

A Network of Thrones: Kinship and Conflict in Europe, 1495-1918

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Abstract

We construct a database linking European royal kinship networks, monarchies, and wars to study the effect of family ties on conflict. To establish causality, we exploit decreases in connection caused by apolitical deaths of network important individuals. These deaths are associated with substantial increases in the frequency and duration of war. We provide evidence that these deaths affect conflict only through changing the kinship network. Over our period of interest, the percentage of European monarchs with kinship ties increased threefold. Together, these findings help explain the well-documented decrease in European war frequency.

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1 Introduction

*Bella gerant alii; tu, felix Austria, nube. Nam que Mars Aliis, dat tibi regna Venus*¹

Unofficial Habsburg Motto

“Although marriages may secure peace, they certainly cannot make it perpetual; for as soon as one of the pair dies, the bond of accord is broken...”

Desiderius Erasmus, Education of a Christian Prince (1516)

War has high costs - military budgets, injuries, disease, lives lost, and disruptive effects on long run economic growth. Fortunately, the frequency of war has greatly declined over the past several centuries (Levy, 1983; Pinker, 2011; Gat, 2013). One popular explanation for this trend is increased connectivity between states. These connections can take a variety of forms. They include economic interdependence, membership in international organizations, increased cultural exchange, and personal relationships. We focus on this last type of connection and establish a causal relationship to conflict in the context of Europe between 1495 and 1918.

Early Modern Europe was characterized by hereditary, increasingly centralized monarchies. This form of government places the personal relationships of monarchs and their families at the center of politics. As the heads of royal families, monarchs were expected to arrange the careers and marriages of close family members. Dynastic marriages were negotiated strategically, in order to benefit the royal family and the state. The explicit purpose of many of these marriages was to end a conflict or reduce the likelihood of future conflict. The Habsburgs are a well-known (and well-studied) example of a dynasty that took marriage negotiations extremely seriously. The empires they forged owed much more to the Habsburgs’ marital cunning than their martial prowess.

Dynastic marriages ultimately knit together rulers across the continent. It is our hypothesis that these kinship bonds were effective in decreasing the

¹“Let others wage war; you, happy Austria, marry. For what Mars awards to others, Venus gives to thee.” Traditionally attributed to 14th or 15th century statesmen, the motto was only popularized much later.

prevalence of war. In particular, we study whether, *ceteris paribus*, rulers who were more closely connected by living ties in the European network of great families were less likely to fight wars.

Theoretically, this is not obvious. That a fellow prince has become a cousin-in-law is, to the hard-headed realpolitiker, no reason to make peace with him. Kinship networks can affect international relations through a variety of channels, some of which run counter to our hypothesis. For example, 16th century humanist scholar Desiderius Erasmus argued that they led to foreign entanglements which increased the likelihood of conflict. Ultimately, the net effect of kinship networks on war is an empirical question.

To address this question, we construct a unique dataset which combines genealogical records on European royalty with contemporaneous conflict data. Our dataset links three main components. First, we generate a list of sovereign Christian monarchies. For each monarchy, we document its history of rulers. Second, we build a dynamic kinship network between the royals of Europe based on Tompsett (2014)'s genealogical data. Finally, we combine and expand existing data sets on European conflicts and their covariates during this period.

This dataset allows us to apply the tools of social network theory to test our hypothesis. Our paper distinguishes between two types of kinship networks. The first consists of living family connections which change as individuals are born, marry, divorce, and die. The second is based on genetic relationships, which never varies for a pair of monarchs. We measure this "blood" connection by a pair's distance to their closest common ancestor. For the blood related, our evidence is suggestive. It points towards rulers with a common grandparent (and to a lesser extent, a common ancestry in general) being more likely to fight wars. This is consistent with a historical record of succession crises over who is to inherit a country's leadership.

Our main results are on living kinship ties. Simple OLS regressions do not indicate any consistently significant relationship between living kinship ties and conflict incidence. However, there is good reason to believe that such an estimate is biased. Specifically, as mentioned above, the formation of kinship ties is strategic. In particular, diplomatic marriages were seen as a way to

prevent or end conflicts. Thus marriages may have been disproportionately formed between dynasties with a high propensity for war. This would introduce a positive bias in the OLS estimate. We provide a simple framework which captures this idea and helps to guide our analysis.

To correct for this bias, our main results exploit downward variation in kinship ties caused by the deaths of individuals important to the kinship network. Our reduced form approach avoids making structural assumptions about the network formation process. This is beneficial since structural models of network formation not only require strong assumptions, but also are typically computationally demanding and plagued by multiple equilibria.

We motivate our key findings with an event study. This shows disruptions to the kinship network caused by these deaths decrease a dyad's connectedness for about a decade and raises its war propensity for a similar duration. These effects are only present when a death breaks network ties. The death of a monarch's close relative who is not important to the network does not lead to an increased chance of war.

Using exogenous deaths of network important individuals (i.e. dropping those with plausibly political causes of death, such as assassination), we instrument for kinship distance to remove bias due to endogenous network formation. This instrumental variable approach finds that decreased connectedness between a pair of rulers leads to a substantial increase in war frequency and duration. The estimated coefficients imply that a pair of monarchs whose only family connection is a pair of married children would see an 9.2 percentage point increase in their war probability if this marriage tie were dissolved. These findings are robust to different measures of kinship distance.

In line with previous literature, we observe an over 50% decline in the prevalence of war after 1800. We also document a new fact: kinship ties between European monarchs grew substantially over time. Thus our main result, that kinship networks promote peace, suggests that these growing kinship networks can explain 48% of the much discussed decline in European war frequency.

To our knowledge, no previous paper has quantitatively explored the connection between royal family networks and war. However, there are a number

of related papers which we briefly review in section 2. In section 3, we provide historical context for our study. In section 4, we provide a conceptual framework motivating our analysis. Sections 5 and 6 discuss our data and provide OLS estimates. Section 7 presents our main results. Section 8 performs a robustness analysis on our findings and rules out spurious relationships that could be driving our results. In section 9, we conclude. An online appendix documents our data construction, trends in royal family connection across time and dyads, and more fully explains the network measures employed.

2 Related Literature

The main contribution of this paper is to provide quantitative evidence that living kinship ties impact the decisions of political leaders, leading to a lower incidence of war. We leverage the network structure of our data in combination with a close examination of the historical record to overcome challenging issues related to endogenous network formation. This places our work at the intersection of several literatures.

This paper follows the economic tradition of treating individuals as the primary unit of analysis. Considering pairs of rulers, we explore the importance of personal relationships on war incidence. Jackson and Morelli (2009) survey theoretical models of conflict as a failure of bargaining. We view the personal relationships between rulers as information conduits which lower the cost of bargaining, making such failures less likely.

This approach breaks from the realist approach to international relations which minimizes the role of leaders in favor of system-level, geopolitical variables. Fichtner (1976) argues for the importance of court and family politics in historical analyses. She demonstrated the intense personal nature of historical politics by examining letters from the 16th century Habsburg dynasty discussing their use of marriage as a political tool. More recently, Jones and Olken (2005) use the unexpected deaths of autocratic leaders to show the importance of individual leader qualities on political outcomes. Fisman (2001) uses a related idea to study the value of political connections. He investigates

the effect of rumors of Indonesian President Suhartos death on stock market returns for politically connected firms.

Our empirical analysis makes heavy use of the network structure of our data. This means our paper is also related to the burgeoning literature on the economic importance of social networks. Recently, network methods have been applied to a wide variety of questions.² However, relatively scant attention has been paid to the importance of social networks in historical analysis and/or international relations. There are a few notable exceptions. Within international relations, Maoz et al. (2007) and Maoz (2010) show that bilateral trade relations and mutual membership in international organizations are negatively correlated with bilateral conflict (though find mixed results when using alternative measures of network connectivity). Additionally, Jackson and Nei (2015) advance a theoretical argument that alliance networks without a peace surplus from trade are inherently unstable. They provide some empirical evidence which associates the post 18th century decline in war frequency to a rise in international trade.

The seminal paper applying social network methods to help understand historical events is Padgett and Ansell (1993). They use network centrality to explain how the Medici, a noble family of no particular note in 1400, rose to the pinnacle of Florentine politics in 1434. Their thesis is that Cosimo de' Medici forged a series of marriages and business ties that placed his family 'between' the other great families of Florence. This allowed the Medici the opportunity to be involved in nearly all decisions of consequence.

Our primary source of identification comes from variation in network structure following the (plausibly exogenous) deaths of individuals 'between' two rulers. Azoulay et. al (2010) use a similar identification strategy to show that the death of a superstar researcher reduces the productivity of their coauthors and others in their topic area.

An additional contribution of our paper is our novel dataset which links

²See Jackson (2014) for a review of the literature on social networks in economics. He makes a forceful argument for the importance of network connection in understanding economic outcomes. Relatedly, Ferguson (2018) provides numerous examples of the importance of both elite and lower-class networks throughout history.

genealogical data with the historical record on conflict and other time-varying covariates. Three recent papers use data similar to ours. Iyigun (2008) uses Breckes Conflict Catalogue and finds strong evidence that Ottoman invasions aided the spread of Protestantism in Europe in the 16th century. Iyigun, Nunn, and Qian (2016) use Brecke and other conflict data to study the effect of climate change on European war. Dube and Harish (2016) study the effect of ruler gender on conflict. Like us, they construct a data set matching Wrights (1942) war data to Tompsetts genealogical data. Dube and Harish use the genealogical data to identify the gender of rulers close relatives. They use this information to make a compelling case that female rulers were more bellicose than men. This suggests that queens delegated domestic responsibilities to their spouses, freeing them to lead a more active foreign policy. In appendix A, we discuss the advantages of our dataset versus these similar ones.

3 Historical Context

We restrict our analysis to the monarchies of Christian Europe from 1495-1918.³ Giving a complete account of this rich and fascinating period is far beyond the scope of this paper. However, this section briefly describes some of the institutions relevant to our analysis.⁴

During the period from the end of the 15th century to the middle of the 18th century - typically referred to as ‘early modern’ - monarchy was an ubiquitous form of government. While many monarchs aspired to absolute power, most early modern European dynastic governments were mixed systems with varying degrees of royal, aristocratic, and parliamentary power.⁵ In the 17th

³Geographically, this roughly corresponds to continental Europe, the British Isles, the Mediterranean Islands, and Russia. While, for example, the Ottoman Empire played a major role in European conflict, we are not aware of any examples of Christian and non-Christian royal intermarriage during this interval. Therefore, the exclusion of non-Christian states does not impact our results. For a more detailed explanation of inclusion criteria, see appendix A.

⁴For a one volume history focused on international conflict, consider “Europe: The Struggle for Supremacy, from 1453 to the Present” (Simms, 2014)

⁵Absolute monarchy was an ideal articulated by Jean Bodin and others. For more details on early modern government, See Bonney (1991), especially ch. 6 *The Rise of European*

and 18th centuries the trend was towards centralization of power in the hands of the monarch. Towards the end of our sample constitutional constraints increasingly limited the power of monarchs in many countries.⁶ Despite these limitations, the monarch was typically one of the most, if not the most, important leader in any polity during our period. This was especially true when it came to matters of interstate conflict. For example, in Britain, even during periods when the Parliament and Cabinet decided whether to declare war, the King was in charge of the war's conduct (Hoffman, 2012).

In most monarchies rule was hereditary, although countries differed in the details of succession (especially regarding the possibility of women to inherit the throne). A common norm was that in order to be eligible to inherit a throne, both parents of an heir must be royal. In some regions with stronger aristocracies (such as Poland), the monarch would be elected for life by a council of nobles. Importantly, even in these regions new leaders were typically selected from a single great family.

Monarchs were not only political leaders but also patriarchs and matriarchs of their families. Close family members of the ruler were often selected to be ambassadors, advisors, and military leaders. Marriages of members of the royal family were typically arranged or approved by the monarch.⁷

These institutions made dynastic marriage a common way to build relatively stable political connections between polities. Fleming (1973) provides evidence that such marriage arrangements were greatly influenced by international and domestic political concerns. Studying the descendants of English King George I, she finds that relative to the lower nobility royals were more likely to marry foreigners, other royals, and close relatives. They were also

Absolutism

⁶Marshall and Jagers (2015) provide an index of the constraints on the authority of monarchs covering the last century of our sample. In 1816, they score 16 monarchies in our data and find in 11 the monarch has 'unlimited authority.' By 1900, only 2 monarchies maintain this status. On a scale of 1-7, the average constraint score increases from 1.875 in 1816 to 5.36 in 1900.

⁷Sometimes this principle was legally codified. For example, King George III, upset at the nonstrategic marriage of his brother, passed the Royal Marriages Act (1772) through parliament, which required members of the English royal family to have their marriages approved by the reigning monarch. This law was only repealed in 2015.

less likely to marry commoners. In the data section of this paper, we comprehensively document the ubiquity of inter-dynastic ties.

The Habsburg Holy Roman Emperor and Austrian Archduke Maximilian I (r.1486-1519) was especially adept at marriage arrangements. Marrying Mary of Burgandy in 1477, he gained control of her principalities in the Low Countries. To secure an ally in the interminable Valois-Habsburg struggle with France in Italy, he married his son Philip ‘the Handsome’ to Joanna ‘the Mad’ of Castile in 1498. To reduce border tensions with East European neighbors, granddaughters and grandsons were married to Hungarian and Bohemian rulers. This series of marriages set the groundwork for one of the most successful dynasties in history. Habsburgs would go on to rule lands from the Philippines to Budapest.

Fichtner (1976) uses the marriage negotiation letters of 16th Century Habsburgs to craft a broader anthropological theory of European royal marriage. She finds that royal marriages entailed marathon negotiations over dowries, inheritance rights, and international political obligations. The size of dowries involved (usually bi-directional) could rival the yearly maintenance of standing armies. These marriages allowed the Habsburgs to install spies and influencers foreign courts and place Habsburgs in lines of succession.⁸ These connections also created lines of communication that could become activated even when serious disruptions took place.

The Thirty Years’ War (1618-1648) provides an illuminating example of the relationship of kinship networks to conflict. In the preceding century, Lutheranism and Calvinism had spread across the Holy Roman Empire. A series of wars of religion rocked the continent. With religion so politically charged, inter-confessional royal marriages became very rare. An important tool for the deescalation of dynastic conflict was eliminated.

Protestant Bohemian nobles, concerned about the erosion of Protestant rights, brought the lingering conflict to a head. They did so by throwing the

⁸ “*In an age when accurate information from abroad was at a premium, a child at a foreign court could keep one apprised of events there. Ferdinand’s daughter Catherine reported to her father regularly about dealings between her husband, King Sigismund Augustus of Poland, and Muscovy...*”. Fichtner (1976)

Habsburg's representatives out a window in 1618 (in the Second Defenestration of Prague), and calling for the election of a protestant prince. The ruler they chose in 1619 was Frederick V, elector of The Palatinate (r.1610-1623). This outcome was unacceptable to the Habsburgs (Bohemia being a pivotal voter in the electoral college which selected the Holy Roman Emperor), and a steadily escalating conflict ensued.

Figure 1 shows the family and ancestral relationships between the states of Europe in 1618. From this figure alone, one can predict the two primary blocs during the Thirty Years' War. On the left, note three main clusters of connections: the Catholics of France, Spain and Southern Italy; a second cluster of Catholic States in Austria, Bohemia, and Poland; and a Protestant cluster, containing England, the Netherlands, Denmark and the Protestant electorates of the empire (Prussia, Saxony, and the Palatinate). The division between these camps is clearly centered in modern Germany and the Netherlands, which was to be the battlefield for the conflict. The second map emphasizes the strength of Habsburg ties between the family's Austrian and Spanish branches.

Arguably, it was Frederick V's centrality in the international system that led 'The Bohemian Revolt' to escalate into a century-defining war. The lands controlled directly by Frederick V were relatively weak, but he was at the center of protestant politics. Frederick V was the son of the founder of the Protestant Union, which contained many other protestant-leaning principalities of the Holy Roman Empire. He was closely connected by blood and marriage to the most important protestant states in Europe. King James I of England (r.1567-1625) was his father-in-law, William the Silent of Orange (r.1544-1584) (first Stadtholder of the independent Netherlands) was his grandfather, the elector George William of Brandenburg (r.1619-1640) was his brother-in-law, and Christian IV of Denmark (r.1588-1648) was his uncle-in-law. All of these states would eventually be drawn in to the war. The Habsburgs too drew in familial allies. Phillip III (r.1598-1621) of the Spanish Habsburgs begrudgingly rallied to his cousins' cause.

Figure 2 displays the time trends in war and connectedness. It suggests an

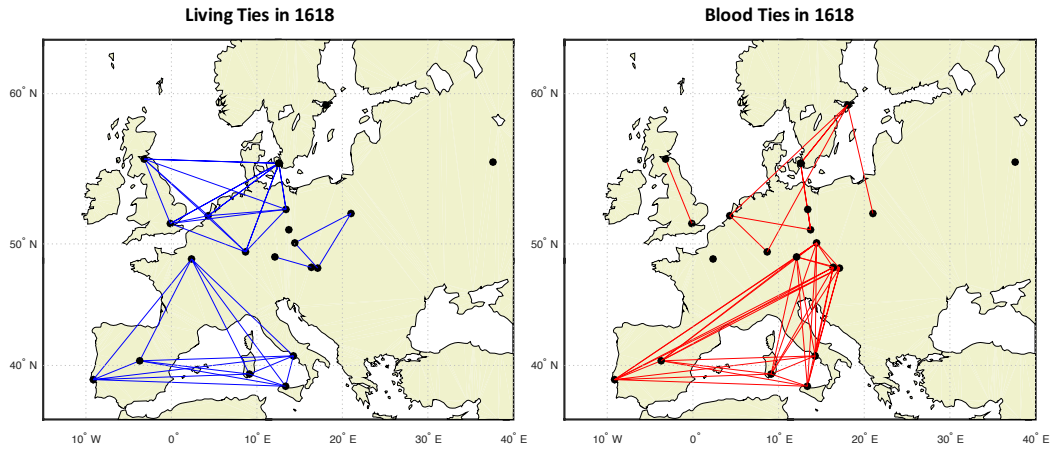


Figure 1: In the lead up to the Thirty Years' War, kinship connections displayed a clear Catholic/Protestant division. In the above maps, black dots represent capitals. In the left figure, lines represent living kinship connections between rulers (i.e. a line connects the capitals if their rulers share a living family tie), while in the right figure lines represent blood connections within 3 generations (i.e. the two rulers share a great grandparent).

inverse relationship, driven by a decrease in conflict and increase in connections in the 19th century. The years between the Napoleonic Wars and World War I, sometimes known as 'The Concert of Europe' were atypically peaceful. A 'Holy Alliance' of the major monarchs of Europe was declared, dedicated to defending royal prerogatives and conservative values against the new ideas sweeping Europe. This alliance, explicitly a fraternity, may have only been possible because of their increasing sense of kinship.⁹

In World War I, this system of personal relationships between the rulers failed. King George V of the United Kingdom (r.1910-1936), Tsar Nicholas II of Russia (r.1894-1917), and Kaiser Wilhelm II of Germany (r.1888-1918) were all first cousins, and grandchildren of Queen Victoria of England (r.1819-

⁹From the text we have "...the three contracting Monarchs will remain united by the bonds of a true and indissoluble fraternity, and, considering each other as fellow-countrymen, they will, on all occasions and in all places, lend each other aid and assistance ; and, regarding themselves towards their subjects and armies as fathers of families, they will lead them, in the same spirit of fraternity with which they are animated, to protect Religion, Peace, and justice."

Trends in Kinship and Conflict

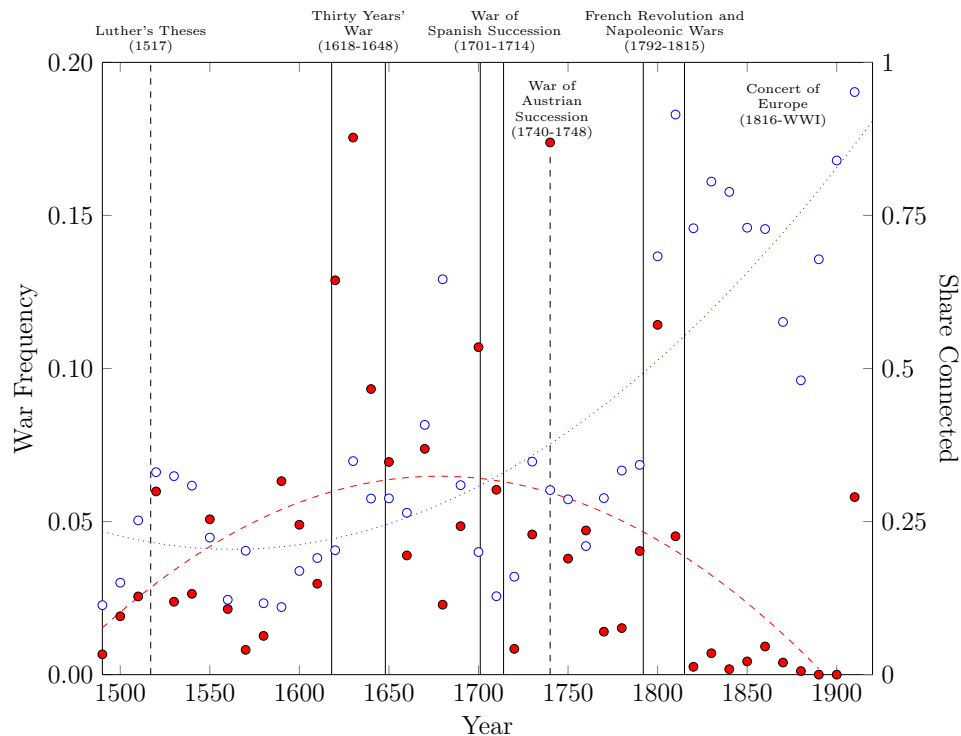


Figure 2: Hollow circles report the share of dyads with a living kinship tie, left axis. Solid circles report share of dyads at war, right axis. Second order polynomials are fitted to each data series. Important political events indicated. Overall war frequency and kinship connection, averaged by decade, are negatively correlated, $\rho = -.197$.

1901).¹⁰ While democracy in the United Kingdom had developed to the point that King George V had limited influence, Kaiser Wilhelm II and Tsar Nicholas remained important decision makers. On the eve of the war, the German and Russian rulers exchanged a series of personal telegrams signed ‘Willy’ and ‘Nicky’, desperately trying to deescalate the conflict. However, since their grandmother’s death, the two had grown into mutual distrust and suspicion.¹¹

¹⁰George V and Wilhelm II were her biological grandchildren. Nicholas II was a grandson-in-law, having married Victoria’s granddaughter Alix of Hesse in 1894.

¹¹While signing the mobilization order, Kaiser Wilhelm II remarked “*To think George and Nicky should have played me false! If my grandmother had been alive, she would never have allowed it.*”

This last gesture towards brotherhood proved too little too late, and with the war came the end of a Europe dominated by kings and tsars.¹²

4 Connecting Kinship and Conflict

Our paper is motivated by a clear historical record of European monarchs and their advisers treating dynastic marriage negotiations, papal annulments, lines of succession, and the bonds of kinship between rulers as central to foreign policy. Uniting these considerations are their origins in family networks. Changes in these familial network connections are therefore likely to be associated with political outcomes.

There are several mechanisms by which a change in family connections might influence diplomatic outcomes. One set of theories is that rulers who are closer family are more likely to resolve disputes amicably. This could be because the rulers are more disposed to trust connected rulers as allies (as in Levi-Strauss's (1949) theories of marriage alliance among primitive tribes). Alternatively, perhaps close family ties facilitate dispute resolution by promoting the spread of information. This information spread may be overt (as connected rulers spend more time interacting with each other, for example during family events and holidays) or covert (as a daughter married abroad might serve as a spy at a foreign court, as in Fichtner (1976)). Any of these effects might lower effective negotiation costs and allow for more efficient resolution of conflicts.

Close family ties could also prevent conflict by raising the expected cost of war or the surplus from peace. For instance, a shared interest in a mutual relative might prompt cooperation between rulers. The possibility that a mutual relative would serve as a hostage, and therefore provide insurance

¹²Although at least one Polish royal did not believe this at the time. Princess Radziwill's fascinating handbook to the royal marriage market discusses the politics and culture of royal marriages leading up to the war, and predicts the consequences of the war for future marriages. In 1914 she writes "*It is probable however, that, after the present war has come to an end, Royal alliances will become once more subjects of general interest, and of greater importance than has been the case during the last twenty years or so. This fact has led me to include in my book a review of the personages eligible to become one day the consorts of European rulers.*"

against aggression, is a more cynical version of that idea. The fact that a pair of closely connected rulers (or their heirs) have a chance of inheriting each others' domains may also give them a further interest in promoting bilateral prosperity.

On the other hand, it may simply be that familiarity breeds contempt. Relatedly, closely connected rulers may find themselves in more frequent succession disputes. These mechanisms would tend to raise the expected spoils (and frequency) of war. It is our hypothesis that these mechanisms are quantitatively much less important than the ones which lead to peace.

While this list is not exhaustive, it illuminates the diversity of mechanisms by which family ties can influence the chance of conflict. They also suggest a basic conceptual framework to guide our empirical analysis. This framework draws attention to the endogenous characteristics of the kinship network. This endogeneity motivates the need for exogenous variation to recover the true causal effect.

Our unit of analysis is the dyad (a country-pair). Suppose a given dyad experiences a potential conflict with exogenous probability, p . Think of this as their idiosyncratic latent war propensity. Potential conflicts can either resolve peacefully or escalate into war. We assume that the dyad is able to resolve the potential conflict with probability $q(\frac{1}{d})$, an increasing function of inverse kinship network distance. The idea is that tighter kinship bonds either increase the incentive to resolve disputes or lower the costs of doing so.

Notice that this framework suggests that an exogenous increase in kinship network distance, d , lowers q and thus leads to more frequent wars. Suppose war is socially inefficient and that the dyad can reduce war frequency by exerting costly effort to lower d . In this setting, dyads with a large p have a correspondingly large (Coasian) incentive to form tighter kinship bonds (e.g. through strategic marriage). Therefore, we are likely to observe pairs with the highest latent war propensity forming the tightest kinship ties. This means a simple regression of war frequency on $\frac{1}{d}$ will produce a coefficient with positive bias.

Our study requires a source of exogenous variation in network structure

to recover the causal effect of kinship networks on war frequency. The ideal experiment would take two ex-ante identical country pairs and randomly vary one of the pair’s level of connection. Any subsequent difference in conflict behavior would be attributed to the changed kinship network. To approximate this, we use variation in a dyad’s kinship network distance following the deaths of nobles important to the network.

5 Data Description

Our analysis is based on a newly constructed dataset on royal kinship networks and wars. The final dataset takes the form of an unbalanced panel of country dyads. Our analysis is restricted to sovereign Christian European monarchies from 1495-1918. This limitation focuses on the types of states for whom dynastic connections are important, and aids in collecting a comprehensive data set. For a complete description of the data and its construction, as well as variables collected but not used in this analysis, see appendix A.

5.1 Summary Statistics

Our raw data consist of 92,340 country-pair (dyad) years. Monarchs are matched to these countries primarily using Spuler (1977). Of these dyads, 3,906 dyad-years are in personal union, where the same ruler controlled two crowns simultaneously. By construction, personal unions are never at war, so these pairs are not included in the analysis.

There are 865 country pairs in our sample. In table 1, we report summary statistics for our data. The first group of variables measure conflict activity. These variables are primarily based on Wright (1942), but we expand and reconcile this data with other sources. War is a dummy variable which indicates whether a pair of countries are at war in a given year. War Start (Continue) is a dummy for whether a pair begins (continues) a war, conditional on being at peace (war) in the previous year.

Wars start in approximately 0.9% of previously peaceful dyads. Condi-

Table 1: Summary Statistics

	count	mean	sd	min	max
War	88434	.040	.196	0	1
War Start	85002	.009	.093	0	1
War Continue	3432	.814	.389	0	1
Neither Landlocked	88434	.614	.487	0	1
Adjacent	88434	.137	.344	0	1
ln(Distance)	88431	6.92	.678	3.27	9.34
Same Religion	88434	.458	.498	0	1
# Immediate Relatives	88434	10.3	5.23	0	34
Shortest Path Length	34766	7.27	4.69	1	30
Resistance Distance	34766	2.78	2.01	.195	15.8
Blood Distance	54140	4.62	1.68	1	7

tional on being at war in a given year, 81.4% of dyads continue into the next year. Together, this implies a war frequency of 4% of dyad-years. Dyads are very heterogeneous in their bellicosity. Some never fight wars, while others are long time rivals. For example, the Archduchy of Austria (and its successor states) and France, which have 363 years of existence, are at war in 25% of years.¹³

The second class of variables are pairwise covariates. Primarily, these are geographic variables that are derived from Reed (2016). Reed provides maps of Europe for our entire time period at very high frequency. The variables Neither Landlocked and Adjacent are self-explanatory dummy variables which vary over time with border changes. We also record the natural log of the distance between two countries' capitals in kilometers. Additionally, we construct a dummy for whether the pair of rulers are members of the same religious group (Catholic, Protestant, or Orthodox).

The final class of variables are based on Tompsett's (2014) genealogical data. The genealogy has 872 individuals alive in the median year, but this amount increases strongly in later years. Figure 8 in the appendix plots the number of living nobles in our data by year. The average pair of rulers have 10.3 immediate family connections (i.e. parents, spouses, siblings or children)

¹³See table 11 in the appendix for additional dyads of interest.

between them. Rulers sometimes share immediate family members, so this corresponds to somewhat more than 5.6 immediate family members per ruler.

We reconstruct these data as a dynamic kinship network in which living individuals are linked with their immediate family members. Immediate family relations are parent/child, sibling, and spousal. Each year the set of individuals is updated based on births and deaths. Links are added for births and marriages and removed after deaths and divorces. Using this network, we calculate measures of kinship distance.

Shortest Path and *Resistance Distance* are our measures of kinship distance between rulers. The shortest path between two rulers is simply the minimum number of network links that must be traversed to get from one ruler to the other. While shortest path distance only looks at one path between rulers, resistance distance is an all-path measure inspired by electrical resistance. This measure is decreasing in the number of paths between two rulers and increasing in the length of each of these paths. If no path exists, both of these measures are defined to be infinity. Only finite values are summarized in the above table. 39.3 percent of dyad-years are connected by living kinship ties. This is mostly driven by within-dyad variation. Of 274 dyads with more than 100 years of coexistence, only 12 are never connected.

The share of states connected by living ties trends upwards over time after a slight dip in the decades after Luther's Theses. In the 1580's only eleven percent of states are connected, the lowest share on record. In the 1910's, the last decade in our data (albeit a partial one) over 95 percent are. A positive trend is still observed when looking only at close connections of less than 8 steps. A larger share of monarchs share a common ancestor. There is no long term trend in the share of dyads with a close blood connection. For more information on our genealogical data and demographic trends see appendix B. For tables and figures further describing the evolution of network ties and conflict, see appendix D.

Blood Distance is a different type of bilateral relationship measure. Instead of relying on the dynamic network of living kinship relations, this measure is calculated from a static directed network in which links run only from children

to parents. Using this network of genetic connections, we report the maximum number of steps from two rulers to their most recent common ancestor. We search the genealogical data up to 7 generations. Like our living measures, this measure is defined as infinity if no common ancestor exists. Appendix C provides a detailed description of the network construction and corresponding measures.

6 OLS Analysis

6.1 Living Kinship Ties and War

We are interested in the relationship between network distance and war. We begin by estimating a baseline specification, eq. (1). This equation models the probability of war as a linear function of inverse kinship network distance, $(1/d)$. The measure d is either shortest path length or resistance distance. For shortest path length, using inverse distance has the attractive property of being bounded between zero and one. In addition, this inverse measure captures the intuition that a unit increase in network distance will be more important for more closely connected rulers. Taking the inverse of our distance measures allows us to deal with unconnected pairs ($d = \infty$) in a natural way. This inverse distance measure takes a value of 0 when the pair is unconnected.

$$War_{(i,j),y} = \alpha + \beta \cdot \left(\frac{1}{d}\right)_{(i,j),y} + \delta \cdot X_{(i,j),y} + \theta_{(i,j)} + \theta_y + \epsilon_{(i,j),y} \quad (1)$$

The outcome variable, $War_{(i,j),y}$, is a dummy for whether countries i and j are at war in year y . We regress this on inverse network distance $(1/d)$. Tables refer to this variable as $(\text{Path})^{-1}$ or $(\text{Resistance})^{-1}$ as appropriate. We also include a vector of dyad-year controls $X_{(i,j),y}$ (including log of capital distance as well as dummies for close blood connection, adjacency, same religion, and neither landlocked), and fixed effects for dyad ($\theta_{(i,j)}$) and year (θ_y). In columns (5) and (6) of table 2, we estimate this model using shortest path length and resistance distance respectively. Columns (1)-(4) estimate the regression with

different combinations of controls and fixed effects. The final two columns report estimates where the outcome variable is replaced with a dummy for the dyad beginning (continuing) a war in year y conditional on being at peace (war) in year $y - 1$.

Throughout the paper, we report standard errors clustered two-way by country. This method is standard in the country-level network literature, employed in papers such as Jackson and Nei (2015). This form of clustering helps to account for correlation among observations which share a country, both contemporaneously and over time.

Two-way clustering allows for, for example, France's fighting a war with Austria to be correlated with it fighting a war with Hungary. This is important both because of the presence of stable alliance blocks, and because our causal results will rely on identifying variation based on events that are correlated between dyads that share a country. Cameron and Miller (2015) show that this clustering procedure can miss some relevant correlations, thus potentially under reporting standard errors. To show our results are not driven by incorrect standard errors, we conduct placebo simulations in our robustness section.

Table 2 finds no consistent effect of either inverse shortest path length or inverse resistance distance on the likelihood of war overall, or on the rate of war start or continuance. These null estimates (excepting a significant at the 5 percent level relationship between inverse resistance distance and war in the sparsest specification) are present in various combinations of covariates and fixed effects. Despite this, the regressions still reveal some interesting relationships. Countries are more likely to start wars when they share a border, controlling for dyad fixed effects, but are also quicker to end them. Countries that share a religion group are significantly less likely to start wars. This latter negative relationship disappears in our subsequent section, where we instrument for connectedness. This suggests that a shared religion primarily lowers war probability by making it easier to form marriage ties.¹⁴

¹⁴Adjacency and distance little variation within dyad. Therefore they are not estimated precisely when dyad fixed effects are included.

Table 2: OLS War Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	War	War	War	War	War	War	War Start	War Continue
(Path) ⁻¹	-0.00524 (0.0198)		-0.0286 (0.0181)		-0.0296 (0.0161)		0.000233 (0.00253)	-0.0132 (0.0552)
(Resistance) ⁻¹		-0.00945* (0.00461)		-0.00724 (0.00539)		-0.00745 (0.00472)		
3 Gen. Blood					0.0125 (0.0107)	0.0115 (0.0111)	0.000653 (0.00149)	0.0143 (0.0127)
Same Religion					-0.0201* (0.00819)	-0.0209* (0.00820)	-0.00778** (0.00258)	-0.0113 (0.0372)
Adjacent					0.0311 (0.0182)	0.0312 (0.0183)	0.0104* (0.00426)	-0.0334** (0.0128)
Neither Landlocked					0.00435 (0.0115)	0.00400 (0.0115)	0.0123* (0.00586)	-0.321 (0.191)
ln(distance)					-0.00371 (0.00327)	-0.00359 (0.00319)	-0.00375 (0.00257)	0.0243 (.)
Pair FE			X	X	X	X	X	X
Year FE			X	X	X	X	X	X
N	88434	88434	88427	88427	88424	88424	83639	3403

* $p < .05$, ** $p < .01$, *** $p < .001$. Standard errors are robust to two-way country clustering. Missing standard errors are due to insufficient variation.

6.2 Blood Ties and War

Table 3 details the association of conflict with blood distance. It regresses war against blood connection of various degree, dyad and year fixed effects, and selected covariates. Brothers have a blood distance of 1, first cousins have a blood distance of 2, and so on. The sample size in this table is lower than in the above section, because we drop dyad-years where one of the rulers has changed.

In all specifications, with or without fixed effects and covariates, having a blood distance of 2 is positively associated with a higher chance of war. An example would be a pair of monarchs whose closest common ancestor is a grandparent. The size of this relationship, an increase of 2.27 percentage points in the annual chance of war (versus a pair of genetically unrelated rulers) is sizable. Although these estimates are not significant, because our data is a comprehensive census, the point estimate is still interesting. No consistent relationship is found between war and brotherhood.

When pooling all blood distances of up to 3 (as in our main results section

Table 3: Blood Distance and War

	(1) War	(2) War	(3) War	(4) War
Blood Distance 1	-0.0219 (0.0136)	-0.0237 (0.0158)	0.00605 (0.0138)	0.00761 (0.0148)
Blood Distance 2	0.0283 (0.0195)	0.0241 (0.0170)	0.0214 (0.0167)	0.0227 (0.0168)
Blood Distance 3	-0.00357 (0.0101)	-0.00609 (0.0107)	0.0221 (0.0145)	0.0230 (0.0144)
Blood Distance 4	-0.00686 (0.0104)	-0.0108 (0.0116)	0.0126 (0.0104)	0.0123 (0.0105)
Blood Distance 5	-0.00205 (0.00908)	-0.00198 (0.00876)	0.0185 (0.0102)	0.0195 (0.0102)
Blood Distance 6	0.00309 (0.0121)	0.00282 (0.0107)	0.0171 (0.00926)	0.0162 (0.00930)
Blood Distance 7	-0.0117 (0.00874)	-0.0101 (0.00666)	0.00436 (0.00403)	0.00485 (0.00425)
Same Religion		0.00302 (0.0128)		-0.0215** (0.00812)
Adjacent		0.0438*** (0.0131)		0.0305 (0.0189)
Neither Landlocked		0.0154 (0.00871)		-0.00615 (0.0132)
ln(distance)		0.00353 (0.00624)		-0.000955 (0.00664)
Pair FE			X	X
Year FE			X	X
N	80221	80219	80181	80179

* $p < .05$, ** $p < .01$, *** $p < .001$. Standard errors are robust to two-way country clustering. Missing standard errors are due to insufficient variation. Omitted category is dyads without a common ancestor.

below), this covariate is a consistently positive predictor of war.¹⁵ We do not have an instrument for the blood relationship of rulers. However, this form of connection is plausibly exogenous to the international political situation in the short run.¹⁶ Any endogeneity of blood distance to long term political relationships are partly accounted for by pair fixed effects. Therefore, our results provide suggestive evidence that war is more likely for the closely related, especially those who share a grandparent.

Erasmus (1516) was aware of the role of dynastic inheritance in creating conflict. In fact, it is his main reason for opposing royal marriages. He writes,

Why, then, is there most fighting among those who are most closely related? Why? From [dynastic inheritants] come the greatest changes of kingdoms, for the right to rule is passed from one to another: something is taken from one place and added to another. From these circumstances can come only the most serious and violent consequences; the result then, is not an absence of wars, but rather the cause of making wars more frequent and more atrocious...

In principle, increases in peace from the creation of living kinship ties might, in the long term, be offset by decreases due to the creation of shared ancestries. However, the share of monarchies with rulers sharing a great grandparent is relatively constant over time (see appendix B).

7 Main Results

To motivate our instrumental variable analysis, we first describe the deaths we are interested in and demonstrate their relationship to connectivity and

¹⁵This result can be compared to Spolaore and Wacziarg (2016). They find that a measure of genetic proximity between nations is strongly correlated with international conflict. More genetically related populations are more likely to fight wars. They suggest this is a consequence of populations of similar cultures being more desirable for conquest.

¹⁶A rare exception being when a loyal closely related ruler is installed by a victorious invader. Such exceptions would tend to bias our estimates of the effect of blood connection on war to be more negative.

conflict. Then we construct an instrument for inverse network distance using these deaths and discuss its validity. Finally, we use this instrument to directly address the endogeneity problem described in section four.

7.1 Shortest Path Deaths

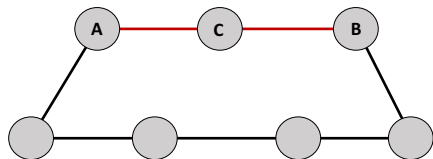


Figure 3: In this simple network, the shortest path from A to B is 2. The resistance distance is $(\frac{1}{2} + \frac{1}{5})^{-1} = \frac{10}{7}$. This graph is consistent with ruler A being married to ruler B's daughter, and ruler A's niece being married to ruler B's grandson. Following C's death, both distance measures increase to 5.

Our primary kinship network measure is inverse shortest path distance. Figure 3 illustrates a hypothetical kinship network between monarchs A and B. In this figure, the shortest path from A to B is length 2 and passes through individual C. If C were to die, the shortest path length would increase to 5. Note that deaths along the shortest path mechanically (weakly) increase the network distance between A and B whether measured by shortest path or resistance. These sorts of “on-path” deaths act as our source of variation with which to identify the effect of the kinship network.

Of 88,434 dyad-years in the final data, 34,766 are observed to be connected by living kinship ties. These connected dyads are the only ones which can be affected by on-path deaths. We observe 4,474 dyad-years with an on-path death.

Figure 4 reports, for the 10 years before and after an on-path death, the yearly empirical mean of inverse path length across the affected dyads. Formally,

$$\hat{\mathbb{E}} \left[\left(\frac{1}{d} \right)_{(i,j),y+t} \middle| Death_{(i,j),y} = 1 \right] \text{ for } t \in [-10, 10].$$

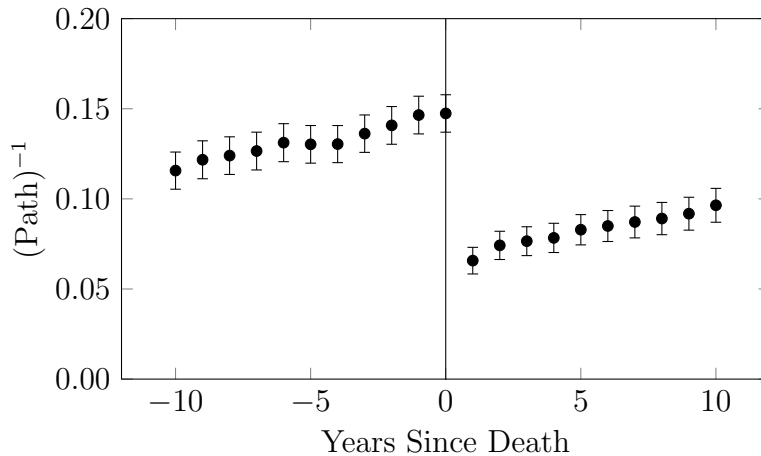


Figure 4: *Effect of on-path deaths on inverse shortest path length*

Figure 4 shows that these on-path deaths produce a substantial and sustained decrease in inverse shortest path length, our primary measure of connectivity. The level of connection grows more quickly in the years following these deaths, consistent with our hypothesis that dyads have a target level of connection they seek to achieve.

These events result from the deaths of 274 distinct individuals, who are on - on average - the shortest paths of 16.3 dyads at the time of their deaths. Interestingly, but unsurprisingly, these 274 key individuals played a disproportionate role in connecting the rulers of Europe.

We document the cause of death for 74.1% of the 274 shortest path deaths in our sample. Overwhelmingly these deaths are peaceful and non-violent. The leading causes of death are old age (12.8%), unspecified illness (12.8%) and childbirth (9.9%), followed by a variety of specific illnesses. Of the 203 individuals with identified causes of death, only twelve died for reasons that could be plausibly tied to the inter-state political situation. Seven were assassinated, four were executed, and one was hit by a cannonball (the unlucky Frederick IV, Duke of Holstein-Gottorp).¹⁷ This fits with Hoffman’s (2012) evidence that early modern rulers, even those who lost wars, faced little to no

¹⁷A detailed account of causes of death is provided in the appendix table 10 and associated data files.

personal risk from international conflicts. Cummins (2017) provides complementary evidence that the proportion of violent deaths among European elites substantially declined (to about 5%) after 1500.

While our main results are very similar with and without these 12 potentially politically motivated deaths, our subsequent analysis will be based on the remaining 262 apolitical on-path deaths. Our main result is not significantly impacted by dropping deaths of unknown cause (Table 9, column (1)).

7.2 Event Study

On-path deaths weaken kinship ties and thus potentially influence conflict frequency. To examine this relationship, we perform an event study analysis of war in years before and after an on-path death. To avoid double counting of dyads, we restrict attention to the subsample in which exactly one on-path death occurs in a 25 year window. Thus, the solid dots in figure 5 report:

$$\hat{\mathbb{E}} \left[War_{(i,j),y+t} \left| Death_{(i,j),y} = 1, \sum_{i=-10}^{15} Death_{(i,j),y+i} = 1 \right. \right] \text{ for } t \in [-10, 15]$$

While on-path deaths may influence the chance of war between a pair of monarchs by lowering their level of connection, they conceivably have a direct effect as well. To explore this possibility, we also report war frequencies before and after the deaths of any immediate relative (child, parent, sibling or spouse) of either monarch. These ‘close’ deaths are more frequent than on-path deaths, and thus a smaller 16-year window is reported so that the requirement of only one such death in the window is not overly demanding. The hollow dots in figure 5 represent:

$$\hat{\mathbb{E}} \left[War_{(i,j),y+t} \left| Death_{(i,j),y}^{Close} = 1, \sum_{i=-8}^8 Death_{(i,j),y+i}^{Close} = 1 \right. \right] \text{ for } t \in [-8, 8]$$

In the years following the on-path death there is a significant increase in war frequency. This elevated conflict propensity seems to persist for about 8 years. Figure 4 indicates that this is the amount of time it takes to mostly

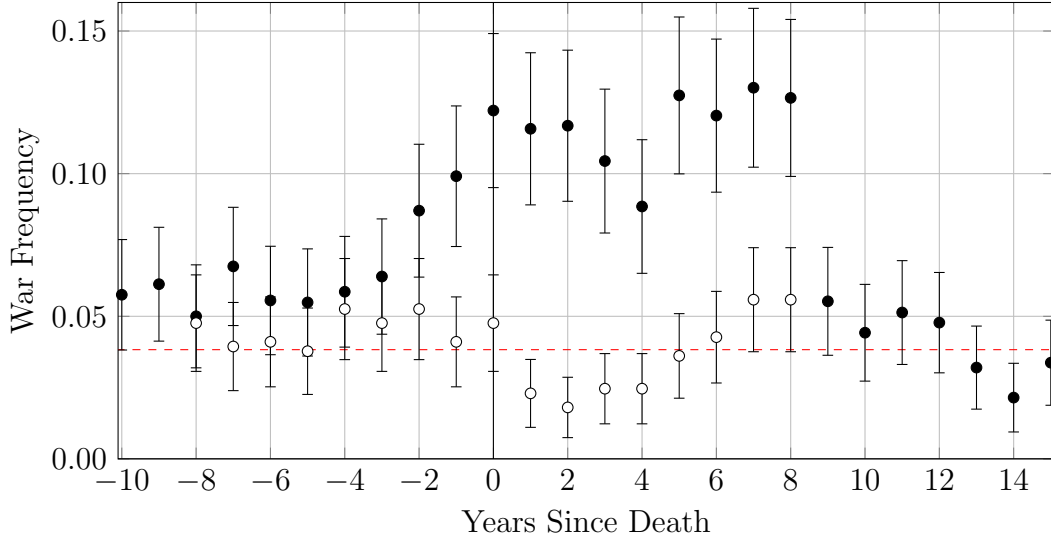


Figure 5: This figure plots the mean war frequency of dyads in the years before and after they experience the death of a relative. Solid dots indicate war frequency before and after an on-path death. Hollow dots are conditioned on close family deaths which are not necessarily on-path. The dashed line indicates overall average war frequency. This sample is restricted to dyads which experience only one death within the time horizon. 95% confidence intervals (based on binomial statistics) are indicated by error bars.

return to long-run levels of connectivity.

This elevation in war is not driven by a small subset of deaths. We observe 3,542 dyad-years of war. Of these, 632 occur in the 5 years following an on-path death. These 632 observations correspond to the deaths of 66 individuals. Similarly, we observe 740 war onsets. Of these, 133 occur in the 5 years following an on-path death. These correspond to 44 individuals.

It is important to note that war frequency is elevated somewhat immediately preceding on-path deaths. This raises the question of reverse causality, the concern that wars are causing deaths rather than vice versa. We rule out the most direct version of this possibility since we exclude assassinations, executions and battle deaths. However, it remains possible that a bellicose international environment may increase royal death rates. For instance, individuals may be exposed to more stress and lower resource levels during wartime, thus increasing their mortality rates.

If it were indeed the case that royal deaths are more likely during periods of elevated conflict, an increased war frequency should be present in the years before both on-path and close deaths. We do not observe an elevated pre-death chance of war when looking at the close death event study (hollow dots). Therefore, it would need to be that war conditions increase ‘on-path’ mortality, but do not affect the mortality rate of a monarch’s close relatives. Since individuals with on-path deaths are also royal, such a differential impact is implausible.

Instead, this anticipatory effect can be readily accounted for without appealing to reverse causality. For instance, suppose the underlying conditions causing deaths sometimes render their victims incapable of performing their network functions in the year or two prior to the actual date of death. This would account for the observed effect.

Another explanation is that small skirmishes are more likely to escalate into wars following a death. In the absence of an on-path death, the skirmish would not have been recorded. However, the weakened network lowers the ability of dyads to deescalate conflicts. When our sources record the start date of the war it may be dated to these initial skirmishes, making it seem that deaths caused wars that preceded them.

It is easy to find examples of this ambiguity in our data. For example, the American Revolutionary War is listed by Wright (1942) as starting in 1775. It first appears in our data as a conflict between France and the British Empire with France’s entry in 1778. Both of these dates are clearly debatable. The American Revolutionaries did not declare independence formally until 1776. The French were aiding the rebels years before 1778 and were induced to formally enter by the Battle of Saratoga in 1777. An example of exactly the phenomenon of interest occurs during the War of Austrian Succession. Wright (1942) lists this conflict as beginning in 1740, with the death of the Austrian Archduke. However, Levy (1983) lists the war as starting in 1739, indicating he believed that Archduke’s death merely intensified an already ongoing conflict.

7.3 Instrument Definition and Identification

To estimate the causal effect of living kinship ties on conflict, we return to our OLS regression specification from section 5. However, we modify the model by instrumenting for inverse kinship distance with lagged on-path deaths. Our instrument, $Z_{(i,j),y}$, is a dummy for whether an on-path death occurred in the previous 5 years. Specifically, $Z_{(i,j),y}$ is

$$Z_{(i,j),y} = \max_{t \in [1,5]} Death_{(i,j),y-t} \quad (2)$$

where $Death_{(i,j),y}$ is a dummy for whether a non-political death occurred along the shortest network path between rulers i and j in year y (ignoring contemporaneous deaths).¹⁸

This is a somewhat coarse instrument, given that some on-path deaths change connectivity more than others. This coarseness is necessary in order to satisfy the stringent conditions for instrument validity. The reason we require an instrument in the first place is that the level of living kinship connection is endogenously determined. Any instrument constructed using information about connectivity prior to the on-path death will also be endogenous and therefore invalid.

More generally, for the instrument to be valid it must be strongly correlated with $\frac{1}{d}$ and satisfy the exclusion restriction. The necessary strong correlation is directly verified in first-stage regressions and can be seen in figure 4. In this setting, the exclusion restriction can be written as:

$$War_{(i,j),y} \perp\!\!\!\perp Z_{(i,j),y} | \{(1/d)_{(i,j),y}, X_{(i,j),y}, \theta_y, \theta_{(i,j)}\} \quad (ER)$$

The exclusion restriction cannot be directly tested and faces an array of potential concerns. (ER) requires that the on-path deaths we use to construct our instrument are independent of war probability conditional on observables.

¹⁸Results are robust to alternate specifications of the instrument. The pooled dummy produces similar results including up to 8 lags of death. Similar results can also be obtained using separate dummies for each lag of death. We prefer the pooled specification because it eliminates worries of over-fitting.

In other words, our identifying assumption is that recent on-path deaths relate to war only through their impact on network distance.

Violations of (ER) can be thought of in three classes: reverse causality, effects through non-network channels, and omitted variables.

The most obvious threat to (ER) is reverse causality. This concern is partially dealt with by only using lagged deaths to construct our instrument. We also exclude politically motivated on-path deaths from our analysis. Indirect channels such as war increasing the likelihood of death by cutting supply lines or otherwise affecting environmental factors are implausible given the close-death placebo result. We can also address reverse causality by selectively excluding deaths that are possibly caused by wars. The default instrument already excludes violent political deaths. Table 9 further restricts attention to deaths with known causes, that are not stress related, and of third parties who are not closely tied to either of the countries whose link their death severs.

A second concern is that deaths directly affect war frequency through non-network channels. For instance, these deaths could potentially generate political instability independently of any effect on the kinship network (e.g. by altering lines of succession, installing inexperienced individuals in senior leadership positions, or simply through a psychological effect on the ruler). In the event study section, we established that the deaths of close relatives ‘off-path’ are not correlated with increased war frequency. Therefore, the effect we see from on-path deaths points toward there being something important about their on-pathness. It is highly implausible that only on-path deaths matter, but the kinship ties themselves do not.

Admittedly, the deaths of close relatives are not a perfect placebo. For example, close relatives may be more or less likely to be in positions of responsibility than on-path royals. As a further test of robustness to the instability channel, we can restrict attention to on-path deaths which do not vacate thrones (Table 9, column (2)). Restricting our analysis to this subset of on-path deaths does not eliminate our estimated effect.

Third, we might face an omitted variable problem. Some unobserved factor could lead to both increased war frequency and an increased frequency of

on-path deaths. For instance, a major epidemic or famine might cause both noble deaths and political turmoil. However, none of our nobles with identified causes of death died of starvation and only a single one died of plague. Further, while epidemics did occur during our time period, these were localized to a single city or region. The two major continent wide epidemics, the Black Death (peaking c.1346-1353) and the Spanish Flu (1918) lie outside our analysis period. Other omitted variable issues are partially addressed by including fixed effects. Dyad fixed effects difference out any persistent dyad-specific unobservable, while year fixed effects remove temporary widespread shocks.

A related concern arises from the fact that nations drop out of our data when they lose sovereignty. This conceivably biases our results since polities enter and leave our data as a result of their conflict behavior. The robustness section presents results where the sample is limited to a more balanced panel consisting only of polities in existence for at least 85% of observed years (Table 7, column (4)). This also does not eliminate our result.

Supposing the instrument is valid, it is important to think carefully about what this source of variation allows us to identify. On-path deaths can only occur along existing network paths and the variation is always in the direction of reducing connectivity. Our estimates are of the marginal impact of increases in network distance on conflict activity within dyads which share kinship ties. Thus, the correct interpretation of results based on this instrument is as a local average treatment effect (LATE). In principle, changes in living kinship ties may be directionally asymmetric. Thus our analysis does not provide direct evidence on how an unconnected dyad would respond to the formation of a new kinship tie.¹⁹ In future work, this could potentially be addressed through a structural model of the mechanism by which kinship networks reduce conflict.

¹⁹Earlier versions of this paper explored potential instruments for *increases* in connectivity. However, these tend to suffer from a lack of power. For instance, we attempted to leverage the occurrence of opposite gender firstborn children of rulers to instrument for the probability of royal marriage. While point estimates are consistent with a symmetric effect, there are too few prince-princess marriages to yield statistical significance.

7.4 Main IV Estimates

With our instrument in hand, we use two-stage least squares (2SLS) to estimate the following model:

$$War_{(i,j),y} = \alpha + \beta \cdot \widehat{\left(\frac{1}{d}\right)}_{(i,j),y} + \delta \cdot X_{(i,j),y} + \theta_{(i,j)} + \theta_y + \epsilon_{(i,j),y} \quad (3)$$

$$\left(\frac{1}{d}\right)_{(i,j),y} = c + \phi Z_{(i,j),y} + \gamma \cdot X_{(i,j),y} + \omega_{(i,j)} + \omega_y + \xi_{(i,j),y} \quad (4)$$

This follows our OLS specification, except it treats inverse network distance as an endogenous variable and instruments for it using a dummy for recent on-path deaths. First stage estimates (of equation (4)) are reported in Table 4 and causal estimates for the impact of inverse kinship distance on war incidence are reported in Table 5. Columns (3) and (6) correspond to equation (3) above where kinship distance is measured by shortest path length and resistance distance respectively. Other columns exclude controls and/or fixed effects.

When dyad and year fixed effects are included, as in columns (3) and (6), we find that our instrument (recent deaths) displays a strong negative correlation with both measures of inverse kinship distance. The strength of the instrument is evidenced by large (> 10) Kleibergen-Paap F-statistics. Pair fixed effects control for the fact that dyads with different average connectedness will have different frequencies of on-path death. With these included our identification is based on the short-term deviation from a country pairs' average level of connectedness generated by on-path deaths. Our estimates are not sensitive to the inclusion of other dyad-level covariates.

Columns (1)-(6) of table 5 estimate the effect of kinship ties on war incidence. When dyad fixed effects are included, we estimate a large and significant negative relationship between inverse network distance, no matter how measured, and war. Column (3) reports our preferred specification.

Given that the estimate is a local average treatment effect (LATE), care is necessary when interpreting the coefficients. A naive reading of our results

Table 4: Main First Stage Estimates

	(1) (Path) ⁻¹	(2) (Path) ⁻¹	(3) (Path) ⁻¹	(4) (Resistance) ⁻¹	(5) (Resistance) ⁻¹	(6) (Resistance) ⁻¹	(7) (Path) ⁻¹	(8) (Path) ⁻¹
Recent On-Path Death	-0.0169 (0.0132)	-0.0573*** (0.00920)	-0.0602*** (0.00933)	-0.00389 (0.0344)	-0.165*** (0.0269)	-0.172*** (0.0269)	-0.0585*** (0.00917)	-0.0852*** (0.00999)
3 Gen. Blood			0.0851*** (0.0186)			0.204*** (0.0391)	0.0856*** (0.0184)	0.00817 (0.0336)
Same Religion			0.0674*** (0.0130)			0.167*** (0.0487)	0.0675*** (0.0130)	0.0727 (0.0393)
Adjacent			-0.000132 (0.0131)			0.0181 (0.0551)	-0.00116 (0.0138)	0.00538 (0.0222)
Neither Landlocked			0.0216 (0.0164)			0.0313 (0.0419)	0.0248 (0.0162)	-0.0502 (0.0376)
ln(distance)			-0.0262 (0.0272)			-0.0856 (0.0867)	-0.0310 (0.0278)	0.0252 (0.0469)
Pair FE		X	X		X	X	X	X
Year FE		X	X		X	X	X	X
N	87289	87244	87241	87289	87244	87241	83639	3403
F-Stat	1.638	38.72	41.60	0.0128	37.36	40.75	40.76	72.78

* $p < .05$, ** $p < .01$, *** $p < .001$. Standard errors are robust to two-way country clustering.

Table 5: Main 2SLS Estimates

	(1) War	(2) War	(3) War	(4) War	(5) War	(6) War	(7) War Start	(8) War Cont.
(Path) ⁻¹	0.129 (0.297)	-0.288*** (0.0706)	-0.275*** (0.0643)				-0.0491*** (0.0132)	-0.476* (0.217)
(Resistance) ⁻¹				0.561 (5.291)	-0.100*** (0.0278)	-0.0964*** (0.0258)		
3 Gen. Blood			0.0328** (0.0122)			0.0291* (0.0127)	0.00480** (0.00162)	0.0160 (0.0146)
Same Religion			-0.00423 (0.00847)			-0.00668 (0.00884)	-0.00452 (0.00282)	0.0210 (0.0294)
Adjacent			0.0304 (0.0196)			0.0322 (0.0212)	0.0104* (0.00435)	-0.0318 (0.0179)
Neither Landlocked			0.00852 (0.0103)			0.00558 (0.00968)	0.0132* (0.00606)	-0.358* (0.175)
ln(distance)			-0.0110 (.)			-0.0120 (.)	-0.00520 (0.00303)	0.0369 (.)
Pair FE		X	X		X	X	X	X
Year FE		X	X		X	X	X	X
N	87289	87244	87241	87289	87244	87241	83639	3403

* $p < .05$, ** $p < .01$, *** $p < .001$. Standard errors are robust to 2-way country clustering.

Missing standard errors are due to insufficient variation.

would suggest that a change from being immediately connected ($(\text{Path})^{-1} = 1$) to unconnected ($(\text{Path})^{-1} = 0$) causes a 27.5 percentage point increase in war incidence. However, variation of that magnitude is never observed because pairs with a shortest path of one cannot have an individual between them die.

Rather, the coefficient measures a marginal effect and should be understood with respect to the typical identifying variation. From the first stage regressions, we see that a recent on-path death produces an average change in inverse shortest path length of -0.06 . That reduction is roughly the difference between a shortest path length of four and five. The results indicate that this variation causes (with 95% confidence) a $1.65 \pm .8$ percentage point increase in war incidence. That is a 41 ± 19 percent increase over an overall dyadic war frequency of approximately 4.0%. While not the typical variation observed, to understand the size of the effect, consider a pair of monarchs that move from having their children married to being disconnected. This would correspond to a decrease in inverse shortest path length of $\frac{1}{3}$, and an 9.2 percentage point increase in war frequency.

These estimates suggest the role of living kinship ties in reducing conflict is substantial. Similarly large effects are estimated when we use resistance as our measure of kinship distance. These effect sizes help justify the huge amount of energy exerted over dynastic marriage negotiations. It also helps explain the central role of marriages in peace negotiations to end wars.

The estimated reduction in war incidence could either be from fewer wars starting, or from the wars that do occur lasting fewer years. To differentiate between these channels we change our outcome variable. We consider the effect of inverse network distance on whether a dyad starts (continues) a war, conditional on previously being at peace (war).

Estimates of these regressions are reported in columns (7) and (8) of Table 5. We find that both channels are active. That is, increases in inverse network distance cause decreases in both the rate at which conflicts start and the duration of conflicts that do start. We again interpret the estimated coefficients with respect to the typical variation in path length induced by observed on-path deaths. From columns (7) and (8) of table 4, we see this variation

is -0.06 when a dyad was at peace in the previous year and -0.09 following a year of war. So, a typical on-path death increases the probability of war onset by 0.29 percentage points. This is roughly a 32% increase over a base war onset frequency of 0.9%. Similarly, the probability of a war continuing from the previous year increases by 4.1 percentage points following a typical on-path death. This is a proportionally smaller effect, since wars continue at a rate of 81.4%.

8 Robustness

In this section, we present several alternate specifications of the instrumental variable analysis to address potential threats to identification. Another concern is that our estimator is biased or that the standard errors on our estimates are not sufficiently conservative. To investigate this issue, we conduct Monte-Carlo simulations on a comparable set of placebo deaths.²⁰

8.1 IV Robustness

While column (3) of table 5 reports our preferred specification, several concerns lead us to investigate how our estimates vary in subsets of the data and with alternate definitions of the instrument. Tables 7 and 9 report these robustness checks.

Table 7 reports our analyses for different subsamples of dyads. Columns (1) and (2) suggest that the effect of kinship on conflict is time varying with a more substantial effect in the earlier part of our sample. This is unsurprising since the centralization of power in the hands of monarchs decreased and diplomacy increasingly professionalized over this interval. Column (3) shows that the estimated effect is roughly unchanged when dyads including Hapsburg rulers

²⁰In a previous version of this paper, we also presented semi-parametric estimates of the effects of on-path and close deaths on war. Those results weight observations by the inverse probability of a death based on characteristics of the shortest path (such as average age of individuals on the shortest path, its length, and its gender mix) and the pair's number of close relatives. These estimates are also consistent with our main results.

are dropped. To create a more balanced panel, in column (4) we restrict attention to polities which are in our sample in at least 85% of observed years.²¹ The estimated coefficient is similar to our main specification. This should assuage concerns that our estimates are biased due to endogenous entrance and exit from our sample as the result of war outcomes, or due to our country inclusion criteria.

Table 6: First Stage Estimates: Sample Restrictions

	(1) (Path) ⁻¹	(2) (Path) ⁻¹	(3) (Path) ⁻¹	(4) (Path) ⁻¹
Recent On-Path Death	-0.0801*** (0.0184)	-0.0476*** (0.00770)	-0.0391*** (0.00520)	-0.0610*** (0.00772)
3 Gen. Blood	0.0898*** (0.0256)	0.0382* (0.0164)	0.0426*** (0.00713)	0.0850*** (0.0249)
Same Religion	0.0647*** (0.0132)	0.0370** (0.0113)	0.0317* (0.0126)	0.0715* (0.0297)
Adjacent	0.00989 (0.0140)	-0.0104 (0.0156)	0.0168 (0.0145)	0.0181 (0.0191)
Neither Landlocked	0.0211 (0.0168)	0.0223 (0.0234)	0.0135 (0.0154)	-0.241 (.)
ln(distance)	-0.0239 (0.0574)	0.00295 (0.0132)	-0.0258 (0.0254)	-0.0339 (0.0259)
Pair FE	X	X	X	X
Year FE	X	X	X	X
N	57818	29273	53319	25085
F-Stat	18.99	38.16	56.48	62.51
Notes	Pre-1800	Post-1800	Drop Habsburgs	Long-Lived Polities

* $p < .05$, ** $p < .01$, *** $p < .001$,

Standard errors are robust to 2-way country clustering.

Missing standard errors are due to insufficient variation.

²¹90% or 95% thresholds produce qualitatively similar results. 85% is the lowest natural threshold which excludes France, a country which became a republic (and thus exited our sample) several times, the last of which as a result of a defeat in war.

Table 7: 2SLS Estimates: Sample Restrictions

	(1) War	(2) War	(3) War	(4) War
(Path) ⁻¹	-0.268** (0.0922)	-0.173** (0.0580)	-0.289** (0.103)	-0.241* (0.112)
3 Gen. Blood	0.0351 (0.0187)	0.00926 (0.00764)	0.0351** (0.0130)	0.0323*** (0.00949)
Same Religion	-0.0114 (0.0125)	0.0200 (.)	-0.00533 (0.0110)	-0.00591 (0.00644)
Adjacent	0.0613* (0.0285)	0.00881 (0.0267)	0.0343 (0.0247)	0.0320 (0.0267)
Neither Landlocked	-0.00628 (0.00853)	0.0219 (0.0196)	0.00627 (0.00356)	0.206 (0.227)
ln(distance)	-0.0406** (0.0130)	-0.000712 (0.00503)	0.0122 (.)	-0.0215*** (0.00645)
Pair FE	X	X	X	X
Year FE	X	X	X	X
N	57818	29273	53319	25085
Notes	Pre-1800	Post-1800	Drop Habsburgs	Long-Lived Polities

* $p < .05$, ** $p < .01$, *** $p < .001$,

Standard errors are robust to 2-way country clustering.

Missing standard errors are due to insufficient variation.

Table 9 explores restricted death samples to address potential concerns about the instrument. Column (1) shows that our results are not substantially changed when we construct our instrument using only deaths that are positively identified as apolitical (i.e. also dropping deaths of unknown cause). Column (2) uses an instrument based only on the deaths of on-path non-rulers. This subsample eliminates the possibility of on-path deaths causing wars through the creation of political instability caused by the vacation of thrones rather than through their effect on network distance. After dropping those deaths, the estimated coefficient is still large and negative.

Another concern is that a tense geopolitical situation might be an omitted third variable leading to on-path death and war (although this possibility is already excluded with our close death placebo analysis). We find convincing evidence that stress contributed to the deaths of 11 of those dying on a shortest path and suggestive evidence for 29 more. Column (3) excludes all these stress-related shortest path deaths. The estimate of the effect of shortest path death on war is almost unaffected.

Also already partly addressed with our close-death placebo is the concern that on-path deaths of individuals closely associated with one of a pair of countries may have a direct effect on one of those countries' bellicosity. For 260 of shortest-path death individuals we are able to identify the location of their deaths and for 258 the dynasty they are most closely associated with. In column (4) of table 9 we restrict our attention to shortest-path deaths of individuals not directly connected to each dyad.²² This restriction leads to a notably larger point estimate of the effect of inverse path length on war, consistent with our finding (in figure 5 that the direct effect of a close death on a ruler is a decrease in war frequency).

8.2 Placebo Simulation

A final potential issue for our estimates is the correlation structure of the death shocks. An important feature of our data is that a single death typically leads to many shortest path disruptions. These disruptions change a single ruler's connection with many other states. Because our instrument is based on these disruptions, correlation of this type would cause standard errors to be too small. Two-way clustered standard errors are meant to be robust to these correlations. With those standard errors, our main results are highly significant - often at the .1 percent level. However, Cameron and Miller (2015) show this clustering procedure fails to account for some possible types

²²In other words, we change our instrument so that shortest-path deaths are only counted as occurring for a dyad if two conditions are met. First, the individual is not known to have died in either of the dyad countries. Second, the individual is not known to be a member of a dynasty currently ruling either of the two countries.

Table 8: First Stage Estimates: Alternate Death Restrictions

	(1) (Path) ⁻¹	(2) (Path) ⁻¹	(3) (Path) ⁻¹	(4) (Path) ⁻¹
Recent On-Path Death	-0.0630*** (0.0106)	-0.0487*** (0.00821)	-0.0545*** (0.00883)	-0.0499*** (0.00893)
3 Gen. Blood	0.0848*** (0.0187)	0.0844*** (0.0188)	0.0842*** (0.0187)	0.0834*** (0.0183)
Same Religion	0.0671*** (0.0132)	0.0675*** (0.0129)	0.0667*** (0.0130)	0.0660*** (0.0127)
Adjacent	-0.0000958 (0.0132)	0.000291 (0.0132)	-0.0000156 (0.0131)	-0.000520 (0.0133)
Neither Landlocked	0.0212 (0.0163)	0.0202 (0.0160)	0.0214 (0.0164)	0.0205 (0.0160)
ln(distance)	-0.0255 (0.0272)	-0.0254 (0.0271)	-0.0243 (0.0271)	-0.0249 (0.0273)
Pair FE	X	X	X	X
Year FE	X	X	X	X
N	87241	87241	87241	87241
F-Stat	35.14	35.13	38.12	31.23
Notes	No Unknown Deaths	No Ruler Deaths	No Stress Related Deaths	Only Third Party Deaths

* $p < .05$, ** $p < .01$, *** $p < .001$,

Standard errors are robust to 2-way country clustering.

Table 9: 2SLS Estimates: Alternate Death Restrictions

	(1)	(2)	(3)	(4)
	War	War	War	War
(Path) ⁻¹	-0.309*** (0.0830)	-0.150* (0.0632)	-0.263*** (0.0695)	-0.451*** (0.112)
3 Gen. Blood	0.0357** (0.0119)	0.0224 (0.0145)	0.0318* (0.0136)	0.0475*** (0.0142)
Same Religion	-0.00197 (0.00832)	-0.0125 (0.00893)	-0.00503 (0.00843)	0.00743 (0.00881)
Adjacent	0.0305 (0.0197)	0.0303 (0.0190)	0.0304 (0.0195)	0.0306 (0.0205)
Neither Landlocked	0.00902 (0.0102)	0.00667 (0.0106)	0.00834 (0.0103)	0.0111 (0.0102)
ln(distance)	-0.0118 (.)	-0.00791 (.)	-0.0107 (.)	-0.0153 (.)
Pair FE	X	X	X	X
Year FE	X	X	X	X
N	87241	87241	87241	87241
Notes	No Unknown Deaths	No Ruler Deaths	No Stress Related Deaths	Only Third Party Deaths

* $p < .05$, ** $p < .01$, *** $p < .001$,

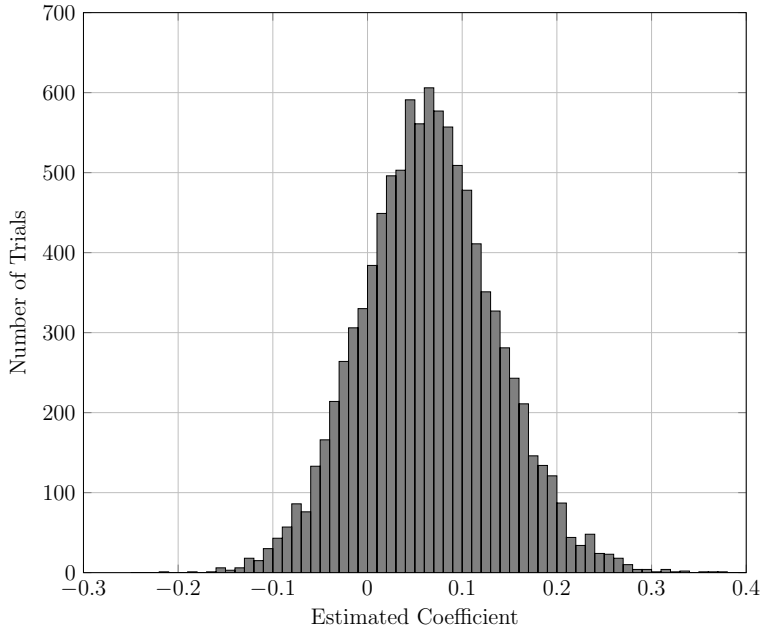
Standard errors are robust to 2-way country clustering.

Missing standard errors are due to insufficient variation.

of correlation.

To confirm that our analytic standard errors are not overconfident, we perform a Monte-Carlo analysis. We randomly generate a series of placebo instruments and re-estimate our main IV specification.

To make our placebo simulations comparable to the true instrument, we use the following procedure. We begin by randomly assigning ‘base’ treatment events to specific ruler-years. We use Bernoulli draws with a parameter calibrated to generate an expected 274 base events (the number of non-political deaths in the data). This mimics the individual deaths underlying our in-



Trials	Mean	Std. Dev.	Min	Max
10,000	.055	.071	-.221	.399

Figure 6: Distribution of simulated estimates of the effect of inverse shortest-path length on war, instrumented using simulated placebo shortest-path deaths.

strument. We then flip a coin to decide which of the two rulers the placebo ‘death’ was closer to. We assign placebo on-path death events to every dyad that ruler is connected to in that year. This procedure makes the simulated instrument even more correlated across specific ruler-years than the true instrument. Therefore this approach produces a conservative upper bound on the magnitude of the estimates an instrument like ours would produce by chance.

This procedure is performed 10,000 times. For each iteration, we replicate the instrumental variable analysis from Table 5 column (3). The parameter of interest is the 2SLS estimated coefficient on inverse path length generated by instrumenting with these placebo treatments. Summary statistics and the histogram of estimated values are presented in Figure 6.

The mean estimate in these simulations is .055. This alleviates concerns

that our main estimator is negatively biased. The variance of the simulated estimates, .071, is similar to our analytical standard error (.064). The coefficient estimated on the real data, -.275, is more negative than any of the 10,000 simulated estimates. We conclude it is highly unlikely our main estimate was produced by chance.

9 Conclusion

We construct a dataset which links a genealogy of European royals to lists of sovereign monarchies, interstate wars, and several covariates. The data provides a rich environment to study the influence of interpersonal relationships on long-run macroeconomic, political, and institutional outcomes. In this paper, we focused on the relationship between kinship and conflict. However, the same data and network tools might well be applied to more traditional economic questions. We think future work investigating the long-run implications of leaders' kinship networks for trade, growth, cultural diffusion and development will be fruitful.

This data reveals a dramatic increase in kinship connections between European monarchs over time. Viewing the genealogy as a kinship network, we use exogenous variation in network structure to provide evidence that close living kinship ties substantially reduced the frequency and duration of war.

Consistent with existing literature, we document a decline in conflict in Europe after 1800. Specifically, we observe 2.99% of dyad-years at war from 1495-1600 compared to only 1.36% from 1800-1918. Given these findings, it is natural to ask how much of this decline can be attributed to increased kinship ties. While it is difficult to say definitively, our results allow us to make a rough approximation.

Suppose we replaced the 19th century's kinship network with its 16th century counterpart. This would result in average inverse shortest path length falling from .118 to .073. In the post-1800 subsample, we estimate a reduction in connectivity of this magnitude would cause war incidence to increase by 0.78 percentage points. Thus our results suggest that roughly 48% of the

decline in war can be attributed to growing kinship ties between rulers. While we acknowledge this sort of extrapolation is imperfect, it suggests that royal family networks played a significant role in keeping the peace.

One broad takeaway from this project is that international relations models that eschew the role of individuals in favor of the collective state are likely ignoring important variables. Rather than being solely driven by abstract geo-strategic imperatives, we show that international political outcomes are greatly influenced by a leader's personal identity and interpersonal relationships. This is in line with the public choice tradition, which emphasizes the role of the individual in politics. It is also consistent with Jones and Olken (2005) who find that the identity of autocratic world leaders has been an important determinant of economic growth in the modern age.

While our study is focused on a bygone era, its key message is timeless. Close lines of communication and tight personal relationships between leaders are vital to preserving peace. In the past, these ties took the form of royal family relationships. Today, professional diplomats play much the same role. Interruptions of these linkages can have devastating consequences, and thus redundancy in these systems is highly desirable.

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Supplemental Appendix for Online Publication

A Data Construction

The data set analyzed in the paper is complex, with many moving parts. This appendix describes the construction of each part, and how the whole is put together.

While elements of our data have been used elsewhere, such as Wright (1942) and Tompsett (2014), both our empirical methodology and the breadth of our data distinguish this paper from the existing literature. We exert significant effort to expand, reconcile, reorganize and improve upon these sources. For example, we re-construct Tompsett’s genealogy as a dynamic kinship network and we bring in additional sources to identify when countries exit wars. Our supplementations also make our dataset much larger. While we have 87,241 observations in our main regressions, Dube and Harish have 37,116 in their comparable dyad-year regressions.

A.1 Genealogical Data

Our genealogical data is taken from the 2014 update of Tompsett’s Royal Genealogy collection. Tompsett’s data covers the “genealogy of almost every ruling house in the western world”, merging many sources of genealogical records. A substantial portion of Tompsett’s data comes from “The Complete Peerage or a History of the House of Lords and all its Members from the Earliest Times” (Cokayne, 1953) and “Europäische Stammtafeln” (Loringhoven, 1964) in their various series and editions. A consultation with New England Historic Genealogical Society revealed these to be well-regarded and reliable.

Adjustments to Tompsett’s data were few, mainly to add birth and death dates for rulers where this information was missing. The total number of adjustments is 125. The full list of changes is included in the data.

A.2 State List

We restrict our analysis to (i) sovereign (ii) hereditary or elective monarchies in (iii) Christian Europe. Of these criteria, the most difficult to operationalize is sovereignty. We used the following procedure in determining whether a state is independent. Any polity we find reference to in Europe over our time period in any listing is given the presumption of sovereignty; this includes the super-national organizations of the Holy Roman Empire (HRE), German Confederation, and the short-lived North German Confederation.

We judge polities to be lacking sovereignty for several reasons. A primary reason for being excluded is via being a province, dependent, or vassal of another state. For example, the Balkan states for most of our time period are vassals of the Ottoman Empire and are thus excluded from the dataset.

De-facto sovereignty is often ambiguous for the members of the three super-national organizations to which we attribute sovereignty. For states of the HRE, we attribute sovereignty only to Electors and Austria.²³ For members of the German Confederation, we retain the 11 states with a vote in the Federal Assembly. For the short-lived North German Confederation, we retain the two member Kingdoms and five member Grand Duchies.

A related reason for exclusion is due to being a puppet state set up by a foreign occupier. When a period of foreign occupation or domination lasts 5 or fewer years, and the previous dynasty subsequently regains the throne, we have the two countries in existence and at war throughout. An exception is that a foreign occupation of less than 5 years will be coded as an interregnum if the incumbent ruler formally and substantively abdicates (even if the dynasty eventually regains the throne).²⁴ When a period of foreign domination lasts for more than 5 years, but the previous dynasty eventually regains the crown, we have the dominated state as not existing during the occupation. This means, for example, that much of the German and Italian speaking world is not sovereign during the height of Napoleon's power. For cases like Spain during the Peninsular War (where a government attempted to organize resistance from the besieged city of Cadiz) where there is at least partially organized resistance with loyalty with the previous ruler, we err on the side of keeping the previous ruler installed and at war throughout. When a foreign installation is permanent, we have the installed leader running the country at the end of hostilities. For states where a de jure country has two rulers simultaneously in different parts for a period of decades (i.e. longer than a civil war), we

²³Some prefer the term 'Habsburg Monarchy' or 'Austrian Monarchy' to refer to the Habsburg patriarchal lands in central Europe. However, this is an unofficial term, and our analysis relies on precisely identifying rulers with titles. Therefore we code the ruler of Austria as the individual with the title of Austrian Archduke, with other Habsburg ruled lands (such as Bohemia and Hungary) potentially in the hands of other members of the Habsburg royal family. These countries only drop out of our data following our rules regarding permanent personal union. After that time, what we denote Austria in figure 7 can be thought of as the Habsburg Monarchy, until the establishment of a successor state (the Austrian Empire and later Austria-Hungary).

²⁴For example, in the Great Northern War the Saxon King Augustus II abdicated his claim to the Polish throne for a short period. This is coded as an interregnum. During these interregnums, as with any period a ruler is not coded, the country drops out of the data.

consider it two separate countries.²⁵

Finally, we list only the more powerful member of a pair of states under permanent personal union. Personal unions were a common occurrence in our period in which a single individual would rule two or more countries. When we see a pair of states entering and leaving personal unions (such as due to divergent inheritance laws, as in the case of Hanover and the United Kingdom) in our time period, we list them as separate sovereign states throughout. However, if a personal union lasts continuously until one of the states is abolished (or until the end of our sample period) then we combine the two states into one sovereign entity. We consolidate the two states not at the beginning of the personal union, but rather when the first person to inherit both states simultaneously comes into power.

Of these criteria, the most imperfect is the decision to only list electors of the HRE. Certainly, at least the electors had a degree of sovereignty. The ‘Golden Bull of 1356’, which fixed the constitutional structure of the HRE, established electoral dignity as non-transferable and conferring a degree of sovereignty higher than normal HRE membership. There is also the fact that by being electors, they had influence over who was elected Emperor, and therefore influence over wars fought by the Empire. The list of electors is very stable over time. When in the course of the Thirty Years War the Emperor transferred the treasonous Electoral Palatinate’s vote to Bavaria this led to a major constitutional crisis. Eventually a vote for the Palatinate was restored, but Bavaria retained the Palatinate’s electoral status. Along with the creation of the Electorate of Hanover in 1692 (thereby creating an odd number of electors again), these are the only changes in the course of our sample. So we feel comfortable attributing sovereignty to all the electors.

However, there were a handful of states, mostly northern Italian, which were non-Elector members of the HRE that acted with a degree of autonomy, especially in the early part of our sample. These include Savoy, Switzerland, Milan, Modena, Parma, and Florence. Bavaria before achieving its electoral status also participated in wars independently of the HRE. Many of these would be otherwise eliminated for much of their histories for being republics. It would be impossible to include in our analysis the literally hundreds of members of the HRE, each of which had different degrees of sovereignty. This legalistic approach was determined to be the safest one.

In addition to Austria, the following are the member states of the Holy Roman Empire, German Confederation, and North-German Confederation to

²⁵For Hungary, this means we record a Christian ruler during the century when the better part of the country was ruled by an Ottoman puppet.

which we attribute sovereignty.

1495-1705: *Kingdom of Bohemia*²⁶

1495-1871: *Margraviate of Brandenburg (later, Kingdom of Prussia)*

1495-1806: *Duchy of Saxony*

1495-1623: *County Palatinate of the Rhine (later, Electoral Palatinate)*²⁷

1623-1806: *Duchy of Bavaria*

1648-1803: *Electoral Palatinate*

1692-1806: *Electorate of Brunswick-Luneburg (later, Electorate of Hanover)*

Napoleon disbands the Holy Roman Empire in 1806, and replaces it with a puppet organization named the Confederation of the Rhine. During this period, many of the above states lost sovereignty.

After the defeat of Napoleon, the German Confederation is founded. For members of the German Confederation, we attribute sovereignty to the 11 states with a vote in the inner session of the Federal Assembly.

1815-1866: *Duchy of Holstein, Kingdom of Hanover, King of Bavaria, Kingdom of Saxony, Kingdom of Wuttemberg, Electorate of Hesse, Grand Duchy of Baden, Grand Duchy of Hesse*

1815-1839: *Grand Duchy of Luxembourg*

1839-1866: *Duchy of Limburg*

After the dissolution of the German Confederation, several states are temporarily independent, before being subsumed into the German Empire. Other states become sovereign members of the North German Confederation.

1866-1871: *Saxony, Hesse, Mecklenburg-Schwerin, Mecklenburg-Strelitz, Oldenburg, Saxe-Weimar-Eisenach*

1866-1871: *Kingdom of Bavaria, Kingdom of Wurttemberg, Baden*

1866-1918: *Principality of Lichtenstein*

1839-1918: *Grand Duchy of Luxembourg*

In figure 7, we list the full timeline of countries in our data. In order to be in this list, the state must be attributed both sovereignty and a monarch matched to the genealogical data. Hence, countries occasionally drop from the data for a year or two due to interregnums between rulers. Politics change names over time, and here countries are listed on the same row if they are considered successor states and share a fixed effect. For space, shortened or informal names of the polities are used.

²⁶We drop Bohemia as an independent state at this point due to our rules concerning permanent personal unions

²⁷The electoral dignity of The Palatinate is temporarily transferred to Bavaria during the Thirty Years War. Bavaria comes to control an additional electoral vote.

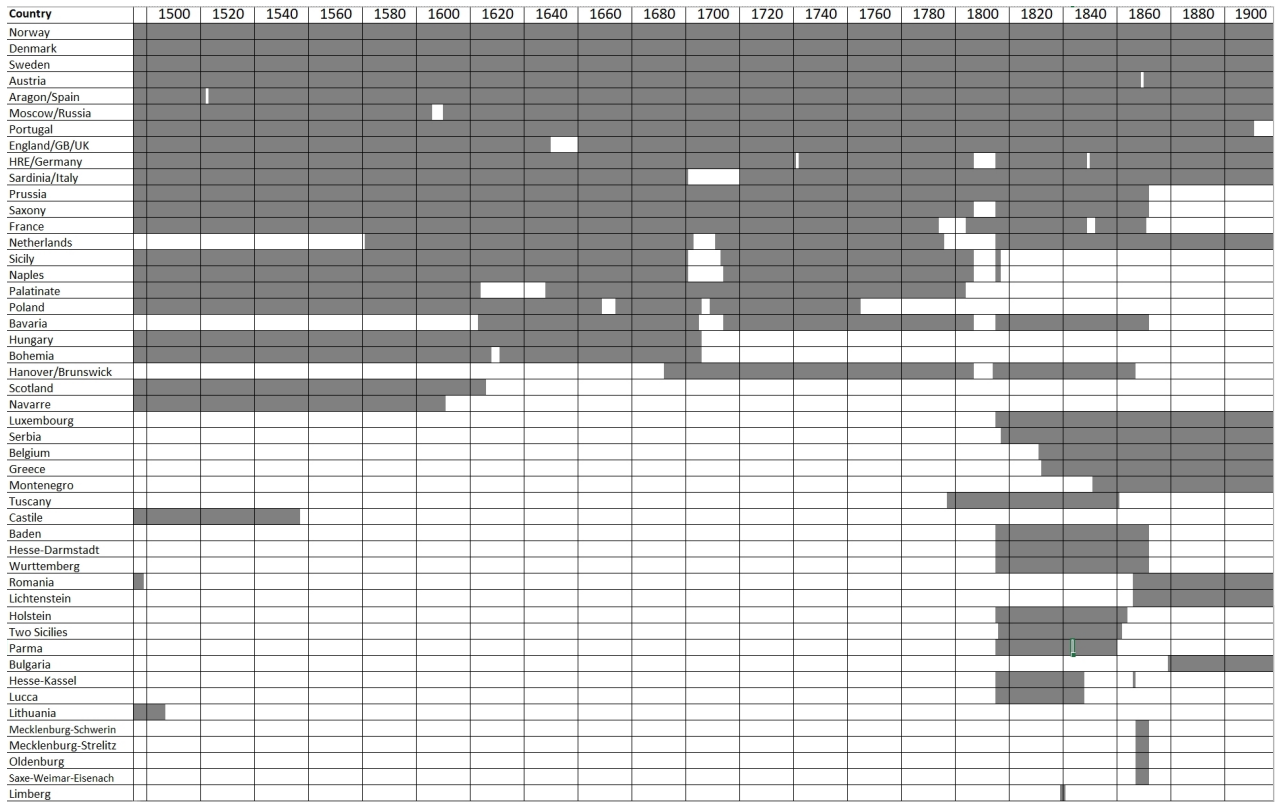


Figure 7: Monarchies in the final dataset by year. For space, shortened or informal names are used. Monarchies sharing a fixed effect (i.e. successor states) are listed in the same row.

A.3 Data on Rulers

For every year of a sovereign state’s existence we attempt to match a ruler from our genealogical data. Our ruler data is primarily derived from Spuler (1977). When multiple dates of rule change are listed, such as the date of the death of a parent and subsequent coronation of their child, the earliest date is used. In elective monarchies, where the next ruler is clear but formal election is delayed this is used to prevent interregnums. For the few occasions in which two simultaneous and cooperative rulers are listed by this or another source, we choose the individual who seemed to be the dominant decision maker. As all of these situations are marriages or involve closely related individuals, this subjectivity does not matter to our results. For the majority of state years where Spuler does not list a ruler, we use Tapsell (1984). A handful of imputations from outside these sources are noted in the data.

In situations where Spuler is ambiguous (i.e. he lists both an incumbent ruler and a claimant) we attempt to keep rulerless periods as brief as possible. During civil wars and succession crises, we have the incumbent ruling throughout the war; if the pretender wins we have him ruling subsequently. When incumbency is seriously in doubt, we err on the side of having the eventual winner ruling throughout. States completely lacking in executive leadership are listed without a ruler, dropping out of our sample. This can sometimes occur as a result of a succession crisis. We attempt to keep such interregnums to a minimum.

Finally, there is the special case of the Netherlands Stadtholder. While the Seven United Netherlands might in some ways be described as a republic (or confederation of republics), in times of foreign conflict, they were represented by a general Stadtholder. Traditionally, this Stadtholder was the Duke of Orange. Foreign countries would maintain royal missions with the Duke, with the understanding that he represented the Netherlands internationally. Therefore, in the years before the Netherlands are actually a monarchy, we record the Stadtholder or (failing the existence of a general Stadtholder) the Duke of Orange as the Seven United Netherlands' monarch.

A.4 Data on Wars

The most difficult portion of this data to assemble is the set of war dyads. A war dyad is a pair of states which are at war in a given year. Our goal is to have a list of every conflict involving at least two states with sovereign Christian European rulers. Prior to 1816, there is no standard list of interstate wars. This arises from ambiguity about what a state is, what a war is, and when wars begin or end. Our list is based on Wright (1942), which uses a primarily legalistic definition of war

As supplements, use was also made of Phillips and Axelrod (2005), Langer (1972), Brecke (2012), Levy (1983), and Sarkees and Wayman (2010). For the Thirty Years War, a supplementary source was Parker (1997). For the Schmalkaldic War a supplementary source was “The Age of Reformation” (Smith, 1920).

Before 1816, the best comprehensive list of wars with a clear criteria for inclusion is Wright's.²⁸ Wright attempts to document every war from 1480-

²⁸In the post-1816 period, the gold standard in war records is the Correlates of War (CoW) database. CoW defines interstate wars as “those in which a territorial state that qualifies as a member of the interstate system is engaged in a war with another system member. An inter-state war must have: sustained combat involving regular armed forces on both sides and 1,000 battle-related fatalities among all of the system members involved.

1940. He defines war as “all hostilities involving members of the family of nations, whether international, civil, colonial, or imperial, which were recognized as states of war in the legal sense or which involved over 50,000 troops. Some other incidents are included in which hostilities of considerable but lesser magnitude, not recognized at the time as legal states of war, led to important legal results...” (Wright, p. 636). Wright defines war in the legal sense as “the legal condition which equally permits two or more hostile groups to carry on a conflict by armed force” (Wright, p. 8).

A.5 Procedure for Generating War List

Because Wright was the best list of wars available when we began our data collection which covers our entire period of interest, it forms the basis of our primary war dyad data. However, a number of difficulties prevent us from relying solely on Wright’s text.

First, there are errors to be corrected. For example, in his coding of The Second Northern War (table 35), Hanover is not listed as a participant, despite a footnote noting the year they signed a peace treaty ending their involvement; France is listed as entering the 1st Opium war after the war’s conclusion (this entry seems to be correctly attributed to the war a row below); and he fails to record Hungarian participation in Ottoman War of 1537-1542, in which Hungary was the principle theater, and the Austrian Archduke (listed at war with the Ottomans) was in personal union with the Royal Hungarian Crown.

Second, Wright does not report information on war sides and war exit that is important for our purposes. His text only states the time states entered the war, and their primary allegiance to one of two war sides. Therefore, Wright does not comprehensively record examples of parties switching sides during a war, exiting a war early, or compound wars not well described by two completely opposed camps. For example, in the Thirty Years War and French Rev and Napoleonic Wars there are several shifts in the sides of the conflict and examples of states only at war with some members of an alliance group.

Third, because we are primarily concerned with which leaders are fighting wars, we need to understand whether our coded rulers correspond to Wright’s understanding of state leadership. For example, Wright records a Polish Russian conflict in which a Russian Tsar intervened to help a Polish King put down anti-Russian insurgents. However, because the Polish King and Rus-

Any individual member state qualified as a war participant through either of two alternative criteria: a minimum of 100 fatalities or a minimum of 1,000 armed personnel engaged in active combat.”

sian Tsar were aligned in this incident, it does not make sense to call it an international war for our purposes.

Finally, our list of states does not perfectly match Wright's (excepting non-European states, theocracies, states in permanent personal unions, states facing interregnums, republics, and a few non-Elector HRE members, our list is a superset of Wright's). Therefore, it is important for us to search for wars including states not in his list.

For every war, Wright lists five pieces of information. These are: The year every state in his list entered the war; the side each state primarily fought on; which of these sides was the war's aggressor; when the war ended; and the war's type (civil, imperial, or balance of power). Occasionally, he also lists the month of the war's inception or close, as well as the number of important battles fought.

To reconcile Wright's schema with our own, we needed the following additional pieces of information.

- Did any states which we code as sovereign but Wright does not participate in any of Wright's wars? Were there any wars between our states involving one or fewer of Wright's?
- In wars involving more than two states, did any state leave the conflict early?
- Did any war participants switch sides over the course of the conflict?
- If the HRE (or German Confederation) is participating, to what extent was it acting collectively?
- Did the conflict involve a succession crisis or civil war, which might lead us to have a different understanding of war 'sides' than Wright?
- Check whether Wright made any unambiguous typos or errors

For every war listed in Wright (1942), we began by searching for a corresponding account of the war in question in Phillips and Axelrod (2005) and Langer (1972). Usually these are sufficient to answer the above questions, but additional sources were consulted when these left the situation unclear. For the Thirty Years War, a supplementary source was Parker (1997). For the Schmalkaldic War a supplementary source was Smith (1920). Any deviation from a nave Wright coding was noted and cited in our data.

For wars involving only one or fewer members of Wright's system, we searched Phillips and Axelrod (2005) and Brecke (2012). Interstate wars appearing in these lists meeting both Wright's legalistic war criteria and not

including more than one of Wright's states (we assume that Wright's list is comprehensive for wars including two or more of the states he tracks) were added. Adding wars from scratch in this manner is rare, leading us to add only 25 war-year dyads from five wars.

Levy (1983) and Sarkees and Wayman (2010) were used primarily as sanity checks for clear Wright coding errors. In the data, we record whether our final coding conflicts with Levy (1983). For all but the most complex compound wars, we also record how our final dyadic codings correspond to a naive Wright coding which would ignore the above issues.

A few notes follow on how we proceeded in ambiguous cases.

For states in personal unions (like Denmark with Norway and the various crowns held simultaneously by the Spanish rulers), if we code one state at war we assume the other is at war as well, unless we find evidence otherwise. For the Austrian Habsburgs, we extend this principle to Bohemia and Hungary (when their titular rulers are close relatives of the Austrian Archduke rather than the Archduke or Holy Roman Emperor himself).²⁹ By construction, we never have a ruler of two nations at war with himself.³⁰

Only extremely rarely does this principle come into conflict with our deference to Wright's list of wars. This is because he rarely lists two countries in personal union separately in his lists of states. The one significant exception is Hungary (a state for which Wright has several coding anomalies, such as stating they do not participate in several Habsburg-Ottoman wars taking place in Hungarian lands). In these cases, we stick to the principle that states in personal unions are typically united in their efforts, and look for evidence beyond Wright for coding them otherwise.

Wright lists some wars as being fought by the 'German Empire'. For the bulk of our period this is the HRE. Later in the sample, this is the North German Confederation, German Confederation, or German Empire. When the HRE fights conflicts we look at evidence from our sources on this conflict and other concurrent conflicts whether the HRE acting at that moment in a united or divided manner. If there is no evidence of disunion, it is assumed

²⁹For more information on the unusual unity of the Austrian Habsburgs, and its legal and normative foundations, see Tapi (1971), especially p. 38-39. For information on how Habsburg unity was facilitated by an honest and informal communication style, see Fichtner (2016)

³⁰However, we do have observations of Habsburgs at war (during the Habsburg Brother's War between Rudolf II and his cousin Matthias who became King of Hungary in 1608). There is even arguably an observation of a Habsburg at war with himself – Franz Joseph as Emperor of Austria declared war on himself as King of Hungary in putting down the revolution of 1848. For our purposes, this is treated as a civil war, and is therefore not recorded.

that the ‘German Empire’ fighting entails the Habsburg crowns and all electors fighting alongside the Holy Roman Emperor. Otherwise, we mark the HRE as being divided and cite individually which of its members participated.

A.6 Data on Formal Alliances

Data on formal alliances is derived from Gibler (2008) and Levy and Thompson (2005). This data is not used in this paper, but appears in the data files. Gibler accumulates a comprehensive database of every formal alliance since 1648. Gibler’s list of states follows the CoW criteria for system membership and also almost fully encompasses our list. Levy and Thompson’s list, while going back to 1495 only contains alliance behavior for the ‘great powers’.

Levy gives alliance targets explicitly, but Gibler’s targets were determined from Gibler’s summary. If the target of an alliance involves a succession crisis we leave out the target.

A.7 Data on Covariates

Covariates are assembled from a variety of publicly available sources. Religion corresponds to the religion a ruler publicly professed. When no explicit reference to a ruler’s religion can be found, the state or dominant domestic religion is used. During the early phases of the Protestant Reformation, it is often unclear when a ruler fully converts to a protestant sect. For example, a ruler might be privately sympathetic to a Lutheranism, and aid the spread of those ideas, but not publicly convert himself. We always erred on the side of caution in such cases, and consider a ruler as converting to Protestantism only we found evidence they publicly did so. Outside this period, coding the religion of rulers was straightforward.

Coding capital locations was usually straightforward as well. In the rare cases a state had multiple political centers of power, we selected the dominant one. The one instance in which this selection was not straightforward was for the capital of the Holy Roman Empire. This entity had multiple legislative, executive, and judicial centers. Until 1532 we selected Frankfurt as the capital, due to its role as the traditional location for the selection and coronation of Emperors. After 1532 we selected Regensburg, which held periodic Imperial Diets through 1663, and a permanent one after that date. These locations have the added benefit of being near the HRE’s center of mass.

Landlocked-ness and country adjacency were derived from Reed (2016). This map series gives the political borders for Europe and the Middle East at five week periods from the 11th century to the present. Generally, coding

is straightforward. For countries that are briefly occupied, the occupied and occupying country are considered adjacent so long as the two countries were adjacent beforehand. Countries that gain control of new regions according to Reed gain the adjacency of the regions they subsume. However, in the case of a non-permanent personal union, the adjacencies of the countries are considered separately. For example, during the Kalmar Union the King of Denmark ruled Norway in a personal union. However, because for reasons discussed above, Norway is listed as an independent state, Denmark is not coded as adjacent to Russia. Conversely, because Croatia is in a permanent personal union with Hungary throughout our sample, Croatia is not listed as an independent state, and Hungary inherits Croatia's adjacency.

A.8 Generating The Final Dataset

The above data were all collected at the monthly level. However, spotty monthly data makes a monthly analysis impractical. Other information was collected but not used and is included in the data.

When reading the data from the excel data into Stata, we only upload country years in which there is a ruler correctly matched to the Tompsett data. Only twice do we identify a ruler who was not able to be matched to Tompsett's genealogy.

Rulers are read in as beginning their reign at the start of the year in which their reign commences. Similarly, if a country covariate changes during the course of the year, it is read as having changed at the beginning of the year. If the covariate shifts several times during a year, only the last value is read into the final data. Wars are read in as starting at the beginning of the year they commenced, and ending at the end of the year they ended.

B Demographic Trends

Figure 8 displays the amount of individuals alive in our royal data in every year starting in 1495. Note that the amount of royals alive increases dramatically over time. It is unclear what percentage of this increase is due to an actual increase in the quantity of royals versus an increase in coverage.

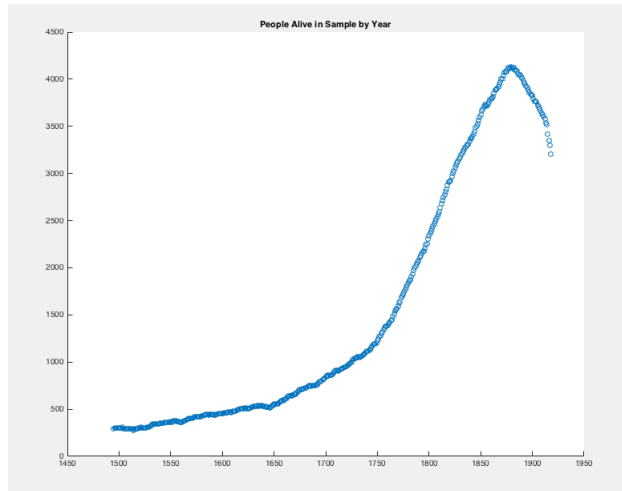


Figure 8: Number of Individuals Alive in Geneological Data By Year

Table 10 lists causes of death by category for all the 274 individuals who die on a shortest path. We end up dropping 12 of these deaths for being potentially endogenous to the political situation. Of these political deaths, seven are assassinations, four are executions, and one is a death in battle.

Shortest Path Death Cause	Obs.	Percent
Unknown	71	25.9
Old Unremarkable	35	12.8
Unspecified Illness	28	10.2
Childbirth	27	9.9
Other Infection	18	6.6
Other Non-infectious	15	5.5
Tuberculosis	10	3.6
Non-Stroke Brain	9	3.3
Pnuemonia	9	3.3
Smallpox	8	2.9
Stroke	8	2.9
<i>Assassination</i>	7	2.6
Cancer	7	2.6
Accidental	7	2.6
<i>Execution</i>	4	1.5
Heart Attack	4	1.5
Fever (Cause Unspecified)	3	1.1
Genetic	3	1.1
<i>Battle Death</i>	1	0.4

Table 10: Causes of Death for 274 Individuals Dying on a Shortest Path. Potentially political death causes in italics.

C Network Concepts

We contend that kinship connections have a causal relationship with interstate conflict. In order to test this hypothesis, we use a suite of tools from network theory. This section offers a brief introduction to the concepts we employ.³¹

A kinship network consists of a set of living individuals, I , and the kinship relations between them. Individuals are nodes of the network and their immediate kinship relations are edges. Specifically, two individuals are said to have an immediate kinship relation if they are spouses, siblings, or parent and child. We construct a kinship network for the European nobility in every year from 1495-1918.

Each year's network can be represented by an adjacency matrix, A_y . A_y is an $|I_y| \times |I_y|$ square matrix, where $|I_y|$ is the number of living individuals in year y . The $(i, j)^{th}$ entry in the matrix is 1 if individuals i and j are linked and 0 otherwise. Formally, these are undirected, unweighted graphs. Another useful concept is the degree matrix, D_y . D_y is the diagonal matrix where $D_{y,(i,i)} = \sum_{j \in I} A_{y,(i,j)}$. The $(i, i)^{th}$ entry of D_y is equal to the number of immediate kinship relations individual i has in year y .

The network of kinship relations evolves yearly. The set of nodes varies as individuals are born and die. Edges can either exist from birth or be formed through marriage. They can be dissolved through divorce.

In order to study this changing kinship network, we introduce summary measures of the kinship network distance between a pair of rulers. We focus on three such measures. These are shortest path length, resistance distance, and distance to common ancestor.

Shortest path length is a straightforward yet powerful measure of the kinship distance between two individuals. Consider two nodes i and j . The shortest path length between them is the minimum number of edges that must be traversed to move from node i to node j . If a path exists, we say the pair is connected. When no path exists, shortest path length is defined as infinite. The longest finite path observed in our sample is of 30 degrees.

³¹For a more thorough introduction to network methods in economics, see Jackson (2008).

The weakness of the shortest path measure is that it only takes into account a single path. Resistance distance also measures kinship distance, but considers all simple paths between two nodes.³² When these paths are non-overlapping, this measure can be calculated as the reciprocal of the sum of the inverse path lengths of all simple paths from i to j . More generally, resistance distance can be calculated by

$$R_{(i,j),y} = \Gamma_{(i,i),y} + \Gamma_{j,j} - 2\Gamma_{(i,j),y}$$

where $\Gamma_{(i,j),y}$ is the $(i, j)^{th}$ entry of the Moore-Penrose pseudo-inverse of $(A_y - D_y)$.³³ This measure was popularized by Klein and Randic (1993) who prove it is a metric in the mathematical sense.

Resistance distance, $R_{(i,j),y}$, is less than or equal to the shortest path distance. When there is no shortest path, we similarly define resistance distance to be infinity. The resistance distance is decreasing in the number of simple paths connecting two nodes. Resistance distance will also be shorter when these paths are shorter and have fewer nodes in common. As this distance metric takes into account all paths between two nodes, it is a natural counterpart to the shortest path distance. Resistance distance has been widely used in the physical and applied sciences, but has been much less prevalent in economics.³⁴

Finally, we measure the blood relationship of a pair by the distance to their nearest common ancestor. None of these ancestors need be alive. This measure is constant for a pair of rulers. To calculate it, we construct a single directed network of all individuals in the data. Unlike the (undirected) network above, in this network links only run in one direction - from children to their parents.

For individuals i and j , we find the set of ancestors common to both individ-

³²A simple path from i to j is a non-repeating sequence of edges starting at i and ending at j .

³³ $(A_y - D_y)$ is known as the Laplacian representation of the network

³⁴An alternative all-paths measure is the hearing matrix defined in Banerjee et al. (2016). Assuming fixed transmission probability, the $(i, j)^{th}$ entry of that matrix is the expected number of times a message originating at node i will be heard by node j after T periods. Resistance distance is strongly inversely correlated with hearing closeness.

uals. Distance to one of these shared ancestors is defined to be the maximum of shortest path distance to the ancestor from either i or j . The minimum of these distances across the set of shared ancestors is our measure of blood distance for the pair. So, if a pair of rulers' closest common ancestor is a mutual great grandparent, their blood distance is 3. If one ruler's grandparent is another ruler's great grandparent, their blood distance is still 3. If a pair do not share a common ancestor, this measure is undefined. If a common ancestor exists, we say the pair is blood connected. The maximum distance searched is 7 generations back.

D Network Connection Across Dyads and Time

Table 11 shows the number of years of coexistence, share of years at war, and average inverse shortest path length for some dyads of particular interest.

Within this subset countries that are closely connected, such as France and its neighbors, tend to be more proximate and closely connected. A notable exception is Austria and Spain, which were ruled by close Habsburg cousins for centuries. The correlation of the average inverse path length and share of years at war is .175 in the above subsample.

Figure 9 plots the overall relationship, at the dyad level, between average connectedness and war frequency. Observations are weighted by the amount of years the dyads coexist. Weighting observations in this way, there is almost no relationship between the two variables. Overall, the pattern is consistent with our hypothesis that network ties were intentionally directed towards counterparts with a high latent risk of conflict.

Figure 10 displays trends in the share of states ruled by related monarchs over time. 62 percent of dyad-years have ruler pairs with a blood connection. The share of dyads with any common ancestor increases strongly over time, from a low of 14.3 percent in the first year observed to a high of 98.8 percent in 1815. After this peak the blood connected share decreases again by about

Dyad	Years	War Frequency	(Path) ⁻¹
France-Spain	362	0.290	0.180
France-Austria	363	0.248	0.123
England-France	353	0.238	0.059
France-Prussia	363	0.204	0.021
Russia-Sweden	418	0.167	0.051
England-Spain	413	0.157	0.075
Russia-France	359	0.078	0.012
Austria-Prussia	377	0.077	0.052
Sweden-Austria	423	0.066	0.033
Russia-Spain	418	0.053	0.021
Austria-Spain	421	0.047	0.252
England-Prussia	367	0.025	0.148
England-Austria	414	0.024	0.066
Russia-Austria	419	0.019	0.036
Sweden-France	362	0.017	0.018
Sweden-England	413	0.015	0.079

Table 11: Years of coexistence, share of years at war, and average inverse shortest path length for several dyads of interest. For space, shortened or informal country names are used. Monarchies sharing a fixed effect (i.e. successor states) are combined for the purpose of calculating dyad averages. Dyad years of personal union are excluded.

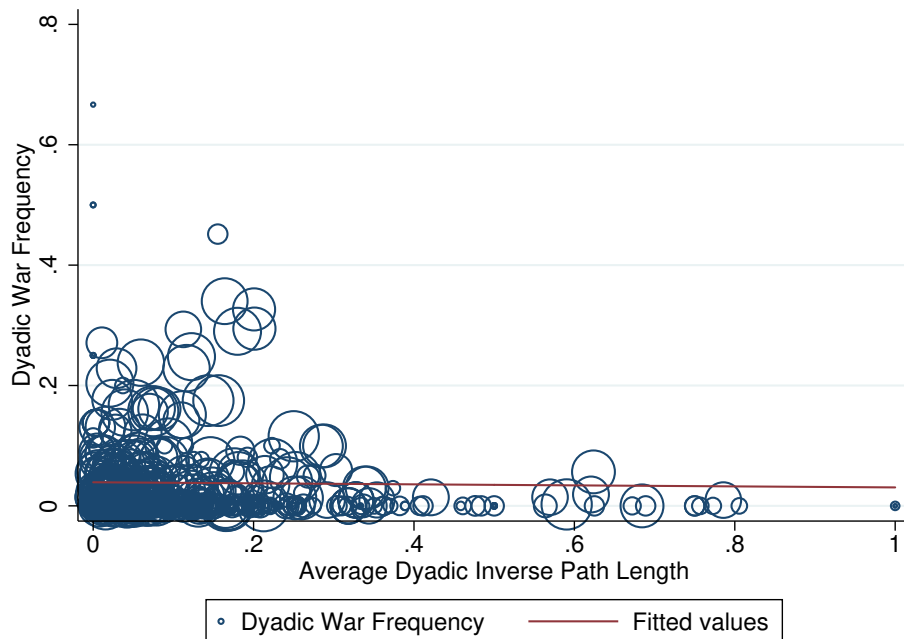


Figure 9: Average inverse path length and war frequency at the dyad level. Observations are weighted by the number of years states in a dyad coexist. Personal union dyad years excluded.

40 percentage points, with a nadir around 1900. On average 17 percent of dyad-years' rulers share a common grandparent or more recent ancestor. 20.6 percent share a common great grandparent or closer.

While the share of states being ruled by related monarchs grows, the share ruled by closely related monarchs (i.e. those of blood degree three or less) shows no clear trend. The fact that there is no clear trend in the share of closely blood connected rulers should partially alleviate the concern that an increase in living kinship connection, while directly decreasing the chance of war, had an indirect effect in the opposite direction by creating more opportunities for succession crises. In both this figure and figure 11 personal union observations are not dropped.

Figure 11 displays the trend in the share of rulers closely connected by living kinship ties over time. Recall that if a pair of rulers have married grandchildren, they have a shortest path distance of at most 5. If a pair of

rulers have grandchildren who are married to a set of first cousins, the rulers have a blood distance of at most 7. Trends in the share of dyads with a close resistance distance and shortest path distance match each other closely. This information is presented at the decade level, because the share of states connected has much higher year to year variance than the blood connection data.

Figures 12a through 14d show the evolution of kinship ties between pairs of states. The capitals of the countries are represented by dots, with lines connecting countries that share a living kinship tie. Most notable is the increase in connection density over time. Also interesting is the eventual integration of Russia into the network of European royal families. This occurred in 1711 through the marriage of Peter the Great's heir to German princess Charlotte Christine of Brunswick-Lneburg. This broke the tradition of the Russian royal family only marrying domestic nobility.³⁵

Another interesting feature of these figures is that polities traditionally considered closely kinship connected are not always connected by our living kinship measure. Consider the case of Austria and Spain. In 1550, Aragon and Castile were connected to Austria through a personal union – Charles V ruled all these domains and more. In 1600, various Spanish, southern Italian, and central European crowns were held by Habsburgs, but by different branches of the family. The two empires were reconnected by the marriage of Anne of Austria to her uncle Philip II of Spain (Charles V's son) but were disconnected again with her death in 1580. This explains the two clusters' disconnection in figure 12(c). The frequent inbreeding of the Spanish and Austrian branches of the Habsburg family led to infamous genetic disorders. Most notable was the imbecility of Charles II of Spain. His lack of Habsburg issue led to the War of Spanish Succession with his death in 1700. Instigating the war, Louis XIV of France had installed his Grandson (Philip V) as King of Spain. This created the tie between Spain and France seen in figure 13(a). However, by the end of the war in 1715, France and Spain were not connected by living kinship

³⁵The marriage was part of Peter's Westernization reforms. These reforms also included moving the capital to St. Petersburg.

ties, despite both being ruled by Bourbons (figure 13(b)). In 1711 Philip V's father, (Louis XIV's son) had died, severing the living kinship (but not blood) connection between the pair.

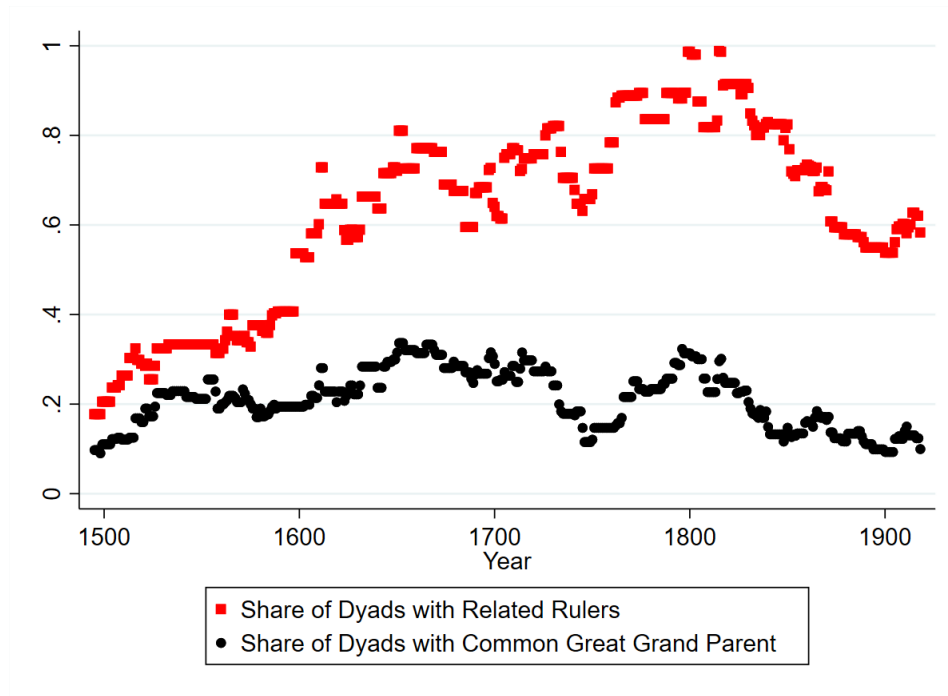


Figure 10: Share of Dyads Ruled by Blood Related Monarchs

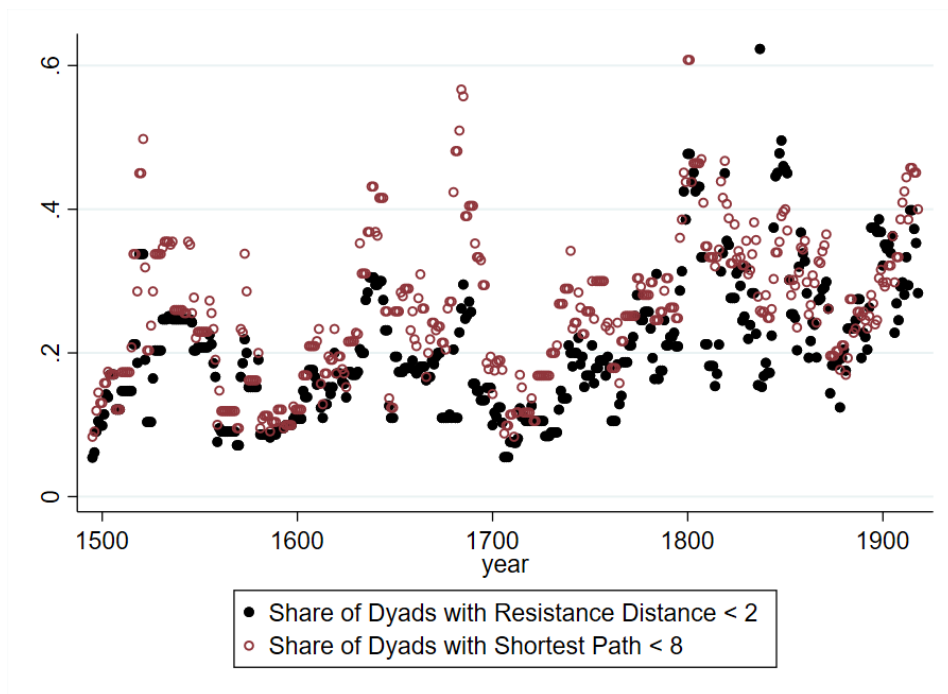
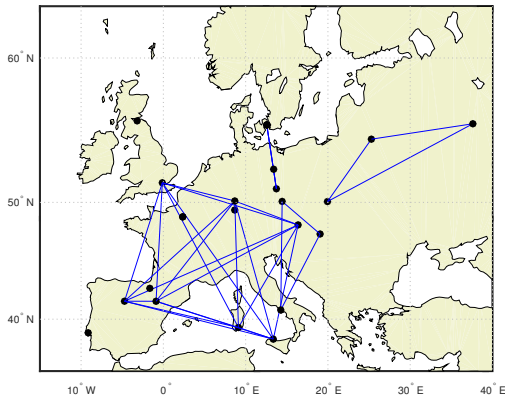
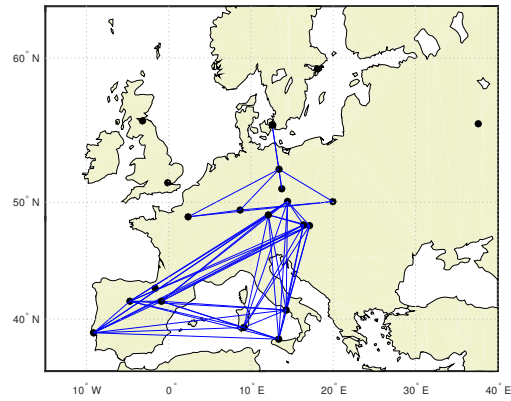


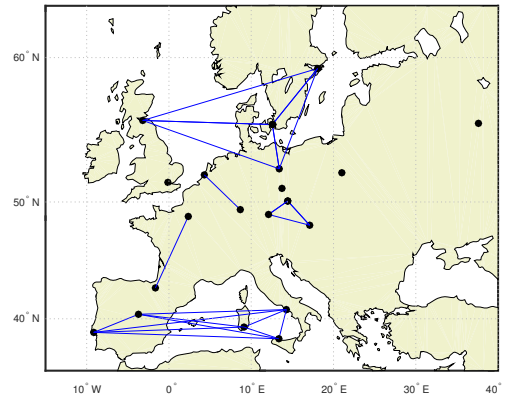
Figure 11: Share of Dyads With Rulers Sharing Close Network Ties



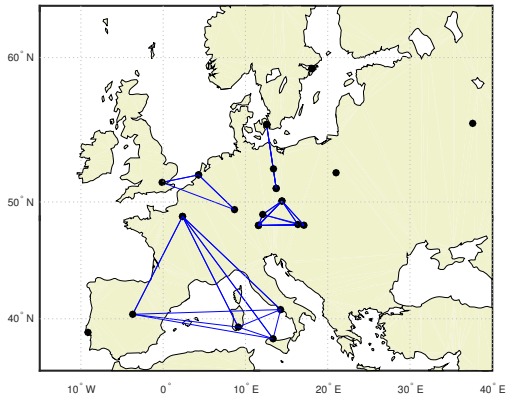
(a) Kinship Connections in 1500



(b) Kinship Connections in 1550

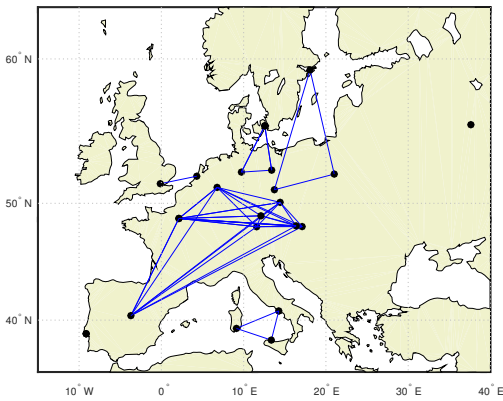


(c) Kinship Connections in 1600

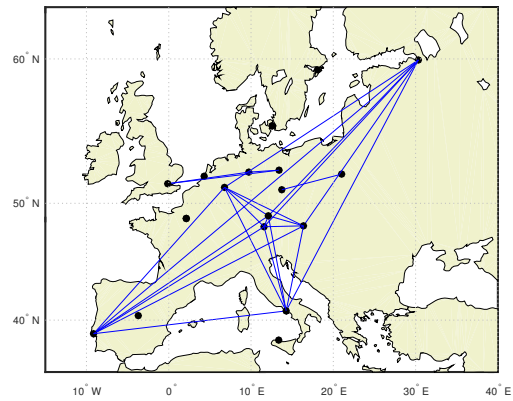


(d) Kinship Connections in 1649

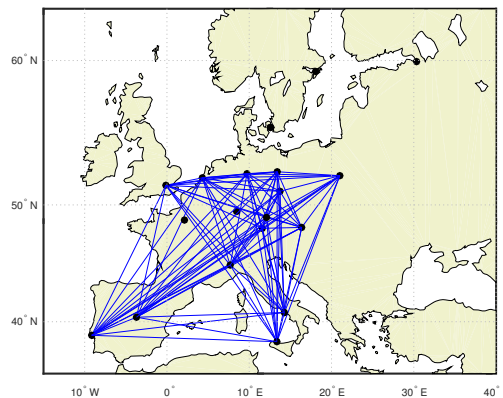
Figure 12: Living kinship connections among the monarchies of Europe in 1500, 1550, 1600, and 1649 (after the Peace of Westphalia). In the above maps, black dots represent capitals. Lines represent living kinship connections between rulers (i.e. a line connects the capitals if their rulers share a living family tie).



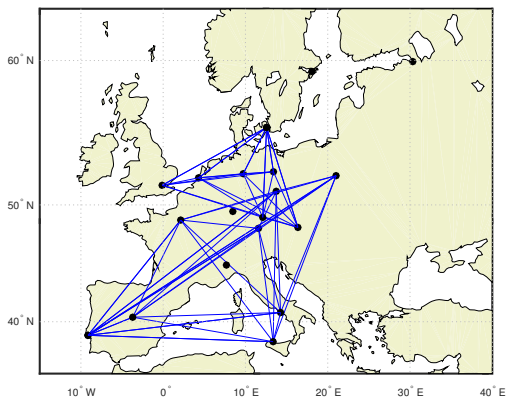
(a) Kinship Connections in 1700



(b) Kinship Connections in 1715

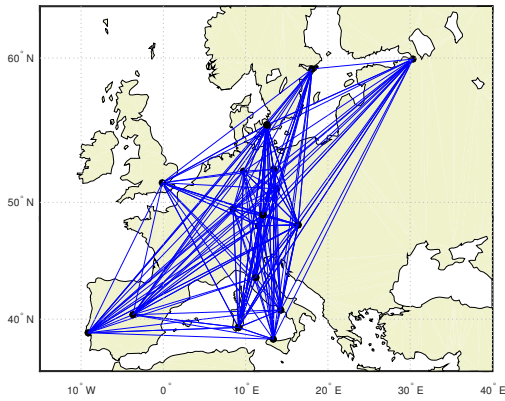


(c) Kinship Connections in 1739

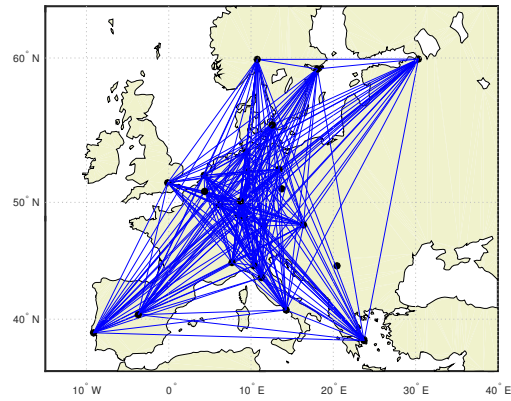


(d) Kinship Connections in 1750

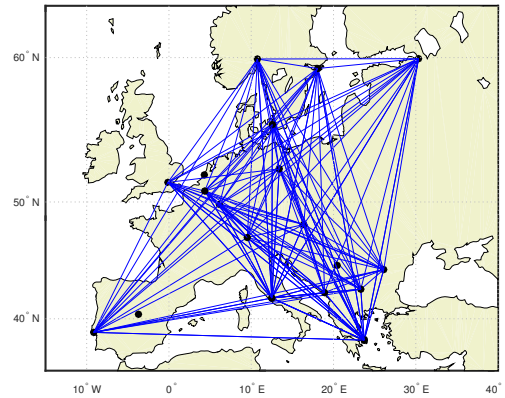
Figure 13: Living kinship connections among the monarchies of Europe in 1700, 1715 (after the War of Spanish Succession), 1739 (before the War of Austrian Succession), and 1750. In the above maps, black dots represent capitals. Lines represent living kinship connections between rulers (i.e. a line connects the capitals if their rulers share a living family tie).



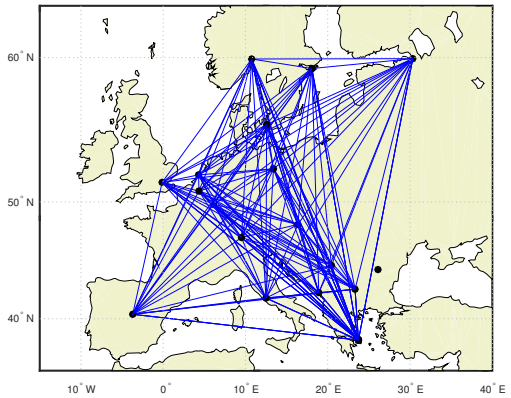
(a) *Kinship Connections in 1800*



(b) *Kinship Connections in 1850*



(c) *Kinship Connections in 1900*



(d) *Kinship Connections in 1913*

Figure 14: Living kinship connections among the monarchies of Europe in 1800, 1850, 1900, and 1913 (before World War I). In the above maps, black dots represent capitals. In the left figure, lines represent living kinship connections between rulers (i.e. a line connects the capitals if their rulers share a living family tie).