✓	✓
Network Controls.		✓	✓	✓	✓	✓
County FE			✓		✓	
Fast-Greedy Community FE				✓		✓
Adjusted R^2	0.555	0.551	0.578	0.711		
Observations	185	185	185	185	185	185

Tables Notes: This table reports a "horse race" between four measures of coalition resources: castles (moveable resources), markets and fairs (economic resources), roads, rivers, and costs (proxies for favorable economic geography) and agricultural resources. In columns (5) and (6), we estimate a lasso including all controls listed in Appendix A2. In all columns, we include baron controls, geography controls, and, economic controls as described in Table 2. Columns (3) and (5) include county fixed effects. Columns (4) and (6) include fixed effects at the fast-greedy community level. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

(Heckman and Pinto, 2022, 36-37).

We use prior military experience as an instrument in the first stage to predict whether or not a baron was inactive in the civil war (Panel B of Table A17). We expect both coalitions to have "proposed" first to barons with relevant experience. There is, however, no relationship between military experience and choosing a side.[28] Indeed, in our model what matters for a baron is not their own military experience or resources but those of the coalition. The exclusion restriction is thus likely satisfied.

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[28]The p-value on a two-sided T-test is 0.48 so we cannot reject the null that the proportion of rebels and loyalists with military experience was equal.

Table A16: Who Joins the Rebel Coalition? Robustness to Controlling for the Network

| | Opposed John in 1215 | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Castles in Rebel Network	0.0444***	0.0426***	0.0433***	0.0340***	0.0423***	0.0425***
	(0.00356)	(0.00342)	(0.00393)	(0.00428)	(0.00380)	(0.00348)
	[0.00328]	[0.00342]	[0.00411]	[0.00478]	[0.00383]	[0.00334]
Personal Grievances	0.221**	0.260**	0.269**	0.214**	0.271**	0.261**
	(0.00351)	(0.100)	(0.109)	(0.0835)	(0.109)	(0.105)
	[0.102]	[0.100]	[0.117]	[0.0875]	[0.116]	[0.101]
Network Measure	0.00743**	-0.000236	0.00162	-0.0113***	-0.000000181	-1.003
	(0.0115)	(0.00292)	(0.00250)	(0.00280)	(0.000000409)	(1.319)
	[0.00279]	[0.00292]	[0.00249]	[0.00284]	[0.000000450]	[1.028]
Constant	-0.0855	0.0669	0.00358	0.444***	0.0502	0.0608
	(0.129)	(0.107)	(0.167)	(0.148)	(0.143)	(0.113)
	[0.125]	[0.107]	[0.167]	[0.155]	[0.141]	[0.110]
Baron Controls	✓	✓	✓	✓	✓	✓
Geography Controls	✓	✓	✓	✓	✓	✓
Economic Controls	✓	✓	✓	✓	✓	✓
County FE	✓	✓	✓	✓	✓	✓
Network Measure	Ego Distance to King	Degree Centrality	Min Distance to Loyalist	Min Distance to Rebels	Betweenness Centrality	Eigenvector Centrality
Adjusted R^2	0.584	0.567	0.615	0.707	0.614	0.567
Observations	185	185	150	150	150	185

Tables Notes: Castles in Rebel Network is number of potential rebel castles in a baron's network. In all columns (3)-(5), we include baron controls, geography controls, economic controls, and county fixed effects as described in Table 2. Robust standard errors are in parentheses and robust standard errors clustered at the fast-greedy community level are reported in squared brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C   Proofs

In this section we provide the formal proofs for Lemmas 1-4. We begin by implementing the backward induction process. We first analyze the optimal choice of the King and derive conditions under which he is likely to accept the proposal should there be one. We then analyze the decision of a rebel leader – whether or not to propose. Lastly, we analyze the decision of a baron to join either the rebel coalition or the loyalist coalition. We then use these results to characterize institutional change. All proofs are in the discussion preceding each result.

C.1   The King

We first construct the King's payoff from accepting the proposal, i.e. $V^k(\alpha_k = 1, \mu_p = 1, \{(K_t, R_t)\})$. Since no fighting occurs, then no costs of fighting are incurred. However, each rebel has taken from the King his movable resources at the moment of joining the rebel coalition, and every subsequent time period until T. These resources, however, are restored after the proposal is implemented, i.e. at $T + 1$ onwards. Thus, at $t = 1$, the unmoved resources of the

Table A17: Who Joins the Rebel Coalition? Two-Step Heckman

| | Opposed John in 1215 | | | |
	(1)	(2)	(3)	(4)
Castles in Rebel Network	0.0256***	0.0228***	0.0249***	0.0241***
	(0.00493)	(0.00466)	(0.00472)	(0.00451)
Personal Grievances	0.416***	0.308***	0.194*	0.257***
	(0.143)	(0.118)	(0.112)	(0.0919)
In Public Opposition by Jan 1215	0.241	0.138	−0.0990	−0.00804
	(0.190)	(0.161)	(0.150)	(0.134)
Average Ruggedness		−0.00375		−0.00270
		(0.00237)		(0.00249)
Average Soil Quality		−0.0680*		−0.0564
		(0.0365)		(0.0426)
Coastal		0.191**		0.227**
		(0.0931)		(0.0888)
Riverine		−0.0429		−0.0624
		(0.0885)		(0.0925)
Roman Road		0.324**		0.351**
		(0.156)		(0.153)
Markets and Fairs		−0.0424**		−0.0804***
		(0.0199)		(0.0228)
Number of Castles		−0.0142		−0.0260
		(0.0532)		(0.0590)
Knights Owed		−0.0000507		0.0000237
		(0.000180)		(0.000191)
N. Baronies		0.183		0.323**
		(0.131)		(0.157)
Constant	0.184	0.244	0.513***	0.0995
	(0.156)	(0.219)	(0.138)	(0.187)
County FE		✓		✓

| | Active in 1215 | | | |
	(1)	(2)	(3)	(4)
Personal Grievances	1.335***	1.075***	1.284***	0.836*
	(0.377)	(0.402)	(0.421)	(0.477)
In Public Opposition by Jan 1215	6.627	6.276	7.119	6.192
	(.)	(.)	(.)	(.)
Military Experience	1.335***	1.306***	1.791***	2.642***
	(0.377)	(0.409)	(0.569)	(0.766)
Number of Castles		0.630***		1.291***
		(0.183)		(0.340)
Average Ruggedness		−0.00516		−0.00631
		(0.00569)		(0.00833)
Average Soil Quality		−0.309***		0.0625
		(0.0910)		(0.215)
Coastal		0.123		0.0796
		(0.228)		(0.380)
Riverine		0.0206		−0.295
		(0.227)		(0.326)
Roman Road		0.0177		−0.406
		(0.387)		(0.623)
Markets and Fairs		0.0592		0.0706
		(0.0581)		(0.0927)
Knights Owed		0.000849		0.00149
		(0.000975)		(0.00154)
N. Baronies		0.884**		−0.165
		(0.346)		(0.873)
Constant	−0.500***	−0.494	−0.309*	0.221
	(0.110)	(0.458)	(0.181)	(0.743)
County FE			✓	✓

	(1)	(2)	(3)	(4)
Inverse Mills Ratio lambda	0.236	0.148	0.00767	0.151
	(0.149)	(0.136)	(0.128)	(0.114)
Observations	186	186	186	186

Table Notes: This table reports the results of a two-step Heckman procedure. Panel (a) reports the results of the second stage where military experience is the excluded variable. Panel (b) reports the results of the first stage. Columns (1) and (3) report a sparse model. Columns (2) and (4) include a host of geographical and economic covariates. We include county fixed effects in columns (3) and (4).

realm is equal to the resources of the King and each baron, less the moved resources of the rebel coalition at $t = 1$. At $t = 2$, it is equal to the resources of the King and each baron, less the moved resources of the rebel coalition at $t = 2$, which may have grown if the 2nd baron drawn joined the rebel coalition. Thus, let subscripts $t = 1, 2, ..., T$ denote the order by which baron-followers are drawn, and let $\mathbb{1}_{R_t}$ indicate membership in the rebel coalition at t. Then the value of the cumulative unmoved resources of the realm from the periods 1 to T – undiscounted to simplify the notation, is $E_{\alpha_k=1} = (e_k + \sum_{i \in N} e_i)T - (e_p - n_p)T - (e_1 - n_1)\mathbb{1}_{R_1} - \left((e_1 - n_1)\mathbb{1}_{R_1} + (e_2 - n_2)\mathbb{1}_{R_2} \right) - \left((e_1 - n_1)\mathbb{1}_{R_1} + (e_2 - n_2)\mathbb{1}_{R_2} + (e_3 - n_2)\mathbb{1}_{R_3} \right) - ... - \left((e_1 - n_1)\mathbb{1}_{R_1} + ... + (e_T - n_T)\mathbb{1}_{R_T} \right)$. This can be succinctly written as:

$$E_{\alpha_k=1} = (e_k + \sum_{i \in N} e_i)T - \sum_{i \in R_1}(e_i - n_i) - \sum_{i \in R_2}(e_i - n_i) - ... - \sum_{i \in R_T}(e_i - n_i). \tag{2}$$

With some abuse of notation, denote also as $E_{\alpha_k=1}$ the present discounted value of (2), of which the King gets share σ_k.

Now from $T + 1$ onwards, there are no more moved resources, and therefore at every time period from $T + 1$ onwards, the unmoved resources of the realm is $e_k + \sum_{i \in N} e_i$. Denote the present discounted value of this stream of unmoved resources as E, of which the King gets the proposed share $\sigma_{k'} < \sigma_k$. Thus, the King's expected payoff from accepting the proposal is

$$V^k(\alpha_k = 1, \cdot) = \sigma_k E_{\alpha_k=1} + \sigma_{k'} E. \tag{3}$$

On the other hand, recall the King's expected payoff from rejecting the proposal (and therefore fighting with the rebels at T): $V^k(\alpha_k = 0, \mu_p = 1, \{(K_t, R_t)\}$. In this case, costs of fighting are incurred at T. Rebels' movable resources have also been moved at each time period $t = 1, 2, ..., T$. Thus, the present value of the cumulative resources of the realm from $t = 1$ to T is $E_{\alpha_k=1}$ minus the (discounted) cost of fighting of the loyalists at T, that is, $E_{\alpha_k=0} = E_{\alpha_k=1} - \beta \sum_{i \in K_T} c_i$, of which the King gets share σ_k, and where $\beta \in (0, 1)$ a discount rate.

The present value of the cumulative resources of the realm from $T + 1$ onwards is still E, of which, with probability $(1 - \rho_T)$, the King gets share σ_k and, with probability ρ_T, he gets share $\sigma_{k'}$. Thus, the King's expected payoff from $T + 1$ onwards is $(\sigma_k - \rho_T(\sigma_k - \sigma_{k'}))E$. His expected

payoff from rejecting the proposal is thus

$$V^k(\alpha_k = 0, \cdot) = \sigma_k(E_{\alpha_k=1} - \beta \sum_{i \in K_T} c_i) + (\sigma_k - \rho_T(\sigma_k - \sigma_{k'}))E. \tag{4}$$

Comparing (3) and (4), the first term of (3) is greater than the first term of (4), and that the difference is larger when the loyalists' cost of fighting is large. From the second terms of (3) and (4), we have $\rho_T(\sigma_k - \sigma_{k'}) \leq (\sigma_k - \sigma_{k'})$, which implies that the second term of (3) is no larger than the second term of (4), but that (absolute) difference is smaller as $\rho_T \to 1$.

In other words, the King is more likely to accept the proposal when the loyalists' cost of fighting is large and the rebels' probability of winning in battle is high. In turn, given γ, the latter is more likely when the rebels' fighting capacity is large and the loyalists' small. Thus:[29]

Thus, we have Lemma 1 in the main text: in equilibrium, the King is more likely to accept a rebel leader's proposal the more of the following conditions hold:

1. the rebel coalition has large movable resources and low fighting costs

2. the loyalist coalition has small resources and high fighting costs

C.2   The rebel leader

The rebel leader p's expected payoff from proposing at T is $V^p(\alpha_k, \mu_p = 1, \{(K_t, R_t)\})$. If p proposes, his payoff would depend on whether the King accepts or rejects and, if he rejects, on the probability ρ_T that the rebels win in battle.

Suppose k accepts the proposal, then the present value of the cumulative resources of the realm from $t = 1, 2, ..., T$ is $E_{\alpha_k=1}$, of which p gets share $\sigma_{i=p}$. From $T + 1$ onwards, p gets share $\frac{1-\sigma_{k'}}{N}$ of E. Thus, if k accepts the proposal, p's payoff from proposing is $\sigma_{i=p}E_{\alpha_k=1} + \frac{1-\sigma_{k'}}{N}E$.

If k rejects the proposal, then fighting ensues and p's expected payoff depends on ρ_T. If the rebels win, p gets $\sigma_{i=p}(E_{\alpha_k=1} - \beta \sum_{i \in R_T} c_i) + (\frac{1-\sigma_{k'}}{N})E$. If they lose, p gets $\sigma_{i=p}(E_{\alpha_k=1} - \beta \sum_{i \in R_T} c_i) + E)$. Then p's expected payoff from fighting is $\sigma_{1=p}(E_{\alpha_k=1} - \beta \sum_{i \in R_T} c_i) + (\sigma_{i=p} + \rho_T(\frac{1-\sigma_{k'}}{N} + \sigma_{i=p}))E$.

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[29]From the foregoing discussion, we know that the King is likely to accept when loyalists have high fighting costs and $\rho_T \to 1$. In turn, the latter is more likely when F_{R_T} is large and F_{K_T} small. F_{R_T} is large when rebels' movable resources are large and fighting costs low. F_{K_T} is small when loyalists' resources are small and fighting costs high.

From the above, p's expected payoff from proposing is thus

$$V^p(\alpha_k, \mu_p = 1, \cdot) = \alpha_k \left[\sigma_{i=p} E_{\alpha_k=1} + (\frac{1 - \sigma_{k'}}{N}) E \right]$$
$$+ (1 - \alpha_k) \left[\sigma_{i=p}(E_{\alpha_k=1} - \beta \sum_{i \in R_T} c_i) + \left(\sigma_{i=p} + \rho_T(\frac{1 - \sigma_{k'}}{N} + \sigma_{i=p}) \right) E \right]. \tag{5}$$

In contrast, if p does not propose, then no fighting costs are incurred. Thus, at each $t = 1, 2, ..., T$, p gets share $\sigma_{i=p}$ of the unmoved resources of the realm, and share σ' of the moved resources at each t. Denote as E_R the present discounted value of the stream of moved resources $\left(\sum_{i \in R_1}(e_i - n_i) + \sum_{i \in R_2}(e_i - n_i) + ... + \sum_{i \in R_T}(e_i - n_i) \right)$. In the cumulative period from $T + 1$ onwards, p gets share $\sigma_{i=p}$ of E. Thus, p's expected payoff from not proposing is

$$V^p = (\alpha_k, \mu_p = 0, \cdot) = \sigma_{i=p}(E_{\alpha_k=1} + E) + \sigma' E_R. \tag{6}$$

To see whether proposing is the optimal action for p, subtract (5) and (6) to get $E \left[\frac{\alpha_k(1 - \sigma_{k'})}{N} - (1 - \alpha_k)\beta \sum_{i \in R_T} c_i + (1 - \alpha_k) \left(\sigma_{i=p} + \rho_T(\frac{1 - \sigma_{k'}}{N} + \sigma_{i=p}) \right) - \sigma_{i=p} \right] - E_R$. Note that while $E > E_R$, the latter expression is negative when the expression in square brackets is non-positive. This would imply that it would be better for p not to propose. Thus, for p to propose, it must be that in the expression in square brackets is greater than zero. We thus set this expression to zero and simplify to get

$$\left(\frac{1 - \sigma_{k'}}{N} \right) (\rho_t(1 - \alpha_k) + \alpha_k) = (1 - \alpha_k)\beta \sum_{i \in R_T} c_i + \sigma_{i=p}(1 - \rho_T(1 - \alpha_k)). \tag{7}$$

Note that the LHS of (7) is more likely to be larger than the RHS when $\sigma_{i=p}$ is small, $\sum_{i \in R_T} c_i$ is small, and ρ_T is large. In turn, given γ, ρ_T is large when rebels' fighting capacity is large, and loyalists' small.

Thus, in equilibrium, a rebel leader p is more likely to propose to the King the more of the following conditions hold:

1. the rebel leader is not too powerful in the realm

2. the rebel coalition has large moveable resources and low fighting costs

3. the loyalist coalition has small resources and high fighting costs

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This proves Lemma 2 in the main text.

C.3 The barons

The last baron drawn, i.e. the Tth baron-follower, chooses whether to join either of the existing coalitions R_{T-1} or K_{T-1}. If he joins R_{T-1}, he gets a share σ'' of the rebels' movable resources at each period in which he is in the rebel coalition, i.e. (only) at T. In addition, he gets share $\sigma_{i=q_T}$ of the unmoved resources of the realm.

From $t = 1, 2, .., T - 1$, $q = T$ has not been drawn yet and so he does not get any share of the rebels' movable resources. He only gets $\sigma_{i=q_T}$ of the realm's unmoved resources. Thus, the payoffs from these periods are immaterial.

However, from $T + 1$ onwards, $q = T$ gets either $\sigma_{i=q_T}E$ or $(\frac{1-\sigma_{k'}}{N})E$, or a mix thereof (depending on ρ_T). That is, he gets $E + \rho_T E(\frac{1-\sigma_{k'}}{N} - \sigma_{i=q_T})$, which increases in ρ_T if $(\frac{1-\sigma_{k'}}{N}) > \sigma_{i=q_T}$, and decreases otherwise. In turn, given γ, ρ_T is larger when the Tth baron is in R_T rather than in K_T – that is, he contributes his (large) movable resources and (low) fighting cost to the existing rebel coalition, and the existing fighting capacities are such that $F_{R_{T-1}} > F_{K_{T-1}}$. Thus, provided that the Tth baron-follower is not too powerful in the realm, i.e. $\sigma_{i=q_T}$ is small, such that he is able to get a better share when institutions change, his payoff from $T + 1$ onwards is likely larger if the fighting capacity of the existing rebel coalition is larger than that of the existing loyalist coalition and his own contribution to the former is large.

To complete the analysis, we compare the payoffs of the Tth baron at period T from joining R_{T-1} or K_{T-1}.

If $q = T$ joins R_{T-1}, he gets at T his share $\sigma_{i=q_T}$ of the unmoved resources of the realm, as well as share σ'' of the rebels' movable resources. Thus, he obtains (a): $\sigma_{i=q_T}\Big(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T}(e_i - n_i)\Big) + \sigma'' \sum_{i \in R_T}(e_i - n_i)$. If $q = T$ joins K_{T-1}, he gets at T only (b): $\sigma_{i=q}\Big(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T}(e_i - n_i)\Big)$. Obviously, (a) is greater than (b) if $\sigma'' > \sigma_{i=q_T}$, but the difference shrinks as rebels' movable resources go to zero. If fighting ensues, we simply deduct the costs of fighting from (a) and (b) to get (c) $\sigma_{i=q_T}\Big(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T}(e_i - n_i) - \sum_{i \in K_T} c_i\Big) + \sigma'' \sum_{i \in R_T}(e_i - n_i - c_i)$ and (d) $\sigma_{i=q_T}\Big(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T}(e_i - n_i - c_i) - \sum_{i \in K_T} c_i\Big)$. Similarly, then, (c) is greater than (d) if $\sigma'' > \sigma_{i=q_T}$, but the difference shrinks as rebels' movable resources and fighting costs go to

zero.

From the foregoing, it is evident that, given γ, $q = T$ is more likely to join R_{T-1} than K_{T-1} if $\sigma_{i=q_T}$ is low, if $\sum_{i \in R_T}(e_i - n_i)$ is large, $\sum_{i \in R_T} c_i$ small, $\sum_{i \in K_T} e_i$ small, and $\sum_{i \in K_T} c_i$ large.

A similar logic holds iteratively for every other baron-follower drawn until the first one at $t = 1$. The relevant time periods during which payoffs are compared are only from the time the baron is drawn until T. Thus, for the $(T-1)^{th}$ baron drawn to play at $T-1$, periods $T-1$ and T matter, and so (a) becomes (a): $\sigma_{i=q_T}\left((e_k + \sum_{i \in N} e_i)2 - \sum_{i \in R_{T-1}}(e_i - n_i) - \sum_{i \in R_T}(e_i - n_i)\right) + \sigma''\left(\sum_{i \in R_{T-1}}(e_i - n_i) + \sum_{i \in R_T}(e_i - n_i)\right)$. As for the periods from $T+1$ onwards, the payoffs are constructed similarly as for the Tth baron.[30]

Thus, we have Lemma 3: in equilibrium, a baron-follower $i = q$ is more likely to be in the rebel coalition the more of the following conditions hold:

1. the baron-follower is not very powerful in the realm, has large movable resources, and low fighting cost

2. the rebel coalition has large movable resources and low fighting costs

3. the loyalist coalition has small resources and high fighting costs

This result is easily modified when barons are myopic. In particular, suppose a baron-follower $i = q$ can only see, i.e. with probability 1, the actions of a subset $S_{i=q}$ of other baron-followers, and sees, with probability 0, the actions of baron-followers not in $S_{i=q}$.[31] Then the payoff (a) above for the Tth baron becomes $\sigma_{i=q_T}\left(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T \cap S_{i=q_T}}(e_i - n_i)\right) + \sigma'' \sum_{i \in R_T \cap S_{i=q_T}}(e_i - n_i)$; (b) becomes $\sigma_{i=q}\left(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T \cap S_{i=q_T}}(e_i - n_i)\right)$; (c) becomes $\sigma_{i=q_T}\left(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T \cap S_{i=q_T}}(e_i - n_i) - \sum_{i \in K_T \cap S_{i=q_T}} c_i\right) + \sigma'' \sum_{i \in R_T \cap S_{i=q_T}}(e_i - n_i - c_i)$; and (d) becomes $\sigma_{i=q_T}\left(e_k + \sum_{i \in N} e_i - \sum_{i \in R_T \cap S_{i=q_T}}(e_i - n_i - c_i) - \sum_{i \in K_T \cap S_{i=q_T}} c_i\right)$. The payoffs for all other barons, the $(T-1)^{th}$ until the first drawn to play, are similarly modified, given their own subsets $S_{i=q_t}$.

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[30]If the same logic holds for all baron-followers, then any baron-follower in the full set of rebel coalition R_T is likely to have large movable resources and low fighting cost, while any baron-follower in K_T is likely to have small resources and high fighting costs. In equilibrium, R_T has large moveable resources and low fighting costs, while K_T has small resources and high fighting costs.

[31]In the medieval world in which communications are costly, information is usually more reliably obtained from one's family network, which could then constitute $S_{i=q}$.

Thus, we can state Lemma 4: in equilibrium, a myopic baron-follower $i = q$ who only sees the actions of a subset $S_{i=q}$ of other baron-followers is more likely to be in the rebel coalition the more of the following conditions hold:

1. the baron-follower is not very powerful in the realm, has large moveable resources, and low fighting cost

2. the rebel coalition in $S_{i=q}$ has large moveable resources and low fighting costs

3. the loyalist coalition in $S_{i=q}$ has small resources and high fighting costs