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The Patriarchy Index: a new measure of gender and generational inequalities in the past

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The Patriarchy Index: a new measure of gender and generational inequalities in the past[1]

> "Patriarchy, slavery, caste, estates, and racism have been the main, stark, classical forms of institutionalized existential inequality" (G. Therborn)

Abstract

This article presents a new measure for cross-cultural studies of family driven age- and gender related inequalities. This composite measure, which the authors call the Patriarchy Index, combines a range of variables related to familial behaviour, such as patterns of marriage and post-marital residence, living arrangements, the position of the aged and seniority patterns within domestic groups, and the sex of the offspring, thus representing the varying degrees of sex- and age-related social inequality in different familial settings. The comparative advantages of the index are tested by assessing how 266 historical European regional populations from the Atlantic to Moscow scored on the patriarchy scale. Further importance of the index is tested against contemporary measures of gender discrimination showing strong correlation between historical and contemporary inequality patterns. Finally, we test for the associations between demographic, institutional, socioeconomic and environmental characteristics of the regional populations and the spatial variation in the patriarchy levels. Overall, the study furthers two research fields: the one increasingly stressing the importance of the family as a crucial generator of societal inequalities; and the other arguing for the importance of the historical context when analyzing current global inequality patterns.

Introduction

Inequality is one of the most discussed problems in contemporary social sciences, as well as in national and global politics (Milanović, 2010). Last decade, in particular, had witnessed enormous developments in this regard, as more and more data were collected on a (nearly) global scale and subjected to ever increasingly sophisticated analyses striving to find out and show what 'inequality' looks like, what its tendencies are, as well as its consequences (Milanović, 2005; Therborn, 2006). Economists in particular have devoted more energy than others to global studies of the contemporary distributional dynamics. Economic historians, including those subsumed under the New Institutional Economic History label - have recently joined the bandwagon providing sterling contributions to our understanding of historical

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national and global inequalities in the distribution of wealth, income, and well-being (Van Zanden et al., 2014a, 2014b; Milanović et al., 2011).

Ever since, inequalities by gender played a crucial role in those discussions. Apart from being stimulated by intrinsic, social justice perspective, and the variable nature of gender across cultures (Schlegel 1989)[2], recently this interest in gender equality was fuelled by recognition of the economic literature that women are important for a wide range of development outcomes (World Bank, 2011; earlier Boserup, 1970). While the now general strive for gender equality across the world is scientifically well informed, it's success or failure depends on the efficiency of measuring sex-related inequalities across societies. Over the last three decades, measures capturing different aspects of gender inequalities in outcomes, as well as those focusing on the institutions underlying those disparities, have become available (for a review see Johnston 1985; Young et al. 1994; Malhotra et al., 2002; Klassen, 2006; also Carmichael, 2014, 100-104; Whyte, 1978b). The field continues to evolve (Dilli et al., 2014).

For all the contributions already there on the field of gender inequality, they are impacted by at least two main drawbacks. First, there has been a striking absence of long-term perspective in much of gender inequality studies. None of the composite gender indices used in the developmental literature pre-date 1995, and recent attempts to provide greater historical depth via the Historical Gender Equality Index (HGEI) though undeniably further the current measurement spectrum, are only a moderate step forward from the long run perspective (the gender measures they employ go back only to the 1950s; see Carmichael et al., 2014; Dilli et al., 2014). As one move further back in time the available data and indicators tend to narrow quite dramatically, and for a more distant past they are largely unavailable for larger social groups or geographical clusters of population (Drwenski, 2015; also Milanović et al., 2011). This presents a potentially serious drawback because gender inequality may have had historical roots (Lynch, 2011), and women's pathway to equal rights and socioeconomic standing has been generally a long-term process to be observed in the long run (Dorius and Firebaugh, 2010).

[2] Two early anthropological works provided striking evidence on multidimensionality of female 'status'. In the late 1960s Schlegel performed a cross-cultural study of female domestic status in matrilineal societies. She found a striking variability of male-female dominance patterns in 66 societies studied, which she grouped into 'three styles of domestic authority' (Schlegel, 1972; also Schlegel, 1975). In 1978 Martin Whyte published the first hologeistic study on the general status of women in 93 preindustrial societies. Though he discerned only very few correlations between 52 variables measuring the relative status of women in his cross-cultural survey (see Whyte, 1978a, ch. 5, p. 96-106), some important elements of female status (domestic authority and public status) were found to correlate negatively with societal and cultural complexity (i.e. in the complex societies of Eurasia with plow agriculture).

Secondly, while various theorists stressed the multidimensionality of gender inequalities (e.g. Whyte, 1978a; Schlegel, 1972; Mason, 1986; Young et al., 1994), most of the analyses tend to investigate gender discrimination in separate from other associated forms of discrimination. Meanwhile, it has been suggested that that gender inequality is inextricably braided with other systems of inequality (Coltrane and Adams, 2000, p. x; cf. also Young et al., 1994, 61), of which the discrimination by age (seniority) – i.e. the institutionalized superiority of the older over the younger - is the most crucial one. According to Therborn (2004, p. 13-14), together with age-discrimination, gender inequality forms two 'basic intrinsic dimensions' of patriarchy. These two forms of expropriation are dialectically related and often act to reinforce each other in fostering complex hierarchy of authority patterns based on both age and gender (see Joseph, 1996; Zuo, 2009; Dyson and Moore, 1983; also Halpern et al., 1996).

This paper is intended to enrich the ongoing discussion by: 1) suggesting a new inequality measure – the Patriarchy Index (later PI) - that incorporates gender along with its related discrimination dimensions (i.e. seniority) in a place and time sensitive way, going as far back as to the late 17th century (see Gruber and Szołtysek, 2015); 2) using this new measure to unravel what regional patterns and trends over time we can see in the European past, and what are their main determinants; 3) testing the relevance of the new measure against other more established tools from gender inequality research.

This paper is organized as follows. We first present the datasets that have been used. Then we elucidate our notion of patriarchy and its components, and present a list of variables for measuring these elements. Next, we introduce the Patriarchy Index, and discuss its strengths and caveats in the context of inequality research. This will set the scene for a review of the Index' application across 266 regions of historic Europe. In two subsequent sections we will test the relevance of the new measure against other more established tools from gender inequality research, and will use ordinary least squares regression to control for the effects of variation in institutional and socioeconomic conditions on the patriarchy levels across the samples. We discuss the implications of our study for broader comparative research on historical inequalities at the end of the paper.

Data

Because historical measures of inequality are rare and difficult to develop, the success of any attempt at revealing the issue at – preferably - pan-European – scale, is contingent upon the availability of relevant data (Johnston, 1985, p. 234). In our efforts to construct a composite

historical measure of age and sex discrimination we relied on census and census-like microdata from Mosaic and North Atlantic Population Projects (NAPP), because these data are abundant across historic Europe, they are publicly available in the form of machine-readable, harmonized microdata samples, and they are relatively easy to process (Szołtysek and Gruber, 2016; Szołtysek, 2015a; Ruggles et al., 2011) (Table 1; Figure 1 below shows the distribution of those regions across space)[3].

The Mosaic Project (Szołtysek and Gruber, 2016), currently encompasses 115 regions of continental Europe, includes all kinds of historical census-like materials other than full-count national censuses (e.g., church lists of parishioners, tax lists, local estate inventories), and deals with data going back to 1700, or even earlier (with roughly 65% from the 19th century). To include Great Britain and Scandinavia, the microdata from historical national census public-use microdata from The North Atlantic Population Project (NAPP; see Ruggles et.al., 2011) were applied, focusing on the oldest available data for these Northwest European countries [4]. The Mosaic and NAPP microdata samples are very similar in terms of structure, organization and available information. In each case, they describe the characteristics of the individuals in a settlement or area grouped into households (co-resident domestic groups), providing the interrelationships between co-resident persons. All demographic variables stored in the databases are harmonized across space and time using common international standards, allowing spatially sensitive accounts of historical localized gender and generational indicators to be generated across multiple locations (Gruber and Szołtysek, 2015; Szołtysek and Gruber, 2016). Since Mosaic/NAPP census and census-like microdata are hierarchical and multilevel, individual- and household-level observations they provide can be aggregated and taken as evidence for larger-scale "structures," including villages, parishes, administrative regions, and states, as well as other geographically bounded terrains.

Our units of analysis are "regions", i.e. geographically defined groups of people. These regions are administrative units used in the respective census (all NAPP data and most of Mosaic data) or created for the purpose of this analysis (in the absence of applicable administrative units). Overall there are 266 such regions (see Table 1). These regions have been grouped into seven larger European territorial clusters meant to capture the varying

[3] www.censusmosaic.org; https://www.nappdata.org/napp/.

[4] In order to minimize a possible modernization effect of the 19th century on patriarchal patterns, we decided to use the oldest available NAPP data for Northwestern Europe. This was possible for Iceland, Denmark, and Norway, but unfortunately no data earlier than 1880/81 census is available for Great Britain and Sweden within the NAPP collection (the data for Great Britain in 1851 is highly clustered and therefore not used). We have used the 100-percent-samples with the exception of England, where a 10-percent-sample is used. Though Mosaic data are based on various sampling schemes (these, in turn, contingent upon the varying data availability), they cannot be considered a probability sample of all historical European societies or cultures.

institutional and socioeconomic characteristics at the time of the census. NAPP data is grouped into Scandinavia and Great Britain, while Mosaic data is grouped into "Germany" (to cover German-speaking areas outside of Habsburg territories), "West" (west and southwest of Germany), "Habsburg", "East" (the area of East-Central and Eastern Europe, i.e. the former Polish-Lithuanian Commonwealth, as well as Russia), and Balkans (south of Croatia and Hungary).

Table 1 somewhere here

Figure 1 somewhere here

The 266 regional populations cover much of the European landmass from the Atlantic Ocean to Moscow, and run across many important fault lines in the European geography of demographic systems. The database encompasses societies which varied significantly in terms of family and household organization (Szołtysek, 2015a; Szołtysek et al., 2016): strictly nuclear and neolocal populations of Denmark and Great Britain; stem-family societies in parts of Germany and Scandinavia, and in southwestern France; societies of the eastern European joint-family type (Russia; Belarus; eastern Ukraine; or Albania and Serbia); as well as a range of intermediate patterns with varying degrees of intermingling (e.g. proper Poland; Romania). Furthermore, the database covers much of European variability in terms of geographical features, populations, cultures, and socioeconomic geography: i.e., plains, mountains, and coastal areas; free and un-free peasantries; a range of ethnicities and religions; and a range of regional patterns of economic growth in the early modern and modern eras. Though a slight majority of the 266 locations included come from the second half of 19th century (56 percent), altogether 40 percent of them predated 1850, and 16 percent preceded 1800. The collection contains both rural and urban sites, although rural societies clearly predominate[5].

There are certain theoretical merits of identifying the systematic forms of gender and generational biases at the familial or household level. There is a general appreciation of the fact that the household (family) is a particularly meaningful site for measuring gender equity and discrimination (e.g. Folbre, 1986; Lamphere ,1975; Ilcan, 1996; Malhotra et. al., 2002; also Narayan, 2006). While households have been a ubiquitous and essential part of the

[5] Mosaic data generally has regions which are either urban or rural, while NAPP data is analysed according to administrative boundaries of the time of the census. Therefore regions of NAPP data are of mixed urban and rural populations. The definition of urban is not the same for all NAPP data, but we use the information provided in the microdata. The censuses of Iceland in 1703 and of Norway in 1801 do not provide such information and therefore we have assumed that these regions were predominantly rural.

functioning of an preindustrial economy and a society (Szołtysek, 2015a), they were also the most basic arena for kinship, socialization and the transmission of values, including those related to power and equality, justice and gender relations, age hierarchy and stratification (Kok, *forthcoming*), as well as the relationship between the individual and the authority (Dilli, 2016). That differently configured family systems are capable of shaping demographic processes – including generational relations and family welfare, in distinct ways, has been long know to demographers (e.g. Skinner, 1997). Recently, the New Institutional Economists showed that the family and household organization patterns exert considerable influence on regional inequalities through their divergent impact on the status of women, investments in human capital, persistence of specific cultural norms and values, labor relations, and development of corporative institutions (e.g. Alesina and Giuliano, 2014; Carmichael et al., 2016).

Patriarchy and its composite measure

Contrary to often value-laden, monolithic, and ideologically determined discourse of patriarchy in Western feminism (see Walby, 1990), we treat the concept as a useful descriptive tool for discussing broader social inequality patterns in a comparative perspective. In line with a number of recent theorists, we see patriarchy not as having a single form or site, but as encompassing a much wider realm (cf. Kandiyoti, 1988; Joseph, 1996). According to Therborn, patriarchy has two basic intrinsic dimensions: "the rule of the father and the rule of the husband, in that order" (2004, p. 13-14). As such, it refers to generational and to conjugal family relations, or, more clearly, to generational and gender relations, thus encompassing both the stratification by sex in social attainment, as well as the domination of men over each other based on the seniority principle (Joseph, 1996). Finally, Halpern showed that the multifaceted nature of the Balkan patriarchy has been historically anchored in the interlocking combination of the rule of the father, the eldest, or the husband (Halpern et al., 1996)[6].

Based on these considerations, but mitigated by the very nature of the data available to us (see above), we conceptualized "patriarchal" elements as clustering in the four "domains" which we believe capture the four major dimensions of the phenomenon under consideration: domination of men over women, domination of the older generation over the younger generation, the extent of patrilocality, and the preference for sons. Table 2 provides the list of the components considered, showing how they were actually defined and measured, and

[6] To the best of our knowledge, Malhotra's et al., 1995 remains the only formal specification of 'patriarchy'. However, the authors focus solely on the latter's gender aspect.

indicating the expected direction of their relationship with societal patriarchy levels (+/-) (for a comprehensive discussion of all components and age standardization, see Gruber and Szołtysek, 2015). Table 3 presents a summary of the descriptive statistics for all of these variables considered for the computation of the index.

Table 2 somewhere here

Table 3 somewhere here

For the main empirical analysis, these variables were combined in one composite measure, the Patriarchy Index, which gives equal weight to the domains listed in Table 2, thus representing the varying degrees of sex- and age-related social inequality ('patriarchal bias') in different societal and familial settings. Since the strategy for the construction of the Index was described in detail elsewhere (Gruber and Szołtysek, 2015), here we only stress that both the component variables within specific domains, as well as the domains themselves were generally correlated with each other in the expected direction[7]. While the inter-domanial correlations are usually not particularly high (with some notable exceptions), most of them can be considered moderate to strong depending on the choice of boundaries (all of them are also positively correlated at a significant level). This applies also to the relationship between gender and generational domination, which we argued should be inextricably braided with each other (Figure 2). Overall, these interrelationships are generally reassuring in both validating the usage of the index as one measurement of patriarchy[8], and in justifying our plea for exploring gender and seniority biases conjointly.

Such constructed, our Index can be used to measure comparatively the "intensity" of patriarchy across time and space; thus approximating "systems of sex- and age-related social inequality", in which individuals have differing levels of access to power, capabilities, prestige, and autonomy depending on gender and age (cf. Niraula and Morgan, 1996). Accordingly, in Table 4 we provide a general benchmark against which all of regions included in the analysis can be grouped into five clusters of different levels of intensity of patriarchy.

[7] For example, out of 45 correlations between the different components (see Table 3), 31, i.e. 69 percent, were significant.

[8] Cf. Whyte (1978a) who compared 52 variables measuring the relative status of women in a cross-cultural survey of 93 preindustrial societies (the variables included, e.g., arranged marriages, inheritance, marriage payments, female control over property, etc.), to find only very few correlations between them (hardly ever above 0.3, most of them insignificant; see Whyte, 1978a, ch. 5, p. 96-106.

Figure 2 somewhere here

Table 4 somewhere here

Spatial distribution of the Patriarchy Index

The distribution of the Index across space is presented in two ways. Figure 3 shows the complete scale of index points arranged according to regional membership and time period, while Figure 4 charts the data geographically.

Figure 3 somewhere here

Figure 4 somewhere here

The observed values of the PI range from eight to 35 points. There were no regions with absolutely any patriarchal features as defined above, same as no societies to which absolute patriarchal characteristics could be assigned. Although it would be an exaggeration to speak of clear-cut groupings of regions with high or low patriarchy intensities across historic Europe, certain patterns do emerge. At the most general level, the ranking of regions is broadly consistent with perceptions from the historical demographic and sociological literature, and seems to confirm the dichotomous East-West pattern (Hajnal, 1982; Therborn, 2004). Western Europe tended to be much less patriarchal than eastern and southeastern Europe. Patriarchal features were much more pronounced than elsewhere on the continent as we move east and south of the Danube after it passes Vienna; and especially east of the Bug River, where Polish and Ukrainian ethnicities converge; and then farther into the territories of European Russia.

This generalization is, however, subject to certain qualifications. While indeed, the areas around the North Sea Basin had generally lower levels of patriarchy than elsewhere, the lowest patriarchy intensities have been found also in Germany and Scandinavia. Especially in the cities, the levels of patriarchy in northern Germany, which is adjacent to Scandinavia, appear to have been low. Equally striking was that low patriarchy was not confined to any particular region of Europe, but rather to a vast area stretching from Iceland and Great Britain, through northern France, the Low Countries, Germany, and Scandinavia, and extending even to Poland and Austria, with only few exceptions underway. The most counterfactual to the assertion of bipolarity in the distribution of patriarchy in Europe is, however, a long belt of medium patriarchy spreading between the continent's western, eastern and southern extremes, thus linking Catalonia and southwestern France with various culturally and geographically

disparate areas of Westphalia and Tyrol, and with a long vertical stretching from Lithuania to Wallachia (Romania) in Southeastern Europe. Thereby, an increase in European patriarchy levels can be said to have proceeded from the low patriarchy areas in Northern Europe, Scandinavia, and the western and central portions of the Great European Plain, then spreading concentrically towards medium patriarchy levels, and finally towards its high or very high levels only in the peripheral areas covered by the data[9].

We also observe a considerable variation within countries and across the macro-regions of Europe, including those defined in the paper. The territory between the Baltic, the Adriatic, and the Black Seas seems to have been particularly diverse, as it might include places with low levels of patriarchy (like the western and northern parts of historical Poland), or places with moderate to even high levels of patriarchy (such as the many locations across Hungary, Slovakia, and Romania). In fact, historical Poland-Lithuania (once encompassing Poland, Lithuania, Belarus and much of the Ukraine) is the only historical region for which we found a combination of high-to- low patriarchy intensities. These features of the country's "patriarchal profile" strengthen assertions made elsewhere that, relative to the family organization patterns across Europe, the patterns found in Poland-Lithuania were of a transitory, intermediate nature (Szołtysek, 2015b). In addition, Germany with the combination of very low, low, and medium degrees of patriarchy, was also found to have been very diverse.

Furthermore, the observed distributions of patriarchy do not necessarily comply with corresponding patterning of three main types of family systems (neolocal nuclear; patrilocal-stem; patrilocal-joint) commonly attributed to the European past. While it has been argued that gender structural bias generally informs the three main types of family systems in contingent fashion, being most pronounced in joint family systems and minimal in conjugal family systems, with stem family systems as intermediate (Skinner, 1997, p. 58-60), we find the family-patriarchy relationship to be more complex. For example, regions with prevailing conjugal-neolocal model of family (like northern France and Romania) may still be distinguished by their low *versus* medium patriarchy; Norwegian and Westphalian stem-families would also score differently on the patriarchal scale, and the same applies to the comparison between East-central European joint-family regions in Latvia, central Ukraine and Slovakia (Szołtysek et al., 2016).

[9] Such spatial pattern only partially converges with Reher's famous north-south delineation of intergenerational family solidarity patterns in western Europe (Reher, 1998).

Finally, our data do not support a usual "vernacular" story purporting that 'once upon a time there was a traditional stark patriarchy in Europe' which tended to diminish once societies or regional populations have started to develop and 'modernize'. While caution is required when approaching pooled cross-sections included in Figure 3, these data suggest that societies and regional populations alike were not fully commensurable and did not move along the one line of progress as regards their patriarchal traits. While it might be argued that one of the reasons for the relatively low levels of patriarchy in much of Great Britain might be attributed to the late time period of its data, data from other regions do not support this general tenet. The earliest data from Scandinavia had either equally low patriarchy levels, or even lower as those from the late nineteenth-century; early 19th century data from Germany were scoring not much worse on the patriarchal scale than those from the end of the century; and Eastern localities, though underrepresented in later periods, do not show any clear signs of moderation in their patriarchy levels with the passage of time. Finally, early twentieth-century Albania was strikingly more patriarchal than several populations of the Balkan area from hundred or more years earlier.

The Patriarchy Index and other gender inequality measures

Before endorsing the comparative advantages of the index based on Mosaic and NAPP data, four potential caveats (or misconceptions) regarding its relevance for wider historical inequality studies need to be addressed.

First, like all quantitative, indexed measures of inequality, our own European approach to patriarchy is subject to the criticism of failing to capture the true complexity of the concepts it purports to measure. However, a fundamental issue in the use of historical statistics has always been the problematic relationship between what one wants to measure theoretically and the data series available for construction of empirical indicators. While the Index inevitably implies a reduction of 'patriarchy's' internal intricacies to a set of quantifiable characteristics, this is the only way to go if spatially sensitive descriptions of historical gender and generational indicators are to be generated on the large scale. While many existing indices are based on available pre-aggregated information, the advantage of the index based on census microdata lies in the possibility for creating new variables, thus covering new dimensions of inequality.

Still, if "sex- and age-related social inequality" is to be defined as the departure from parity in the representation of women and men and/or young and old in key dimensions of social life such as health, politics, economics, labor, and family (see; Young et al., 1994, p.

57, 59)[10], then the PI covers explicitly only the latter of them, which puts certain limits on its exploratory power. While the Index' good anchorage in the familial /domestic sphere that was considered crucial for the production of systematic forms of gender and generational biases is clearly advantageous, our results should be confronted with patriarchy research based on other sources and covering other spheres, providing such a research would ever become compiled on a larger scale.

Thirdly, it has to be remembered, that unlike most existing social science indicators of sex discrimination, the PI does not solely indicate gender differences (or women's status), but merges the gender dimension with that of the seniority. While this offers a more encompassing approach to multidimensionality of empowerment and agency (especially in the light of the predicted pairing of the two dimensions; see Narayan, 2006, p. 74-75), it may also present a comparative disadvantage because of difficulties involved in comparing the Index with other – primarily *gender* laden – measures.

Finally, it needs to be recognized that because the Index marks the situation of women, the aged and the young in terms of their attainment of some socially valued resources (or positions) without measuring the position of these groups to some normative standards or reference categories, it represents the absolute, not relative measure of gender- and age-inequality (see Johnston, 1985, esp. 233 ff; Young et al., 1994, p. 57-58)[11]. This property of our measure must be kept in mind while attempting comparisons with exact indicators of inequalities, be it gender or age-related.

Give these ambiguities, it might be interesting to check to what extent our regional patriarchy estimates overlap with some more comprehensively derived accounts of gender and/or age related inequalities at a large scale. To this end, we find it particularly useful to test the association of the Index with a composite measure developed by Carmichael which provides a general picture of how the interplay between the various features of the family system as they relate to the position of women looks on selected European spots. Carmichael's measure, known as 'Girl Friendliness Index' (GFI), gives a sense of how gender friendly each society was based on the various components of its family system, these being inheritance patterns, domestic organization, the prevalence of cousin marriage, post-marital residence and the extent of monogamy (Carmichael, 2014, p. 187-189). While some of these

[10] Elsewhere they talk about 'the unequal representation of women and men in valued social positions' (Young et al., 1994, p. 57).

[11] For the sake of clarity, it has to be noted that two of the Index' components (panel 'Son preference') do represent measures of women's situation relative to men. However, the majority of our components are relative, not a ratio measures.

measures correspond at least vaguely to our own components of the IP, they were derived in a different manner by utilizing ethnographic information from both Murdock and Todd, which was then averaged at the country level[12].

A quick check of Carmichael's results against our own, averaged at the country level, can be visually judged by means of two scatterplots below. Because our own results are only available for a limited number of European countries, so the scatterplot above has to be approached with caution.

Figure 5 somewhere here

This correlation, although for a small number of cases, shows that there is indeed a moderate negative relationship between the ethnographic measures captured in the GFI and the PI. In view of the very different data sources and estimation methodologies behind the two measures, a moderate correlation between the indices definitely merits attention[13].

A more interesting question that could be posed based on this sort of data is whether the combination of various historical family-related institutions and societal mechanisms as revealed by the PI might be positively associated with measures capturing gender inequalities today. With all the caveats in mind[14], one way to answer this question would be to inspect a similar scatterplot between the country score on the historical patriarchy levels and the so-called Historical Gender Equality Index (Dilli et al., 2014), one of the most recent methodological innovations in the measurement of gender inequalities worldwide[15].

Figure 6 somewhere here

[12] The exact methodology for matching these two sources is explained in Rijpma and Carmichael (2016), and Bolt (2012). Todd's data is most detailed for Europe, while it is the least detailed in Murdock's data. While only a quarter of Murdock's data covers the pre-1890 period, Todd claims his data captures pre-industrial conditions (Todd, 1985).

[13] According to Carmichael, Spain has been equally 'girl friendly' as Great Britain, whereas they differ substantially in their patriarchy levels; Iceland and Albania, i.e. countries almost at the extremes of patriarchal scales, are considered equal according to GFI.

[14] Here, we are exclusively interested in a diagnostic dimension of the relationship, without positing any explicit causal links between past and present. If the varying historical patriarchy levels influenced contemporary gender inequalities in any detectable way, they did so in a path-dependent manner, a proper testing of which would have to face a problem of reverse causality and time-varying covariates.

[15] This measure aims to capture gaps between the genders rather than absolute levels of achievement, and in particular seeks to capture those results which stem from the unequal treatment of women. The HGEI captures gender differences in life expectancy, labour force participation, infant mortality, educational attainment, marriage ages, and political participation. We have decided to use HGEI data from decade 2000, since they are the most complete ones. We thank S. Carmichael and A. Rijpma for sharing their data with us.

Again, there is a substantial negative relationship between the two measures, with countries which score high on the historical patriarchy scale also scaling low in the present day gender equality. Even without positing explicit claims as to lasting impact of historical patterns of the age and sex-biases on gender equalities/inequalities today, the observed association between the two measures is an important finding pointing out a potential relevance of the Index for contemporary social sciences.

Predicting patriarchy

Why do some societies reveal higher levels of patriarchy, and others lower? Answering this question presents a formidable task, especially given an inherent difficulty in acquiring comprehensive information on potential predictors from the surviving body of historical statistics[16]. What follows, then, presents anything but just a provisional picture circumscribed but a variety of caveats, and subject to change.

Our analytical strategy is straightforward. The unit of analysis were the 266 regional populations for which the Patriarchy Index (our dependent variable), along with a set of covariates which strive to capture the broad variation in historical human capital levels and living standards, as well in agriculture and institutional framework, have been computed[17].

To control for the variation in historical human capital levels, for each of the regional populations we computed *numeracy* expressed by a tendency to round self-reported ages in the census. The Spoorenberg's Index (W_{tot}) was used instead of other measures of age heaping (such as Whipple's or ABCC indexes) in order to account for all types of digit preference in our data, not only those related to rounding on 0 or 5 (Spoorenberg, 2007). A rich economic history literature has shown numeracy to be a good proxy for basic education (incl. the spread of literacy), especially in preindustrial times, and thus a meaningful indicator

[16] Referring to medieval England, Bennett (2007, 78) suggested that "patriarchy was an effect of many institutions", but has not specified their potential effects any further. Therborn, speaking of 'de-patriarchalization' referred to historical legislation changes, proletarianization, and wider processes of urbanization and industrialization as possible primary causal factors (2004, 17-22; similarly Moghadam, 1992; Mann 1986). According to Rahman and Rao (2004), key determinants of female inequity were cultural norms (esp. regarding kinship), economic conditions, and state policies and legislation. Alesina is currently the best known proponent of the view according to which traditional agricultural practices influenced the historical gender division of labor and the evolution of gender norms (Alesina et al., 2013), though the origins of this hypothesis go back to Boserup (1970).

[17] T*he rules of descent* (Murdock, 1949, p. 15, 43-46; Goody 1961; Levinson ad Malone 1980, 99-112), yet another potential determinant of patriarchy, has not been considered here because some of the IP components seem to be strongly related (if not epiphenomenal) to prevailing descent rules (DESCENT was strongly and positively correlated with patriarchy in all regression models we have tried). Another reason to not include this variable was the sharp multicollinearity between DESCENT and some regional dummies (see below).

for human capital (Baten and Tollnek, 2016). Since W_{tot} measures the extent of 'anti-numeracy', we expect a positive relationship between this variable and patriarchy.

We used the child-woman ratio (the ratio of living children under the age of five to the number of women between the ages 15 and 49, multiplied by 1000; see Willingan and Lynch, 1982, 102-104) and the proportion of the elderly (65+) in each regional population as the crude approximations of living standards (Rosset 1964, 209-210, 231) and the quality of surveying institutions. We assumed their negative relationship with the dependent variable[18]. To control for potentially 'de-patriarchalizing' factors associated with urban industrial life, the proportion of rural population was computed for each region. Finally, regions were distinguished based on whether their populations were subjected serfdom or not, assuming three possible channels through which the latter could increase the patriarchal bias among our regions. First, serfdom was thought to have encouraged the formation of complex family structures (which, overall, tended to be more patriarchal than more streamlined family types) (Alderson and Sanderson 1991). Furthermore, given the needs of upholding rigid social control among the subject peasantry, serfdom (especially in its Russian version) provided conditions under which the authority of the household *patriarchs* (usually the eldest males) was institutionally endowed by the seigniors (Hoch 1986). Finally, because of its heavy reliance on coerced labor with draught animals (*corvee*), serfdom created structural conditions acute to devaluation of the female labor, thus having potentially negative impact on women's status and agency (Szołtysek, 2015b, vol. 1., p. 484; Alesina et al., 2013).

Since variables not considered may still exist and could affect the dependent variable directly or even affect both dependent and independent variables, we added regional dummies to control for the effect of omitted regional characteristics such as efficiency of bureaucracy, the role of labor markets, legal systems, etc. The regional dummies (REGIONS) are Germany, West, Britain, Scandinavia, East, Habsburg lands and the Balkans. Finally, our regional populations were classified according to the date of census taking, i.e. as 'pre-1800' (a reference category), '1800-1850', and 'after 1850'. Based on the general wisdom of sociological and historical literature (Therborn, 2004), we expect patriarchy levels to decrease in time.

Due to limitations in the available variables, the regression models should not be interpreted as attempts to establish causality. Our usage of the OLS regression is bound to

[18] Our interpretation of CWR is not a typical one. Scholars have generally argued that, other things being equal, patriarchy tend to increase fertility (Dyson and Moore 1983). However, as a net fertility measure (the number of surviving births from the five years prior to the reference date), CWR is highly sensitive to 1) (variations) in child and infant mortality, and 2) underregistration of infants and young children (Gauvreau et al., 2000).

control for the effects of a broad variation in institutional and socioeconomic framework, and not to assess the statistical significance of each independent variable. The primary purpose of the regression is to evaluate the level of patriarchy in each census sample and to assess systematically whether the patriarchy level in each region is high or low, given the institutional and socioeconomic circumstances accounted for. Furthermore, we use the regression to predict patriarchy across Mosaic and NAPP data. These predicted levels can then be compared with the actual strength of patriarchy in each region, allowing to gauge whether a given population has higher or lower patriarchal bias than would be expected on the basis of that population's institutional and socioeconomic characteristics.

Table 5 shows the results of OLS regressions of the PI by region on the variables discussed above. Altogether, three ordinary least-squares (OLS) models were run, each time using weights for seven broad regional clusters of the data (REGIONS). The first model includes numeracy as our proxy for the human capital level, the second model takes into account selected historical institutional, demographic and socioeconomic factors, and the third model also includes regional dummies (with Germany as the reference category) and time-period controls (reference category 'before 1800')[19]. In the all model the VIF-values are much below the threshold considered posing a serious problem with collinearity (equal or above 10).

Numeracy turned out to be an important predictor of patriarchy. Populations with higher numeracy levels (i.e., those with lower levels of W_{tot}) tended to have on average lower levels of patriarchy. While this predictor retains a significant positive relationship with patriarchy across all models, other independent variables have more modest effects. Our indicators of living standards (the child-woman ratio and the proportion of elderly) are significant only in the second model and – as anticipated – they are related to lower patriarchy levels. The importance of those both variables diminish in the last model in which the spatial and temporal distribution of our populations is taken into account. At the same time 'rurality' tends to be associated with the higher patriarchy although its impact is significant only in the final model. Serfdom, on the other hand, had mixed and insignificant effect on the IP. This lack of impact could be attributed to the interaction between serfdom and other variables since, according to the literature, populations with serfdom tend to have lower levels of both human capital and the standard of living.

[19] To check the robustness of the findings robust regression models with MM-estimation (Andersen 2008), and with weights for regions, have been estimated, which yielded very similar results.

Control variables included in the full model indicate that, other things being equal, Britain had considerably lower levels of patriarchy compared to German lands, while patriarchy levels in both Western and Eastern Europe, as well as in the Habsburg land and Balkans tended to be significantly higher. These effects held constant when the impact of time period is taken into account. Although the observation that the populations from the period after 1850 have significantly higher patriarchy levels is quite baffling and contrary to the expectations, its impact must be interpreted in the context of the temporal distribution of studied populations. The observations from Balkans usually characterized by high patriarchy represent mostly the later period. Most importantly, although controlling factors reduce the influence of the human capital proxy compared with basic models, numeracy continue to have significant effects (and in the predicted direction) on patriarchy levels.

To further investigate the spatial fit of our full model, we plotted the predicted and observed values in a graph in order to determine the extent to which outliers are clustered in certain regions.

Figure 7 somewhere here

In the graph, most regions cluster rather closely around the diagonal line, underscoring the finding that a few simple institutional and socioeconomic indicators effectively predict a large share of variation in the patriarchy levels. Generally, no particular regional outliers can be discerned, and the regions' constituent populations spread rather equally on both sides of the diagonal. Though Mosaic populations display relatively larger variation (they tend to fall below and above the diagonal more significantly than the NAPP data), they do so symmetrically. This is understandable given a generally greater dispersion of Mosaic data across time and space.

Conclusions

This study sought to move the analysis of historical gender inequalities beyond its usual confines of a one-dimensional focus on sex-stratification/discrimination. It suggested a historical inequality measure that combines both *patria potestas* and *manus mariti*, i.e. both fatherly and husbandly power, along with other dimensions in a composite manner. First, it demonstrates that using historical data with limited but massively available information, it is possible to construct variables which provide for measuring gender and generational relations in the past on a European scale. Secondly, by providing localised indicators combining both gender and age relations, the Index allowed to better account for the historical cross-cutting of

gender bias with other forms of discrimination. This, we believe, enhances both the historical reconstruction of different dynamics of power in preindustrial Europe, as well as the current body of historical statistics on cross-societal inequalities.

Applying the new composite indexed measure to census microdata provided the first account of the regional prevalence of gender- and age-based authority patterns across regional populations of historic Europe. It showed that the complex societies of (western) Eurasia (Goody, 1976), have themselves differed significantly in terms of authority and status accrued to females, as well as in their seniority patterns. The spatial contours of this variation do not necessarily comply with corresponding spatial patterning of main types of historical family systems, making a space for further fruitful explorations of family historians.

That the predictive relationship of the Patriarchy Index with measures of the contemporary gender inequality has been confirmed supports the findings of an increasing number of studies pointing out the impact of historical conditions, structures and institutions on contemporary disparities in development, well-being, and wealth (e.g. Nunn, 2009). It also reiterates the importance of family and household as historically crucial sites for generating societal inequalities (Alesina et al., 2013; Todd, 1985). The patterning of the many elements of power relations and agency contained in the Index, and their spatial contours, alert us that the major variations in the "intensity" of gender and generational biases may be critical to the analysis of historic cross-country differentials in fertility, social mobility, human capital formation, and parental control (Szołtysek et al., 2016b). Future, contextually anchored studies should be able to assess whether what is at stake here are not only stronger or weaker variants of one patriarchal system, but rather significantly different patriarchal systems in the European past, particularly as they have interacted with various family, demographic, and socioeconomic systems.

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Word count: 8866

Tables and figures

Table 1: Data used for analysis:

census	regions	N (=pop.)
Mosaic data:		
Albania, 1918 census	8 rural regions, 6 cities	140,611
Austria-Hungary, 1869 census	9 rural regions from Hungary, Romania, Slovakia	31,406
Austria-Hungary, 1910 census	3 rural regions and 1 city from Austria	20,036
Belgium 1814 census	1 rural region from Western Flanders	13,666
Bulgaria, 1877-1947 household registers	1 rural region and 1 city from the Rhodope area	8,373
Dubrovnik, 1674 status animarum	1 rural region from Dalmatia	1,880
Denmark, 1803 census	9 rural regions and 2 urban regions from Schleswig and Holstein	107,861
France, 1846 census	3 rural regions	16,967
France, 1831-1901 census	1 rural region from South-Western France	5,109
France, 1846-1856 census	1 city from South-Western France	5,669
German Customs Union, 1846 census	10 rural regions and 4 urban regions	36,760
German Customs Union, 1858 census	1 rural region from the East	3,468
German Customs Union, 1861 census	1 rural region from the Southwest	6,541
German Customs Union, 1867 census	4 rural regions and 1 city in Mecklenburg-Schwerin	66,938
Germany, 1900 census	1 city	55,705
Mecklenburg-Schwerin, 1819 census	3 rural regions and 1 city	37,332
Münster, around 1700 status animarum	3 rural regions in North-Western Germany	23,010
Münster, 1749 status animarum	3 rural regions in North-Western Germany	34,169
Netherlands, census 1810-1811	2 rural regions and 3 cities in the south	40,037
Poland-Lithuania, 1768-1804 listings	12 rural regions	155,818
Moldavia, 1781-1879 status animarum	2 rural regions	5,291
Wallachia, 1838 census	4 rural regions	21,546
Russia, 1795 revision lists	1 rural region in Ukraine	8,050
Russia, 1814 private enumeration	1 region in Central Russia	2,955
Russia, 1847 enumeration	2 rural regions in Lithuania and Belarus	19,917
Russia, 1897 census	1 rural region around Moscow	11,559
Serbia, 1863 census	1 rural region and 1 city	9,746
Serbia, 1884 census	1 rural region	9,434
Spain, 1880-1890 local census	1 rural and 2 urban regions in Catalonia	23,997
Ottoman Empire, 1885 census	Istanbul	3,408
Ottoman Empire, 1907 census	Istanbul	4,946
Mosaic data overall	115 regions (89 rural and 26 urban)	932,205
NAPP data		
Denmark, 1787 census (100%)	21 regions	838,623
Iceland, 1703 census (100%)	1 region	51,003
Norway, 1801 census (100%)	19 regions	878,073
Sweden, 1880 census (100%)	24 regions	4,624,825
United Kingdom, 1881 census:		

England (10% sample)	76 regions	2,926,374
Wales (10% sample)	13 regions	1,573,065
Scotland (10% sample)	32 regions	2,783,354
Islands (10% sample)	3 regions	139,614
NAPP data overall	151 regions	14,252,150

Figure 1: Spatial distribution of Mosaic and NAPP data by major territorial groupings

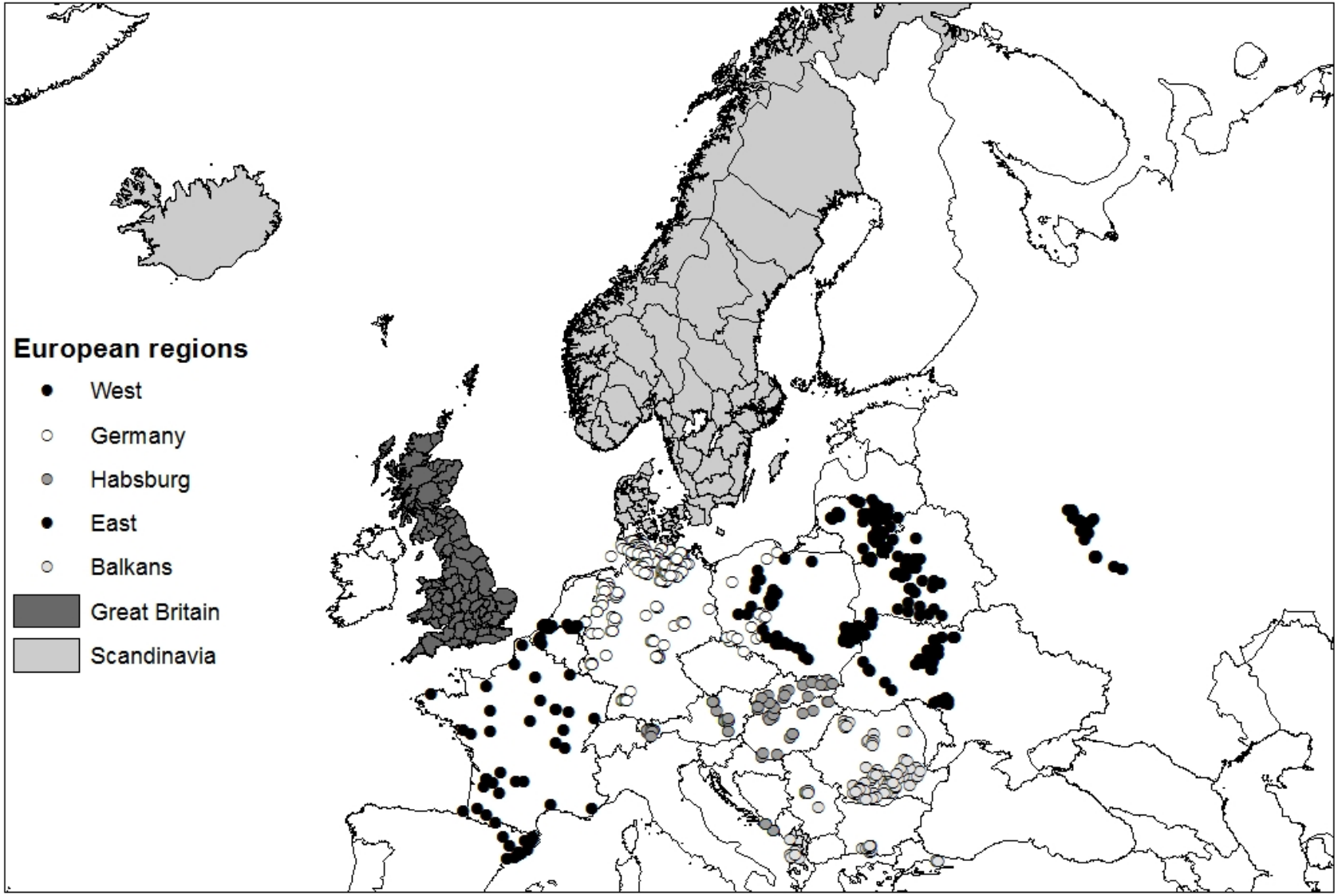


Table 2: Components of the Patriarchy Index

Domain/ component	Component	Abbreviation	Definition/measurement	Relationship with patriarchy	Specification
Male domination	Proportion of female household heads	*Female heads*	the proportion of all female household heads among all adult (20+ years) household heads of family households	negative	age-standardized
	Proportion of young brides	*Young brides*	the proportion of ever-married women in the age group 15-19 years	positive	
	Proportion of wives who are older than their husbands	*Older wives*	the proportion of all of the wives who are older than their husbands among all of the couples for whom the ages of both partners are known	negative	age-standardized
	Proportion of young women living as non-kin	*Female non-kin*	the proportion of women aged 20-34 years who live as non-kin, usually as lodgers or servants	negative	age-standardized
Generational domination	Proportion of elderly men coresiding with a younger household head	*Younger household head*	the proportion of elderly men (aged 65+ years) living in a household headed by a male household head of a younger generation	negative	Only family households;the elderly men must be relatives of the household head
	Proportion of neolocal residence among young men	*Neolocal*	the proportion of ever-married household heads among ever-married men in the age group 20-29 years	negative	only family households; age-standardized
	Proportion of elderly people living with lateral relatives	*Lateral*	the proportion of elderly people (aged 65+ years) living with at least one lateral relative in the household	positive	Only family households
Patrilocality	Proportion of elderly people living with married daughters	*Married daughter*	the proportion of elderly people (aged 65+ years) living with at least one married daughter in the same household among those elderly people who live with at least one married child in the same household	negative	Only family households
Son preference	Proportion of boys among the last child	*Boy as last child*	the proportion of boys among the last children (if the last child is one of a set of siblings of both sexes, he or she will be excluded from the analysis).	positive	only children of household heads; only age group 10 to 14 years; family households
	Sex ratio of youngest age group	*Sex ratio*	the sex ratio (boys to 100 girls) in the youngest age group (0-4 years old).	positive	Only family households

Table 3: Descriptive statistics for the components of the Patriarchy Index (266 regions of Europe)

Component	**Mean**	**Standard deviation**	**Minimum**	**Maximum**
Female household heads	0.13	0.06	0.01	0.31
Young brides	0.06	0.11	0.00	0.66
Older wives	0.22	0.08	0.01	0.37
Female non-kin	0.21	0.12	0.0	0.57
Younger household head	0.13	0.11	0.00	0.68
Neolocal	0.60	0.23	0.03	0.97
Lateral	0.14	0.12	0.00	0.73
Married daughter	0.35	0.20	0.00	0.80
Boy as last child	0.50	0.05	0.34	0.81
Sex ratio	101.9	7.8	81.8	137.3

Source: Mosaic/NAPP projects.

Figure 2: Scatterplot of Male Domination Index and Older Generation Domination Index

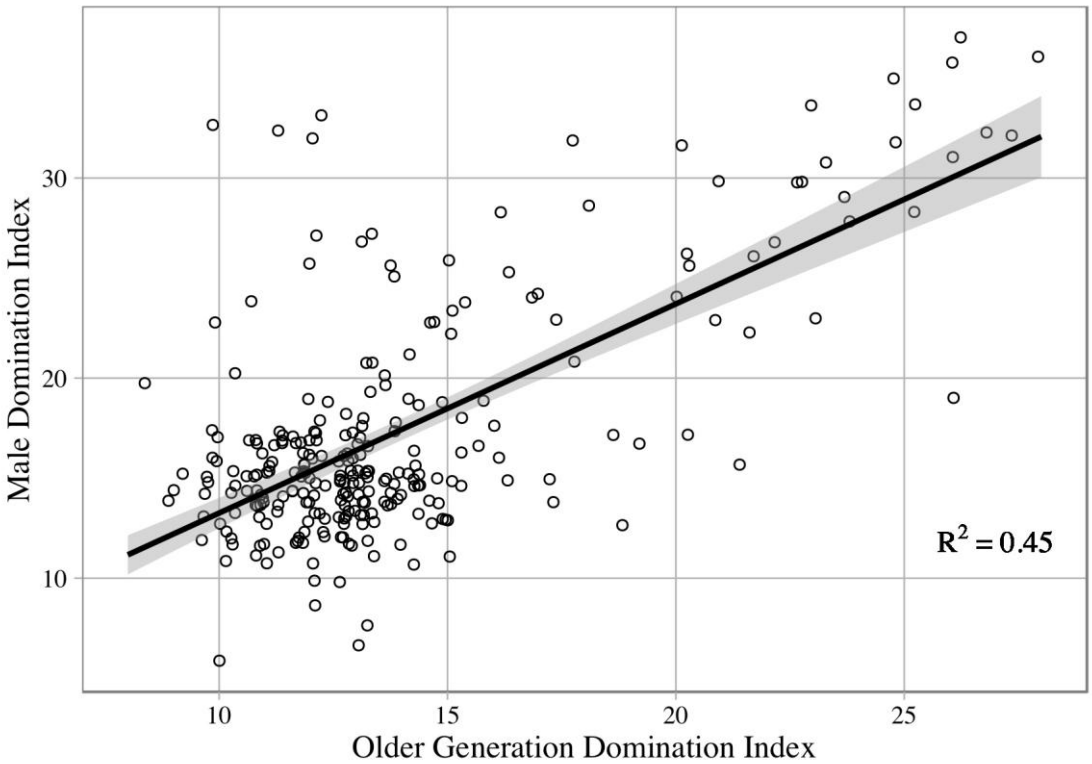


Table 4: Levels of patriarchy

	Patriarchy Index	Mosaic regions	NAPP regions	All regions
Very low	0 – 10	4	19	23
Low	11 – 16	44	126	170
Medium	17 – 23	46	6	52
High	24 – 29	16	0	16
Very high	30 – 40	5	0	5
		115	151	266

Figure 3: Regional values of the Patriarchy Index by time period and macro-geographical membership

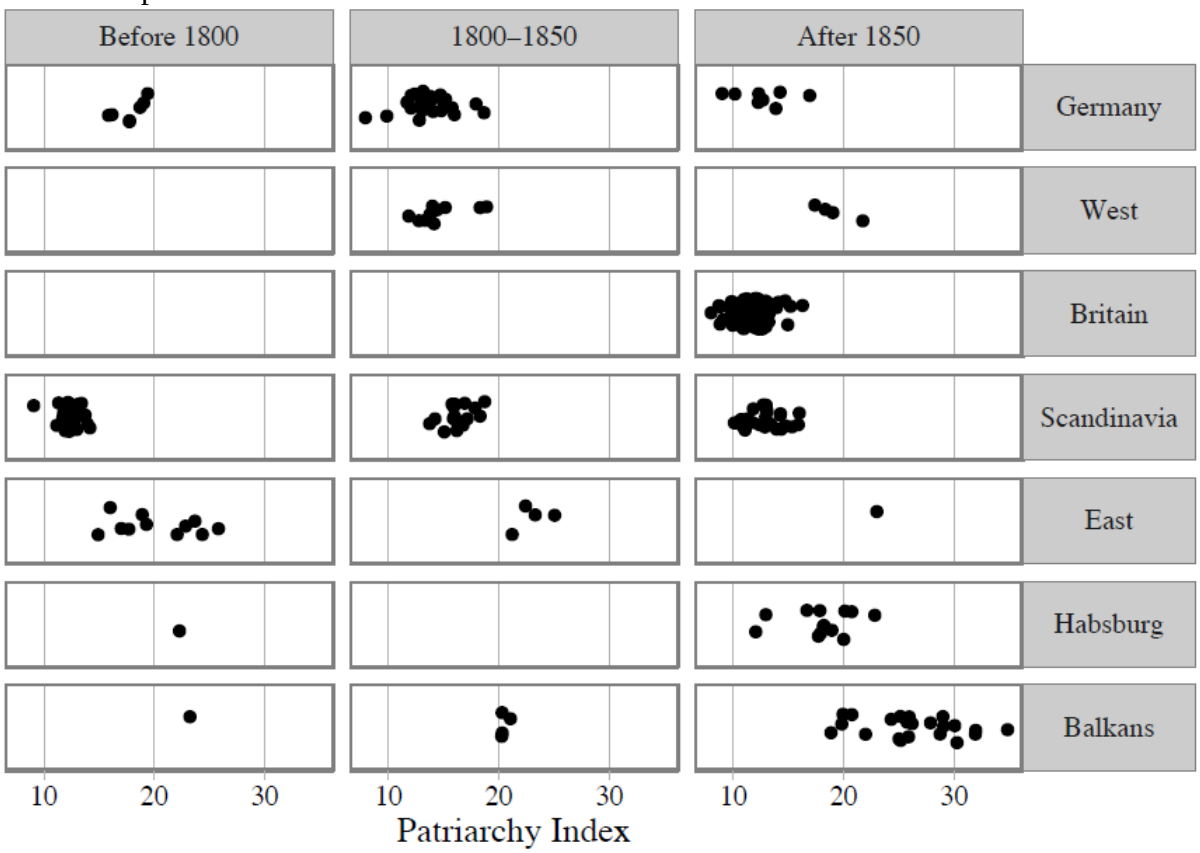


Figure 4: Spatial distribution of the Patriarchy Index

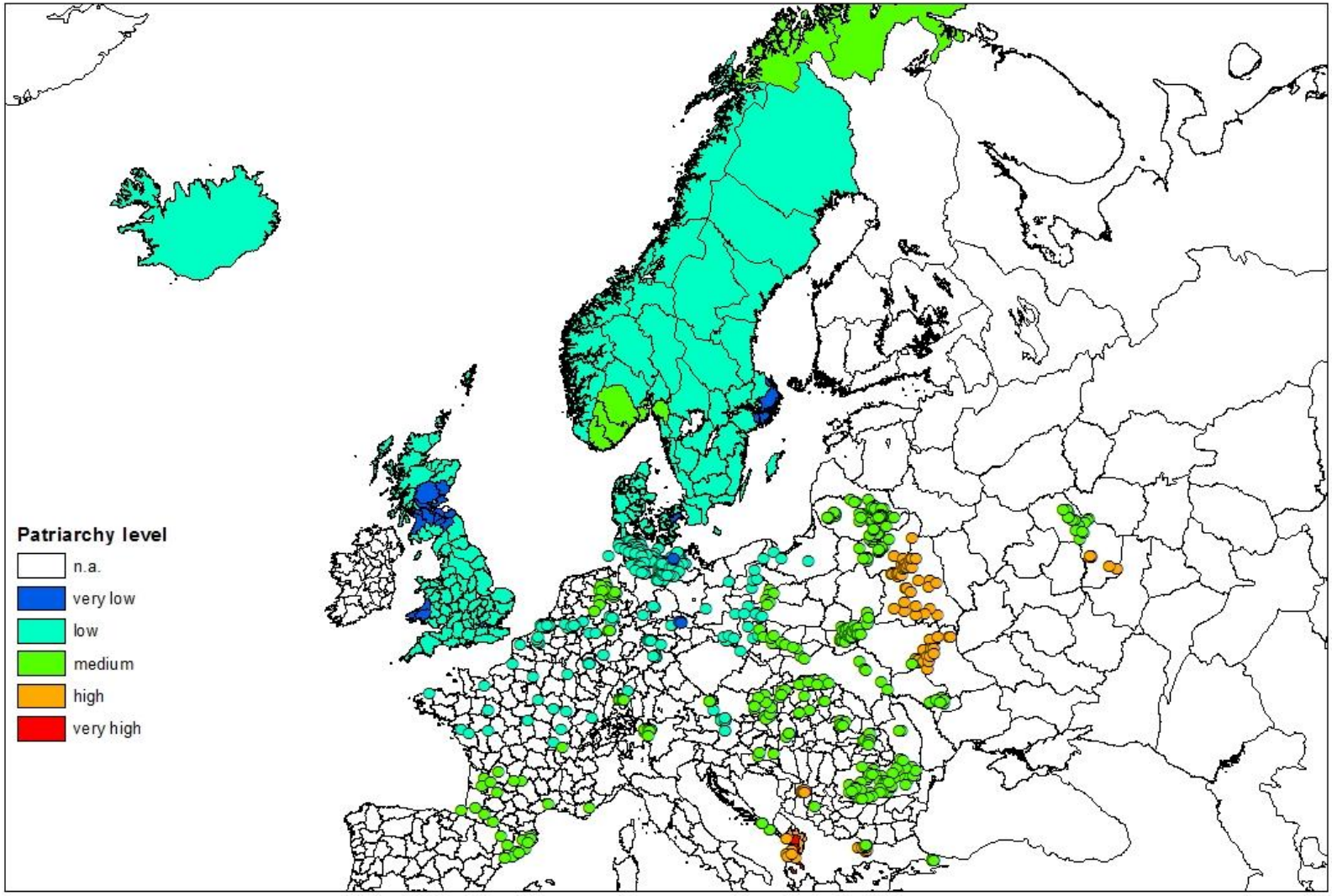


Figure 5: Relationship between the PI and Girl Friendliness Index (Carmichael 2014) for combined Mosaic/NAPP data

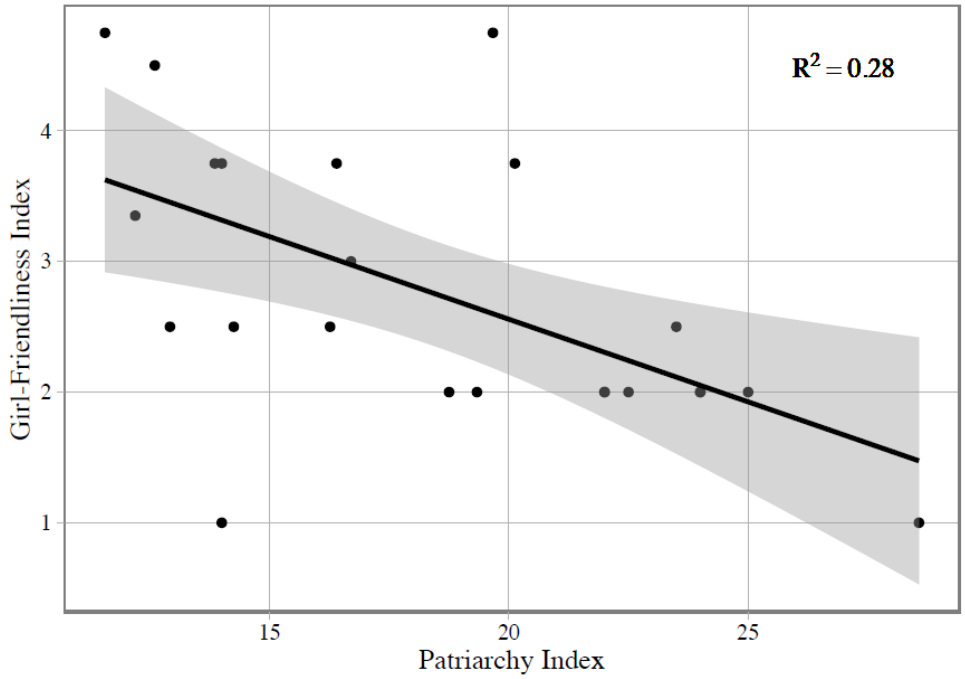


Figure 6: Relationship between the PI and Historical Gender Equality Index for 2000 (Carmichael), for combined Mosaic/NAPP data

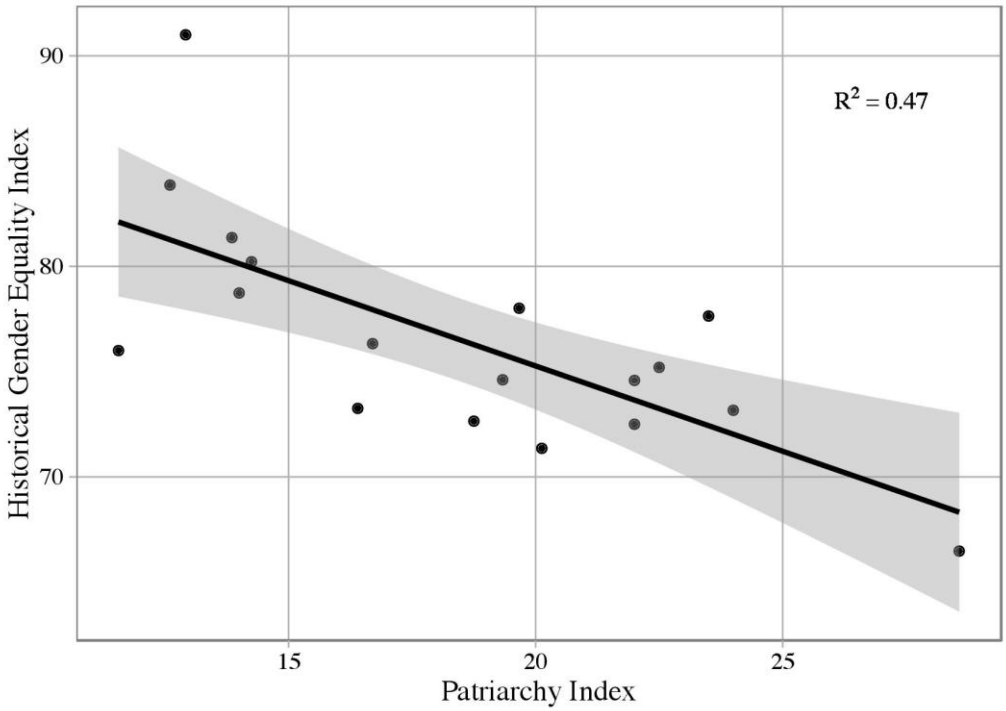


Table 5: Regression results

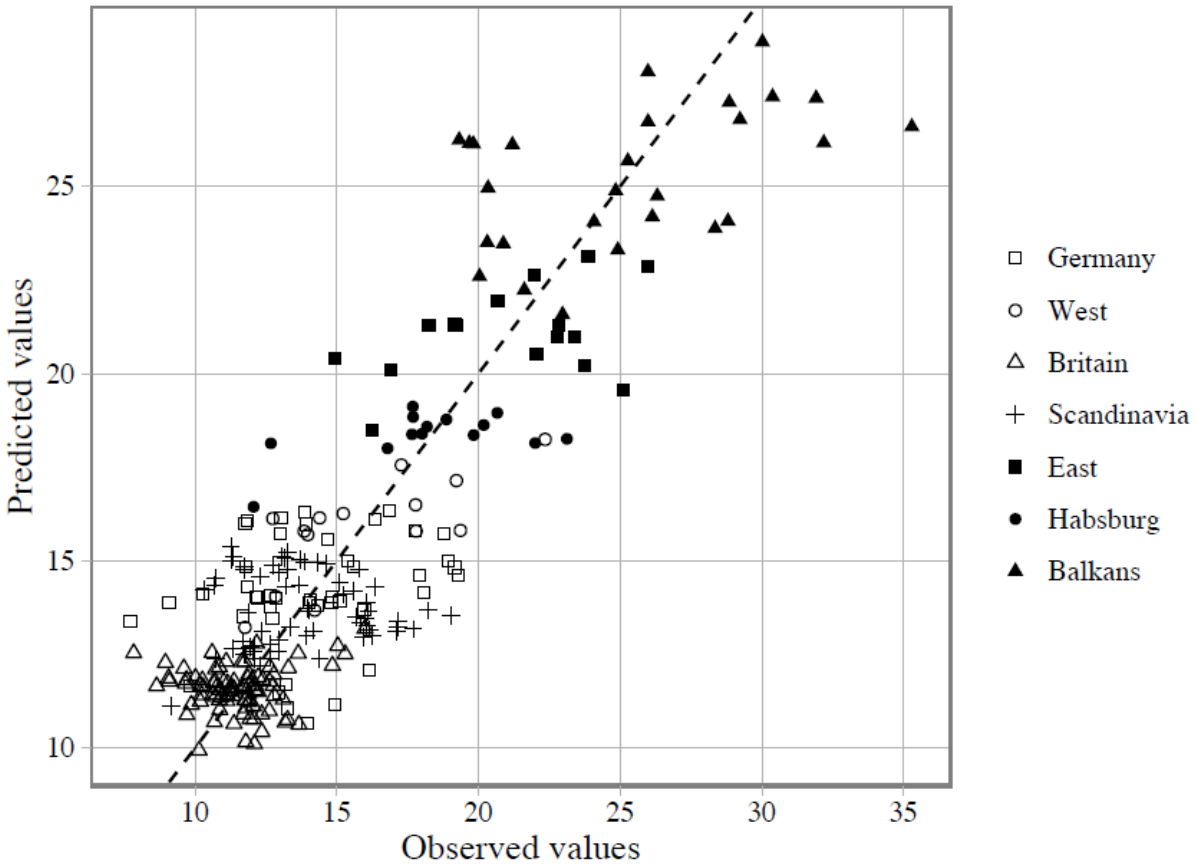
	Model 1				Model 2				Model 3				
	B	SE B	std. Beta	t	B	SE B	std. Beta	t	B	SE B	std. Beta	t	VIF
(Intercept)	13.24	0.36		35.963***	19.97	1.69		11.817***	11.89	1.38		8.577***	
Wtot	1.44	0.10	0.6	14.186***	1.51	0.12	0.63	12.482***	0.51	0.12	0.22	4.230***	3.140
Child-Woman Ratio					-0.01	0.00	-0.14	-2.650**	-0.00	0.00	-0.08	-1.871	2.093
Proportion of Elderly					-0.63	0.15	-0.22	-4.239***	0.04	0.12	0.01	0.317	1.967
Proportion of Rural Population					0.02	0.71	0.01	0.034	2.59	0.55	0.16	4.715***	1.404
Serfdom					-0.79	0.84	-0.04	-0.944	1.55	1.03	0.08	1.496	4.600
Period 1800-1850									0.43	0.60	0.04	0.718	2.719
Period after 1850									2.80	0.67	0.28	4.156***	4.080
West									2.01	0.65	0.09	3.089**	1.865
Britain									-4.26	0.81	-0.40	-5.227***	2.926
Scandinavia									-0.67	0.68	-0.06	-0.981	2.066
East									4.56	1.08	0.22	4.201***	5.179
Habsburg									2.14	0.78	0.10	2.737**	2.694
Balkans									8.52	0.93	0.52	9.126***	3.837
Observations	266				266				266				
R^2 / adj. R^2	.432 / .430				.475 / .465				.750 / .737				
F-statistics	201.249***				47.156***				58.192***				
AIC	1558.09				1545.129				1363.933				

* $P \leq 0.05$

** $P \leq 0.01$

*** $P \leq 0.001$

Figure 7: Observed and predicted patriarchy levels (Mosaic and NAPP data)



Online appendix: References to the data and the maps

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Maps:
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Footnote on the first page of the publication:
[1]The maps used in this publication are partly based on the following source: © EuroGeographics for the administrative boundaries.