

Queens: Data Appendix (For Online Publication)

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We create a new dataset to examine the effects of female rule on war, covering European polities over 1480-1914. In this appendix, we provide further information regarding the construction of this dataset and the variables used in the analysis. In the sections below, we: detail construction of the polity-year panel; describe our genealogy variables; present a comparison of our first born male variable to equivalent measures in the Human Mortality dataset; detail the construction of the war variables; present a comparison of our war data to other comparable war data sources; and provide further information on territorial change.

A Construction of Polity-Year Panel

We obtain information on European polities and rulers from [Morby \[1989\]](#). This source provides a listing of various polities, the period over which each polity was in existence, as well as the time span of each ruler's reign. This information serves as the basis for our polity-year panel structure.

Polities included in the Panel—. Our main sample includes polities that had at least one queen, historically, between 1480-1913. Our auxiliary sample contains 18 additional non-queen polities that did not have any queens during this time.¹ Both groups are listed in Table A.1 and mapped in Figure 1. As this map shows, neither sample includes the German kingdoms. This is because various parts of the German polities were ruled by different houses/families simultaneously, and we are unable to observe which house/family was involved in each of the different wars. As an example, consider the polity called the 'House of Brunswick-Lüneburg'. According to [in Morby \[1989\]](#), during the year 1524, it was ruled by Otto III from the Middle Line of Lüneburg, Ernest I also from the Middle Line of Lüneburg, Erik I from the Line of Calenberg-Göttingen, as well as Henry II from the Line of Wolfenbüttel. Although Brunswick is listed as a participant in the war data by [Wright \[1942\]](#), we are unable to discern which of these rulers actually participated in the war; or if multiple rulers fought, if they all fought for the same side.

Some of the other polities shown as missing from our samples in Figure 1 are those that did not have monarchies over this period. This includes Bosnia, Macedonia and Liechtenstein, which do not have monarchy listings in [Morby \[1989\]](#). Albania did have a monarchy listing, but after World War I, which is outside of our sample period.

Time Period of each Polity and the Austrian Exception—. We follow [Morby \[1989\]](#)'s timeline for the period over which each polity was in existence, with the exception of Austria. According to Morby, the Austrian Empire begins in 1804. But the actual start date of Austria is somewhat ambiguous since the polity existed under the Holy Roman Empire prior to this

¹This list includes France, Italy and large swaths of Eastern Europe (such as Poland, Hungary, Romania and Bulgaria).

time, and some historical events suggest a separate Austrian entity prior to the 1800s. For example, the Austrian monarch was always also the ruler of the Holy Roman Empire, except in 1740-1799, which marked the reign of Maria Theresa, who was ruler of Austria, specifically. Other historical events point to a distinct Austrian empire as early as the mid-1600s. The end of the Thirty Years War and the Westphalian Peace in 1648 resulted in increasing autonomy among European polities. Around this time, Holy Roman Emperor Leopold I initiated a series of political changes to establish a more direct rule of the Habsburgs in Austria [Noble, 2008, p.507-508]. Leopold increasingly came to depend on the Austrian archduchies, and simultaneously, his authority across the Empire as a whole diminished [Neugebauer, 2006], pointing to the influence of Austria as a separate political entity. Correspondingly, Wright [1942] codes Austria as a separate participant in wars, distinct from the Holy Roman Empire, starting around 1700, during Leopold's reign. We follow Wright in coding Austria as a separate polity with the start of Leopold's reign in 1658. This also allows us to capture the reign of Maria Theresa, whose reign otherwise would be omitted from the panel.

Overlapping Rule and Multiple Rule.— In our dataset, a reign is comprised of a monarch or a set of monarchs who are ruling over a given period of time. In most cases Morby [1989] lists only a single monarch as ruling a given polity during a given year. However, when there is a transition from one ruler to the next, there is an overlap between the first ruler's last year of reign and the next ruler's first year of reign. For these transition years, we uniformly assign the overlapping year to the new ruler's first year of reign.

There are also 16 instances in which more than one monarch is listed as being in power during a given year. These cases of multiple rule arise for three reasons: (a) a husband and wife may have jointly ruled a polity (e.g. Isabel I and Ferdinand V in Leon and Castile) (b) two rulers who were not married may also jointly ruled a polity (e.g. Ivan III the Great and Ivan the Younger who were a father-son pair in Russia); and (c) one monarch may have governed a polity for less than a year before a second monarch began governing. For example, consider the case of Edward V in England who became king in 1483 after the death of his father Edward IV. But Edward V too died the same year and his uncle Richard III assumed the throne. In cases like this one, we do not simply assign the overlapping year to the newest incoming ruler (Richard III) since this would completely omit the reign of the monarch who ruled only for part of the overlapping year (Edward V). We instead list the two monarchs (Richard III and Edward V) as co-rulers since they ruled during the same year.

In some instances a monarch may rule jointly with another monarch for some years and then continue to rule on his or her own. For example, Joan III from the Kingdom of Navarre (Pamplona) ruled jointly with Anthony during the period 1555-1562 and then on her own until 1571. In this example, Joan's rule with Anthony constitutes a distinct reign from the

one in which she rules on her own.

B Construction of Genealogy Variables

Source of Genealogy Data—. While [Morby \[1989\]](#) provides information on the different polities and rulers, it does not provide detailed genealogical information for these rulers. We instead cull this information from the Catalog of Royal Family Lineages [[Tompsett, 1994](#)], which uses the same polity listing as [Morby \[1989\]](#). Where available, we collect the following information for all rulers in our sample: the ruler birth/death year, the year of marriage/divorce, number of spouses, the spouse's death year, the number of siblings,², sibling's birth/death year, the number of children, the child's birth/death year. [Tompsett \[1994\]](#) does not record the gender of the different relations and so we rely on the names of the ruler, spouse, sibling and children to determine their gender.³ In the event of a discrepancy between [Morby \[1989\]](#) and [Tompsett \[1994\]](#) about ruler names, reign years, or the relationship with the ruler(s) of the previous reign, we favor [Morby \[1989\]](#).

Defining the Instrument Monarchs—. Our instruments are defined on the basis of the previously reigning monarchs, i.e., whether the previous monarchs had a sibling who was female or a first-born child who was male. In most of the 193 reigns in our sample, the actual reign preceding the current reign is conceptually appropriate for identifying the relevant “instrument monarchs”, based on whom the instruments are defined. For example, the English monarch King Charles I came to power in 1625 after the reign of his father James I, and we define James I as the instrument monarch for Charles I.

However, for 30 cases, we have to go back to further reigns to identify the conceptually appropriate instrument monarchs — namely because monarchs ruling across multiple reigns breaks the correspondence of previous reigns to previous generations. The Data Appendix Table lists these cases and the column labeled “Type” denotes why we have to go back beyond the previous reign.

Fourteen of these cases arise because family members of the previous generation ruled across multiple reigns. For instance, in four cases, we have to go back two reigns to locate parents of the relevant monarchs, who were married to one another, but also ruled during separate previous reigns. As an example, Henry III came to rule the Kingdom of Navarre (Pamplona) in 1572. The reign directly preceding his reign was that of his mother, Joan III, who ruled on her own from 1562-1571. But as discussed in the *Overlapping Rule and Multiple*

²We define siblings as those who share the same mother as the ruler.

³For most of the cases in our sample, the relation's name instantly reveals the gender. In the few instances where this is not clear, we use other web sources to determine whether the child was male or female. In some cases, [Tompsett \[1994\]](#) lists the child's gender but not the child's name - for these we record the gender as listed.

Rule sub-section above, Joan also co-ruled with her husband Anthony, who was Henry III's father, during an earlier reign. Thus, the instrument monarchs for Henry III are comprised of his parents, Joan III and Anthony. In two other cases we have to go back to locate two individuals who co-ruled together previously although the individual inheriting the throne was not their child, but for example, a niece or nephew. For example, Charles V inherited the throne of the Duchy of Lorraine from his uncle, Charles IV, and we have to go back to a previous reign to include his aunt, Nicola, as the other instrument monarch.

In addition, there are two cases that involve either a nephew / uncle or niece / aunt ruling together previously; two additional cases involving a father and son ruling together previously; and four cases that have to do with siblings ruling across different previous reigns. Each of these cases also denotes circumstances in which it would be conceptually inappropriate to ignore one of the previous rulers in defining the instrument set. For example, consider the case of Catherine I of Russia, when the instrument monarchs are two siblings who ruled together. Catherine inherited the throne after the death of her husband, Peter I, the Great. However, prior to that reign, Peter I co-ruled together with his brother, Ivan V. In circumstances like this one, both siblings could have generated offspring who could have potentially inherited the throne, and therefore the instrument monarchs in this case include both Peter I and his brother Ivan V. In fact, both the daughter of Catherine I (Elizabeth Petrovna) and the daughter of Ivan (Anne), *did* go on to become reigning monarchs in Russia. Therefore locating the conceptually relevant instrument monarchs also strengthens the first stage.

On top of the fourteen cases detailed above, there are another fifteen cases that arise because of the complexities arising from the rulers who rule across multiple reigns themselves – and we need to reach back to avoid previous reigns that were comprised of just themselves or of them and their spouse. For example, in the case of Joan III and Anthony of Navarre described above, the reign prior to when Joan ruled by herself was comprised of Joan and her husband Anthony. We then have to go back two reigns to locate an appropriate instrument monarch, her father, Henry II. These cases are denoted by type “Second reign of ruler” in the Data Appendix Table.

Finally, there is one exceptional case that doesn't fit easily into any of these other categories. This occurs in the Duchy of Lorraine, when a father and son (Francis II and Charles IV, respectively) co-rule together. Their reign follows the reign of Charles' wife (Nicola), who was also Charles' first cousin. In this case we reach the previous generation by going back one reign further to Henry II, who was Charles' uncle, and also his wife's father.

Queens who came to Power with Living Brothers—. In our sample, male preference in accession can be seen from the relatively few cases in which queens came to power while there was a living brother at the time of accession. Of the 29 queens in the sample, there were

six cases in which the monarchs in the previous reign had a male first-born child; but of these six, there was also only one case in which the male child was living at the time of the queen's accession. This was the famous case of Mary II, who came to power along with her husband William III, after his victorious invasion of England in November 1688, in the Glorious Revolution. They deposed James II, Mary's father, who fled the country. Mary had a half brother, James Francis Edward, who was the son of James II and his second wife. He was only a year old when the Revolution occurred, and smuggled out of England to France when the invasion occurred.

In addition, among the nine cases in which the previous monarchs had first-born female (and multiple children) there was only one case in which a younger male child was living at accession. This was the case of Louise Hippolyte who acceded as the queen of the Principality of Monaco (in 1731). Her father, Antonio I, also had a son named Antoine Grimaldi, who was alive at time of accession. There are conflicting accounts of whether Antoine was even a legitimate child, which may be what precluded him from the throne.

Unnatural Death of Monarchs.— We use data from [Eisner \[2011\]](#) to code whether a ruler died an unnatural death. For each ruler, [Eisner \[2011\]](#) identifies unnatural deaths to include those killed by murder, in battle, by execution, by accident or by legal execution. We supplement [Eisner \[2011\]](#)'s list with other web sources, especially since [Eisner \[2011\]](#) only codes regicide information through to 1800. We code a ruler to have died an unnatural death if there is a specific mention of such a killing in these sources.

C Comparing Sex Ratios in Tompsett and the Human Mortality Database

We compare the sex ratio at birth from our genealogical data source to the male-female birth ratio for European countries provided in the Human Mortality Database (HMD).⁴ In particular, we focus on the country-level number of (male and female) births provided in the HMD data. Various national and academic sources are used to calculate the number of births, and the HMD website provides a list of sources by country. We used data for all available European countries that match our polities, and we also restricted the data to the period before 1913. This provides us with a total of eight countries that we can use for the comparison: Belgium, Italy, Denmark, Scotland, Netherlands, Sweden, Portugal and Austria. We found that the overall median male to female sex ratio in the HMD database is 52.73% (with the lowest ratio of 51.06% in Sweden, and the highest ratio of 55.78% in Portugal). It is reassuring that these ratios are similar to and also bracket the ratio of 54% in

⁴The Human Mortality Database is available at <http://www.mortality.org/>.

our dataset, as calculated based on Tompsette's genealogy variables.

D Construction of War Variables

Other than kingdom and ruler genealogy data, we also use information on wars in Europe. Specifically, we required information that identified the participants in a war along with their entry/exit dates for each war. Wright [1942] provides a comprehensive listing of wars during this period. This list primarily includes "all hostilities involving members of the family of nations, whether international, civil, colonial, imperial, which were recognized as states of war in the legal sense or which involved over 50,000 troops" [Wright, 1942, p.636].

Wright also includes "hostilities of considerable but lesser magnitude, not recognized at the time as legal states of war, led to important legal results ..." [Wright, 1942][p.636]. In sum, Wright [1942] considers the scale of war, its recognition and associated legal and political ramifications in determining whether an armed conflict constitutes a war. Importantly, [Wright, 1942, p.638,641] also distinguishes between different types of wars. They are: (1) Balance of Power War - war among state members of the modern family of nations;⁵ (2) Defensive War - war to defend modern civilization against an alien culture; (3) Imperial War - war to expand modern civilization at the expense of an alien culture; and (4) Civil Wars - war within a state member of the modern family of nations.

We aggregate Balance of Power, Defensive and Imperial wars together to define participation in external wars, which involve two or more units at the start of the war.⁶ Civil wars, in contrast, are internal to one unit, i.e., occur in what is one polity at the start of the war. Typically, we analyze external wars separately from civil wars. However, since civil wars can result in the creation of new units (for example, if part of the original unit secedes), so we also analyze an aggregate measure of participation in any type of war in the appendix table A.5.

War Start/ End Dates.— Wright [1942]'s list of wars is also useful for our purposes since it provides a list of participants and their entry/exit dates in each war. The start date of a war is determined based on "first important hostilities" [Wright, 1942, p.638], and the end date of a war is based on "the date of signature of a treaty of peace, or the date of its going into

⁵The family of nations is meant to formally demarcate states that share commonalities based in treaties, and diplomatic relations, but it refers, for the most part, to the European nations, and almost all balance of power wars occur among European nations. The exceptions are the following: (1) there are eight wars involving Turkey in which there is a European aggressor, and these are included as balance of power wars, and (2) there are six wars involving a European polity and a non-European power such as Japan (e.g. Russian-Japanese war in 1904-1905).

⁶Wright [1942] lists Spain as a participant in wars prior in the late 15th century (e.g. War of Granada) but since the Kingdom of Spain only begins in 1516 in Morby [1989], we matched wars involving Spain before 1516 to the polities of either Aragon or Leon & Castile.

effect if that is different , . . . the dates of armistice, capitulation, or actual ending of active hostilities . . . ” [Wright, 1942, p.637]. In cases where entry/exit dates of specific participants were not provided, we used the war start/end dates.

Aggressor/Alliance information— Wright [1942] also provides information on participants and aggressors in a war. The information on aggressors (i.e. the side that initiated a war) allows us to determine whether a polity attacked or was attacked. This is most relevant and accurately measured for Balance of Power wars. Rebels are assumed to have initiated civil wars; the “expanding state” (i.e. the colonial power) is supposed to have initiated any imperial wars, and no participant is an aggressor in a defensive war [Wright, 1942, p.637].

We also used web sources that provided a description of the wars in our sample and identified which sides fought alongside each other and fought against each other. We then used that to code whether a polity fought alongside another polity, i.e., as an ally during a given war.

E Comparing Wright War Data to Other War Data

We also compare how Wright [1942] lines up with other data sources that contain comparable information. One alternative source is the Correlates of War (COW) dataset [Sarkees and Wayman, 2010] which contains information on wars from 1816 onwards. Since COW records inter-state wars, we compare it with our list of balance of power wars, for wars involving at least one queen polity, over 1816-1913. We find that there are 12 common wars in the two data sources, for the time period overlapping between the two sources. In addition, our data covers an additional 16 wars that are not in COW. In contrast, there are just three wars that exist in COW which are not in our sample. These are minor wars that involve six polity years which represent far less than one percent of the total polity-years in our panel data.

Another alternative war data source is [Levy, 1983, p.88-91], which tracks wars fought among the “Great Powers”, starting from 1495. The great powers are restricted to a set of 10 major European polities (and also include the United States, the Ottoman Empire, China and Japan). Given this scope restriction, unsurprisingly, the Levy data source also contains fewer wars than the Wright data source. When we compare the list of balance of power wars in our main sample to this alternate data source for the 1495-1913 period, we find that the two sources contain 51 common wars. However our sample also contain an additional 60 wars that are not in Levy [1983]. In contrast, there are only 10 wars that exist in Levy [1983] that are not in our sample. These wars again seem to be relatively minor in that they span 40 polity years in total, which represents just one percent of the total polity-years in our panel data. These comparisons indicate that the Wright data is comprehensive in its coverage of

European wars.

We also use Wright [1942] rather than either one of these other data sources since it offers far more comprehensive panel coverage. If we used Levy [1983] we would lose 12 of 18 polities with queens from our main sample. If we used the COW dataset, we would lose over 300 years from our panel, as the COW only begins in 1816.

F Territorial Change

We use the the Centennia Historical Atlas (CHA)⁷ to calculate territorial change during a reign. The CHA documents the territorial borders of different European polities and provides 10 continental maps for every year. We identify the home territory of a polity (based on the years of existence listed in Morby [1989]) and then visually compare the area of the first and last maps of a reign. We are not able to observe the precise change in area without the underlying maps from CHA. As an example, for a reign that existed for three years, we compare the first and the thirtieth map to determine territorial change. If there was an increase in a polity's area at the end of the reign, we code an indicator variable capturing territorial gain. We could not identify the polities of Burgundy, Austria, Bourbounnais and Luxembourg in CHA either because their home territories were not marked or their years of existence did not match Morby [1989]. As a result, we identified territorial change for 14 queen polities.

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⁷The Centennia Historical Atlas is available at <http://www.historicalatlas.com/>.

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Data Appendix Table: Previous Reign and Instrument Monarchs

Polity	Ruler 1	Ruler 2	Previous Reign Ruler 1	Previous Reign Ruler 2	Instrument Ruler 1	Instrument Ruler 2	Type
England	Richard III		Richard III	Edward V	Edward IV		Second reign of ruler
England	Henry VII		Richard III		Richard III	Edward V	Uncle/nephew ruled previously
England	Mary I		Mary I	Jane		Edward VI	Second reign of ruler
England	Elizabeth I		Mary I		Mary I	Jane	Aunt/niece ruled previously
England	William III		Mary II	William III	James II		Second reign of ruler
England	Anne		William III		Mary II	William III	Husband-wife ruled previously
Bourbonnais	Peter II		Peter II	Charles II	John II		Second reign of ruler
Bourbonnais	Suzanne		Peter II		Peter II	Charles II	Siblings ruled previously
Bourbonnais	Suzanne	Charles III	Suzanne		Peter II	Charles II	Siblings ruled previously
Bourbonnais	Charles III		Suzanne	Charles III	Peter II	Charles II	Siblings ruled previously
Monaco	James		Louise Hippolyte	James	Anthony		Second reign of ruler
Monaco	Honore III		James		Louise Hippolyte	James	Husband-wife ruled previously
Navarre	Catherine	John III	Catherine		Francis Phoebus		Second reign of ruler
Navarre	Joan III		Anthony	Joan III	Henry II		Second reign of ruler
Navarre	Henry III		Joan III		Anthony	Joan III	Husband-wife ruled previously
Spain	Felipe V	Louis I	Felipe V		Carlos II		Second reign of ruler
Spain	Joseph Napoleon		Ferdinand VII	Joseph Napoleon	Carlos IV		Second reign of ruler
Spain	Ferdinand VI		Philip V		Philip V	Louis I	Father/son ruled previously
Spain	Ferdinand VII		Joseph Napoleon		Ferdinand VII	Joseph Napoleon	Second reign of ruler
Portugal	Maria I		Maria I	Pedro III	Joseph I		Second reign of ruler
Portugal	John VI		Maria I		Maria I	Pedro III	Husband-wife ruled previously
Lorraine	Charles IV	Francis II	Nicola		Henry II		Exception
Lorraine	Charles IV		Charles IV	Francis II	Henry II		Second reign of ruler
Lorraine	Charles V		Charles IV		Nicola	Charles IV	Husband-wife ruled previously
Russia	Ivan III, the Great		Ivan III, the Great	Ivan the Younger	Ivan III, the Great		Second reign of ruler
Russia	Vasily III		Ivan III, the Great		Ivan III, the Great	Ivan the Younger	Father/son ruled previously
Russia	Peter (Pyotr) I		Peter (Pyotr) I	Ivan V	Theodore III		Second reign of ruler
Russia	Catherine I		Peter I, the Great		Peter I, the Great	Ivan V	Siblings ruled previously
Russia	Catherine II		Peter III	Catherine II	Elizabeth Petrovna		Second reign of ruler
Russia	Paul (Pavel)		Catherine II		Peter III	Catherine II	Husband-wife ruled previously

Notes. The Ruler 1 and 2 columns list the ruling monarchs. The previous monarchs 1 and 2 columns list the monarchs who ruled in the directly preceding reign. The instrument ruler 1 and 2 columns show the monarchs used in the instrument. Type is the reason why the instrument monarchs differs from the monarchs in the previous reign.