Polygyny, Inequality, and Social Unrest*

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Abstract

This paper proposes three theoretical mechanisms through which polygyny may be related to social unrest. The mechanisms are related to different dimensions of grievance-inducing and, partly, greed-related inequality, which may occur in polygynous societies. These dimensions include (i) economic, reproductive and social inequality resulting in relative deprivation among non-elite men; (ii) inequality within elites when it comes to the distribution of resources and inheritance, both related to the relative position of dependent family members in a clan; and (iii) gender inequality in general. Using data for 41 African countries from 1990-2014, we provide evidence for these mechanisms and their relationship to social unrest. We find that the first and third dimension of inequality are especially correlated with social unrest. Furthermore, we consider several potential counterarguments but do not find support for them.

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Plural marriage, bred of inequality, begets violence

(The Economist, Dec 19, 2017)

1. Introduction

Polygyny, i.e., the practice of one man being married to more than one wife at the same time[1], is a surprisingly common phenomenon. According to WomanStats, it is practiced in 89 countries worldwide, at least by minority groups of the population. In 50 of these 89 countries, five percent or more of women live in a polygynous marriage.

Previous research has linked polygyny with violence and conflict, e.g., by attributing the onset of armed conflict and civil war to the existence of polygyny. The respective contributions share a common reasoning: because of polygyny, only some men can marry, while others cannot. Hudson and Matfess[2] argue that the tightening of marriage markets comes with the emergence of bride prices so that poorer families cannot afford marriages for their sons. Consequently, a 'pool of frustrated unmarried men' is created, arguably willing to attack other groups so that (large-scale internal) conflict[3] or intergroup violence[4] emerges. Furthermore, these unmarried

[1] The term 'polygyny' is often used synonymously with the superordinate term 'polygamy' that also comprises 'polyandry', i.e., the (rare) practice of a woman marrying more than one husband.

[2] Valerie M. Hudson and Hilary Matfess, "In Plain Sight: The Neglected Linkage between Brideprice and Violent Conflict," *International Security*, Vol. 42, No. 1 (2017), pp. 7-40.

[3] Satoshi Kanazawa, "Evolutionary Psychological Foundations of Civil Wars." *The Journal of Politics*, Vol. 71, No. 1 (2009), pp. 5-34.

[4] Carlos Koos and Clara Neupert-Wentz, "Polygynous Neighbors, Excess Men, and Intergroup Conflict in Rural Africa." *Journal of Conflict Resolution*, Vol. 64, No. 2-3 (2020), pp. 402-431.

men are said to be easily mobilized for organized group violence such as terrorism[5] or rebellions[6], because they are typically young and fall into an age group that is particularly affected by the obstructed marriage markets and at the same time prone to resort to violent behavior, when compared to other age groups[7]. However, the argument of a pool of frustrated

[5] Hudson, Matfess, "In Plain Sight", Jonah Rexer, "The Brides of Boko Haram: Economic Shocks, Marriage Practices, and Insurgency in Nigeria" (2019), unpublished Working Paper available at https://bepp.wharton.upenn.edu/profile/jorexer/ (accessed on June 1, 2021).

[6] Esther Mokuwa, Maarten Voors, Erwin Bulte, and Paul Richards, "Peasant Grievance and Insurgency in Sierra Leone: Judicial Serfdom as a Driver of Conflict." *African Affairs*, Vol. 110, No. 440 (2011), pp. 339-366.

[7] For discussions on young men being particularly affected by marriage market obstructions, see for example Hudson and Matfess, "In Plain Sight," p. 8, Rose McDermott, "The Role of Gender in Political Violence," *Current Opinion in Behavioral Sciences*, Vol. 34 (2020), p. 2, and Rexer, "The Brides of Boko Haram". Koos and Neupert-Wentz, "Polygynous Neighbors," p. 21, follow this argument and focus on men below age 40 in their analysis. Young men may be more prone to the use of violence due to biological reasons, see Rose McDermott, Dominic Johnson, Jonathan Cowden, and Stephen Rosen., "Testosterone and Aggression in a Simulated Crisis Game," *The Annals of the American Academy of Political and Social Science*, Vol. 614, No. 1 (2007), pp. 15-33, Allan Mazur and Joel Michalek, "Marriage, Divorce, and Male Testosterone," *Social Forces*, Vol. 77, No. 1 (1998), pp. 315-330, and Margo Wilson and Martin Daly, "Competitiveness, Risk Taking, and Violence: The Young Male Syndrome," *Ethology and Sociobiology*, Vol. 6, No. 1 (1985), pp. 59-73. Intra-sexual competition with respect to mating resulting in aggressive behavior between men is for example shown by Sarah E. Ainsworth and Jon K. Maner, "Sex Begets Violence: Mating Motives, Social Dominance, and Physical Aggression in Men," *Journal Personality and Social Psychology*, Vol. 103, No. 5 (2012), pp. 819-829. Referring to theories from evolutionary biology, Thayer and Hudson argue that, 'dominance hierarchies' in resource-scarce situations may make violence and violent ideologies appealing for especially young men aiming to increase status in the hierarchy as well as their chances in marriage markets. See Bradley A. Thayer and Valerie M. Hudson., "Sex and the Shaheed: Insights from the Life Sciences on Islamic Suicide Terrorism." *International Security*, Vol. 34, No. 4 (2010), pp. 37-62. Another related argument is the so-called 'youth bulge', i.e., a high share of young people in a society, increasing the risk for violence. See, for example, Henrik Urdal, "A Clash of Generations? Youth Bulges and Political Violence," *International Studies Quarterly*, Vol. 50, No. 3 (2006), pp. 607-662. Others argue that the combination

men—culminating in Kanazawa's claim that polygyny constitutes "the first law of intergroup conflict (civil wars)"[8]—is not undisputed in the literature, e.g., Gleditsch et al.[9] argue that—if at all—gender inequality or misogyny, but not polygyny, explains armed conflict.

This paper argues that a narrow focus on the pool of (mostly young) unmarried men and unequal marriage markets neglects important further mechanisms that may explain how polygyny is linked to instability, social unrest and conflict within societies. Our aim is to provide a comprehensive theory of various types of inequality serving as mediating effects in the polygyny-conflict nexus. Acknowledging that polygyny-related grievances are felt personally in the first place, we turn our attention—in contrast to the existing literature—to small-scale conflict activities where collective action problems ought to play a lesser role. We distinguish four different types of social unrest (violent, non-violent, organized, and spontaneous) that may result from the prevalence of polygyny in a society and test them. We thereby ask whether and how strongly the underlying mechanisms that we propose affect these outcomes.

Theoretical contributions make a strong case that the existence of polygynous marriage institutions in a society raises the potential for conflict, either directly or indirectly. For instance, according to the 'male compromise theory'[10], monogamy became more common only when the

with (economic) circumstances matters: If young cohorts face constrained labor markets, the risk for violent conflict is higher. For example, Thomas Apolte and Lena Gerling, "Youth bulges, Insurrections and labor-market restrictions," *Public Choice*, Vol. 175 (2018), pp. 63-93, or Hannes Weber, "Age Structure and Political Violence: A Reassessment of the "Youth Bulge" Hypothesis," *International Interactions*, Vol. 45, No. 1 (2019), pp. 89-112.

[8] Kanazawa, "Evolutionary Psychological Foundations of Civil Wars," p. 25.

[9] Kristian Skrede Gleditsch, Julian Wucherpfennig, Simon Hug, and Karina Garnes Reigstad, "Polygyny or misogyny? Reexamining the 'First Law of Intergroup Conflict'," *The Journal of Politics*, Vol. 73, No. 1 (2011), pp. 265-270.

[10] Richard D. Alexander, 1987. *The Biology of Moral Systems* (Transaction Publishers, Aldine Transaction, New Brunswick, USA and London, UK, 1987); Laura L. Betzig, *Despotism and Differential Reproduction: A*

power and privileged position of existing polygynous elites were threatened by the rapidly growing frustration among (young) unmarried non-elite men. Others argue that these very frustrations are related to artificially biased sex ratios[11], economic[12], and status concerns[13]. Since polygyny can hamper economic development[14], with low growth rates being strongly positively related to civil conflict[15], there may also be *indirect* channels that explain the positive relationship between polygyny and conflict.

In our own theoretical framework, we focus specifically on norms, traditions and social patterns that are associated with polygyny and may serve as mediating channels to foster social unrest in the first place, but which may also ultimately result in larger-scale conflicts. We argue that polygyny is closely connected to three different forms of mostly grievances-inducing—but to

Darwinian View of History (Transaction Publishers, Aldine Transaction, New Brunswick, USA and London, UK, 1986); Nils-Petter Lagerlöf. "Pacifying Monogamy." *Journal of Economic Growth*, Vol 15, No. 3 (2010), pp. 235-262, and Joseph Henrich, Robert Boyd, and Peter J. Richerson."The Puzzle of Monogamous Marriage." *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, Vol. 367, No. 1589 (2012), pp. 657-669.

[11] Henrich, Boyd, and Richerson, "The Puzzle of Monogamous Marriage" and Rose McDermott, Jonathan Cowden, "Polygyny and Violence Against Women." *Emory Law Journal*, Vol. 64 (2015), pp. 1769-1809.

[12] Gary S. Becker, "A Theory of Marriage: Part II." *Journal of Political Economy*, Vol. 82, No. 2 (1974), pp. S11-S26; and Hanan G. Jacoby, "The Economics of Polygyny in Sub-Saharan Africa: Female Productivity and the Demand for Wives in Côte d'Ivoire." *Journal of Political Economy*, Vol. 103, No. 5 (1995), pp. 938-971.

[13] Betzig, *Despotism and Differential Reproduction*, and Miriam Koktvedgaard Zeitzen, *Polygamy: A cross-cultural analysis* (Berg Publishers 2008).

[14] Michèle Tertilt, "Polygyny, Fertility, and Savings." *Journal of Political Economy*, Vol. 113, No. 6 (2005), pp. 1341-1371 and Michèle Tertilt, "Polygyny, Women's Rights, and Development." *Journal of the European Economic Association*, Vol. 4, No. 2-3 (2006), pp. 523-530.

[15] Edward Miguel, Shanker Satyanath, and Ernest Sergenti. "Economic Shocks and Civil Conflict: An Instrumental Variables Approach." *Journal of Political Economy*, Vol. 112, No. 4 (2004), pp. 725-753.

some degree also greed-based—inequality that potentially threaten the peace and stability of societies:

i. *Vertical inequality between elite and non-elite men*: Polygyny implies a monopolization of women by the (local or ruling) elite. This reinforces both economic inequality and unequal reproductive opportunities for (young) men.

ii. *Horizontal inequality within the polygynous elite*: Members of the polygynous elite (often organized as clans) compete for resources as well as affection on a daily basis. Especially when it comes to inheritance and succession, large polygynous families face the challenge that many (male) heirs exist who may try to (selfishly) secure their share.

iii. *Gender inequality*: While the previous two types of inequality refer mostly to inequality among men, highly patriarchal structures and inequality between sexes make up the core of polygynous family structures.

Despite relatively strong theoretical predictions about the conflict-inducing effect of polygyny, existing empirical evidence is limited to specific channels linking polygyny and conflict or specific local settings. Large-*n* studies sometimes lead to opposite results, such as said contributions by Kanazawa and Gleditsch et al. who cannot agree on whether it is polygyny or misogyny that explains the onset of civil war[16]. Except for Mokuwa et al.[17], who discover a direct conflict effect of polygyny in Sierra Leone, country studies consider the polygyny-conflict nexus at most in passing.

It is, however, possible to arrive at a clearer picture by extending the scope of analysis to variables that are broadly related to both polygyny and conflict. For instance, Hudson and

[16] Kanazawa, "Evolutionary Psychological Foundations of Civil Wars", and Gleditsch et al, "Polygyny or Misogyny?"

[17] Mokuwa et al, "Peasant grievance."

Matfess[18] show that bride prices, which are often an immediate consequence of polygyny, increase violent conflict. Summarizing marriage market obstruction due to polygyny, bride prices or skewed sex ratios with males outnumbering females, Hudson and Hodgson[19] find a positive association with terrorism. Hudson, Bowen, and Nielsen[20] investigate clan governance, where the power of clans is secured by polygynous marriages and its negative effects on state stability and security across societies.

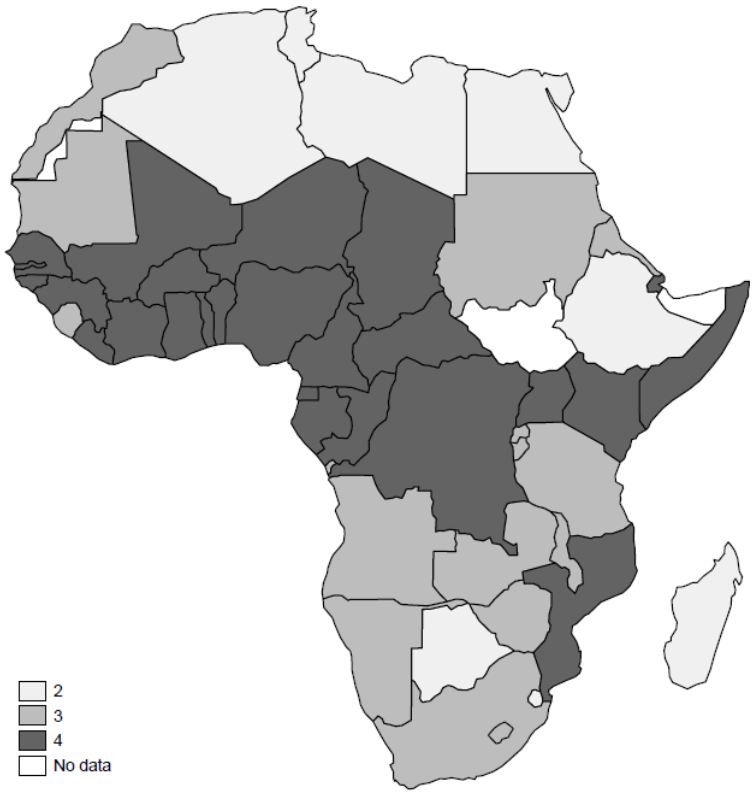
Even if it is not polygyny itself, in all these cases polygyny appears, at the very least, to lay the basis for or significantly contribute to the onset of social unrest and other types of conflict. Nevertheless, neither the underlying theoretical mechanisms nor the empirical evidence are sufficiently well developed to provide a comprehensive perspective on the polygyny-conflict nexus, let alone on the specific linkages between polygyny, inequality and conflict. Our paper will shed light on this nexus by developing a comprehensive theory of these linkages, which we will then put to an empirical test using time-series cross-section data from 41 African countries (see Figure 1 for the prevalence of polygyny in these African countries) for the years 1990-2014.

[18] Hudson and Matfess, "In Plain Sight."

[19] Valerie M. Hudson and Kaylee B. Hodgson, "Sex and Terror: Is the Subordination of Women Associated with the Use of Terror?" *Terrorism and Political Violence* (2020), pp. 1-28. doi: 10.1080/09546553.2020.1724968

[20] Hudson, Valerie M., Donna Lee Bowen, and Perpetua Lynne Nielsen, "Clan Governance and State Stability: The Relationship between Female Subordination and Political Order." *American Political Science Review*, Vol. 109, No. 3 (2015), pp. 535-555.

Figure 1: Polygyny scale 2010, Africa



Notes: Own map using data from WomanStats (PW-Scale), scaled in 2010. A darker color indicates greater prevalence of polygyny, with more than 25% of women in polygynous unions in the highest category.

Next to our theoretical and empirical contributions to the literature, we further add and test a newly compiled measure of horizontal inequality within polygynous families. More specifically, we provide data on inheritance laws and traditions in polygynous societies, which ought to provide substantial insights into the social and economic stratification among wives and potential heirs, arguably fostering within-elite conflict dynamics[21].

To preview our findings, our empirical analysis suggests that medium levels of polygyny, gender inequality and vertical economic inequality are positively associated with both the intensity and incidence of all four types of social unrest under consideration, i.e., (i) violent and

[21] Stanislav Andreski. *The African Predicament* (Michael Joseph, London, 1968).

(ii) non-violent unrest as well as (iii) organized and (iv) spontaneous social unrest. For horizontal inequality, the feasibility of mobilization seems to be particularly important. Countries with higher average incomes and high levels of inequality within polygynous families have a higher probability of experiencing social unrest compared to similar countries without horizontal inequality. The robustness of our results is tested through alternative and complementary hypotheses such as strategic behavior of elites, population growth that relaxes tight marriage markets, and an excess of male deaths that could possibly be balanced by polygynous marriages.

The remainder of the paper is organized as follows. Section 2 develops our theoretical argument and introduces three types of inequality that are related to polygyny. We elaborate on the linkages between these inequalities and polygyny and show how they could ultimately lead to social unrest. Section 3 is on data and methodology, followed by Section 4, which presents our empirical results. Section 5 discusses alternative hypotheses and, finally, Section 6 concludes.

2. Polygyny, Inequality and Social Unrest: Theoretical Considerations

2.1 Vertical inequality between elite and non-elite men

Rebellions and social unrest occur when grievances are sufficiently acute that people want to engage in violent conflict[22]. This argument, which corresponds to the *frustration-aggression* (FA) hypothesis[23] assumes that at some point, personal frustrations become so pressing that

[22] Paul Collier, Anke Hoeffler, and Dominic Rohner, "Beyond Greed and Grievance: Feasibility and Civil War." *Oxford Economic Papers*, Vol. 61, No. 1 (2009), pp. 1-27.

[23] John Dollard, Neal E. Miller, Leonard W. Doob, Orval Hobart Mowrer, and Robert R. Sears. *Frustration and Aggression* (Yale University Press, 1939).

they are converted into violent action[24]. Our paper focuses on grievances that are related to a lack of reproductive and social or economic opportunities. In line with the existing literature, we argue that among males, an (externally imposed) scarcity of women increases *intra-sexual competition for reproduction*[25], arguably resulting in substantial frustration among those who ultimately end up in the pool of unmarried men.

The relevance of this problem can be seen best by analyzing the gender-specific age structure of marriage markets, where one can observe that young men remain unmarried far more often than young women. For the countries with the highest polygyny levels in our sample, Figure 2 shows an imbalance on the marriage market with a much higher share of young women compared to young men being married in their respective age groups (e.g., 15-19, 20-24 and 25-29 years); it is only at higher ages (e.g., 40-44 years) that the marriage market clears for males. Hence, mainly young men, who are relatively more open to violence than older males, remain unmarried, thus providing fertile ground for social unrest and conflict[26]. Hence, we

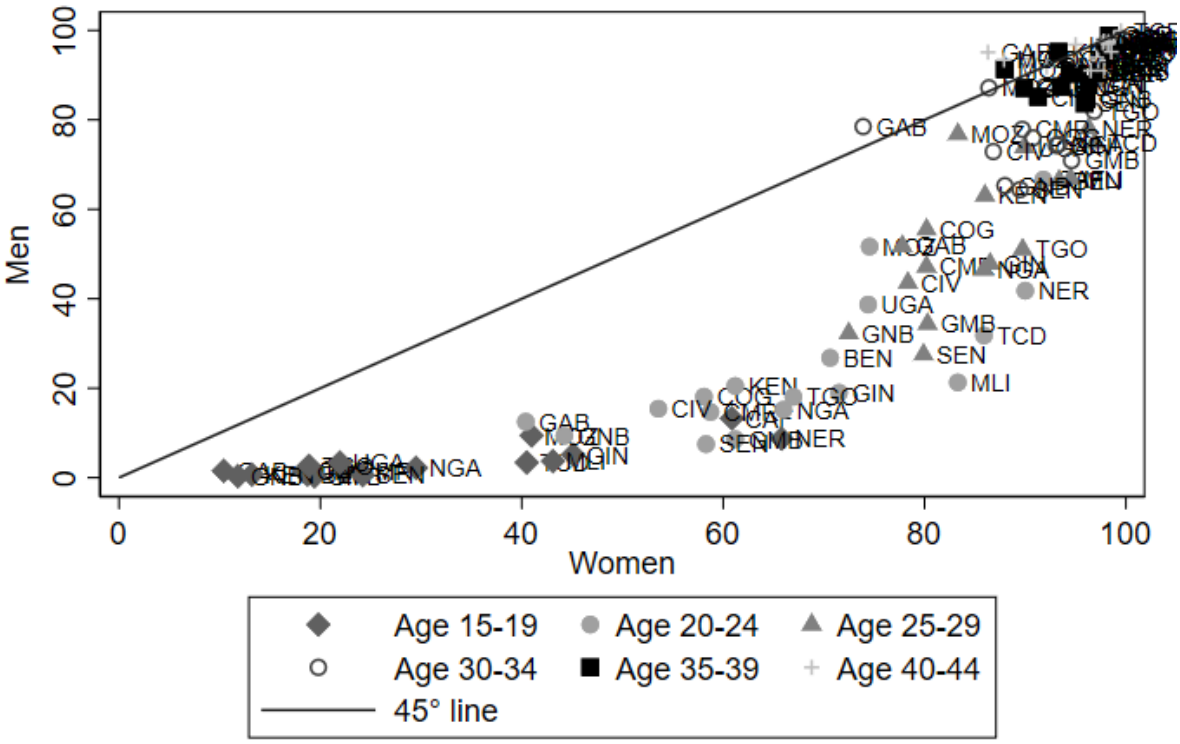
[24] James Chowning Davies, "Aggression, Violence, Revolution and War." in *Handbook of Political Psychology* (San Francisco: Jossey-Bass, 1973): (p. 251) even states, "violence is *always* a response to frustration"' (emphasis added).

[25] Henrich, Boyd, and Richerson, "The Puzzle of Monogamous Marriage," p. 658, and McDermott and Cowden, "Polygyny and Violence against Women," p. 1780.

[26] Some authors have argued that a growing population size ought to relax marriage markets strains, e.g. Urvi Neelakantan and Michèle Tertilt, "A note on marriage market clearing," *Economics Letters*, Vol. 101, No. 2 (2008), pp. 103-105. When there are more young women in each cohort, it should always be possible to match an older man with a younger woman. This would result in a widening marriage age gap between men and women but ultimately help to accommodate imbalances on the marriage market in a given point in time. Not only does the Ponzi scheme logic of this argument raise doubts about the sustainability of this solution of the imbalance problem, even more importantly the uncertainty about future marriage and the necessary waiting time until there is a sufficient number of potential brides cause frustrations in itself. We return to this hypothesis in section 5, where we investigate the impact of population growth on the polygyny-conflict nexus.

hypothesize that polygyny prevents the marriage market from clearing at young ages and leads to a considerable delay in marriage for young men.

Figure 2: Marriage market imbalances in African countries with high levels of polygyny



Notes: Every observation indicates the percentage of men and women, resp., married in the respective age cohort in a country[27]. Sample of 21 African countries with high levels of polygyny (corresponds to the sample used in sections 3-5 of this paper). Data on married population uses the most recent information available in the UN World Marriage Data 2019. The 45-degree line indicates that the same percentage of men and women in a given age group is married. Any observation *below this line* implies that a higher share of women compared to men is married in a given age group.

[27] Data is from United Nations, Department of Economic and Social Affairs, Population Division (2019). World Marriage Data 2019 (POP/DB/Marr/Rev2019).

This frustration is further aggravated when the number of wives and children serves as an indicator of social status[28], increases (e.g., agricultural) productivity[29], or is a means to provide for one's old age[30]. That is, we argue that men—at the individual level—experience frustration resulting from the unfulfilled desire to marry and start a family. As Koos and Neupert-Wentz[31] point out, "[…] excess men are therefore torn between the societal expectations of starting a family and their perceived inability of living up to these norms." At the very least, young men with limited resources need a significant degree of patience to get married. Often, however, having to wait and the underlying uncertainty of whether they will ever have the chance to marry induces frustration and anger for a young man, which in the end could culminate in anti-social and aggressive behavior. The situation spurs feelings of relative deprivation[32] as other males have easier access to the marriage market but are thought to be undeserving of it. This is aggravated further by a lack of economic opportunities.

The literature documents several negative consequences resulting from these grievances. For example, skewed sex ratios with men outnumbering women are associated with higher crime rates[33] and violence[34]. A biological reason for this could be higher levels of aggression or

[28] Zeitzen, *Polygamy*, and Betzig, *Despotism*.

[29] Becker, "A Theory of Marriage," and Jacoby, "The Economics of Polygyny."

[30] Tertilt, "Polygyny, Fertility, and Savings."

[31] Koos and Neupert-Wentz, "Polygynous Neighbors, Excess Men, and Intergroup Conflict in Rural Africa," p. 7.

[32] Ted Gurr, *Why Men Rebel* (Princeton, Princeton University Press, 1970).

[33] Hudson, Valerie M., and Andrea M. den Boer. *Bare Branches. The Security Implications of Asia's Surplus Male Population* (The MIT Press, 2004).

[34] Valerie M. Hudson and Andrea den Boer, "A Surplus of Men, a Deficit of Peace: Security and Sex Ratios in Asia's Largest States." *International Security*, Vol. 26, No. 4 (2002), pp. 5-38, and McDermott and Cowden, "Polygyny."

testosterone among unmarried young men[35]. More specifically, Henrich, Boyd, and Richerson[36] link the pool of unmarried men resulting from polygyny with higher occurrences of rape, murder, assault and robbery. Edlund et al.[37] attribute increasing crime rates in China to skewed sex ratios and tight marriage markets.

Individual grievances are reinforced at the societal level. Polygyny implies a monopolization of women by a small group of men in society, usually the (local) ruling elite or a clan. Because women are scarce, bride prices go up. Furthermore, households with several wives and—due to their high fertility—many children are bigger[38], making polygyny costly. Therefore, only rich, highly productive, or powerful men can afford polygynous marriages[39]. For instance, Gould, Moav, and Simhon[40] show that in Côte d'Ivoire, especially men with high *non-labor* income spend their wealth on as many women (and eventually children) as possible. This leads to a divide in society, or *vertical inequality*, between elite and non-elite men. The low social

[35] McDermott, Johnson, Cowden, and Rosen, "Testosterone and Aggression," and Mazur and Michalek, "Marriage, Divorce, and Male Testosterone."

[36] Henrich, Boyd, and Richerson, "The Puzzle of Monogamous Marriage."

[37] Lena Edlund, Hongbin Li, Junjian Yi, and Junsen Zhang, "Sex Ratios and Crime: Evidence from China," *Review of Economics and Statistics*, Vol. 95, No. 5 (2013), pp. 1520-1534.

[38] Tertilt, "Polygyny, Fertility, and Savings."

[39] Becker, "A Theory of Marriage," Betzig, *Despotism and Differential Reproduction*, Jacoby, "The Economics of Polygyny," Tertilt, "Polygyny, Fertility, and Savings," Hudson and Matfess, "In Plain Sight," Eric D. Gould, Omer Moav, and Avi Simhon, "The Mystery of Monogamy." *The American Economic Review*, Vol. 98, No.1 (2008), pp. 333-357, and Eric D. Gould, Omer Moav, and Avi Simhon, "Lifestyles of the Rich and Polygynous in Côte d'Ivoire." *Economics Letters* Vol. 115, No. 3 (2012), pp. 404-407.

[40] Gould, Moav, and Simhon, "Lifestyles of the Rich and Polygynous."

mobility of males perpetuates economic inequality and unequal opportunities of non-elite men[41].

Combining this divide in society with ethnic cleavages, Koos and Neupert-Wentz[42] show that unmarried men in historically polygynous ethnic groups in Africa are more prone to violence and feel more deprived than unmarried men in monogamous ethnic groups. Ethnic cleavages may aggravate frustrations when the ruling elite also monopolizes women from an ethnic minority, leaving minority men without reproductive opportunities. Furthermore, intergroup conflict is more likely to emerge when polygynous and monogamous groups share a common regional border[43].

When elite families grow faster than the rest of society because of polygynous marriages, low social mobility will be experienced by non-elite men particularly strongly in the labor market[44]. Elite families need more resources and jobs, which is why they extract resources from the rest of society or allocate influential jobs within their group[45]. For instance, Hudson, Bowen, and Nielsen[46] argue that jobs in state ministries or state-owned firms are of particular interest for elite families to secure power and the influence of their clan. Through this mechanism, polygyny helps to avoid—potentially efficient—inter-group competition[47] that could increase

[41] Zeitzen, *Polygamy*, pp. 159-161, describes 'modern' forms of polygyny in African countries. Men are married monogamously but have 'outside wives' signaling status. Note that since private polygynous unions are typically not registered officially, our empirical analysis may underestimate current polygyny levels.

[42] Koos and Neupert-Wentz, "Polygynous Neighbors."

[43] Ibid.

[44] David de la Croix and Fabio Mariani, "From Polygyny to Serial Monogamy: a Unified Theory of Marriage Institutions." *The Review of Economic Studies*, Vol. 82, No. 2 (2015), pp. 565-607.

[45] Andreski, *The African Predicament*.

[46] Hudson, Bowen, and Nielsen, "Clan Governance and State Stability," p. 538.

[47] Henrich, Boyd, and Richerson, "The Puzzle of Monogamous Marriage".

the pie that is available to satisfy economic needs. Therefore, polygynous clan rule and clan-based job allocation increase instability and conflict[48].

In sum, there is a complex link between polygyny, vertical inequality, and conflict. Only when some men are of higher status, have higher productivity or are wealthier, can they afford polygynous marriages. Once polygyny is established, however, it hampers the social mobility of non-elite men, thereby further strengthening the position of the elite. Since the lack of reproductive opportunities in combination with negatively perceived social stratification and relative deprivation is assumed to foster personal frustration and grievances, we expect a high potential for social unrest and, ultimately, conflict[49]. For instance, the promise of money (for bride prices) or easier access to women as well as the prospect of overthrowing the current ruling elite could be reasons to start a rebellion or at least enter into social unrest[50].

Personal frustrations are more likely to result in small-scale conflicts than large-scale conflicts such as civil war, although it cannot be excluded that continued local conflicts will eventually grow to a severe nation-wide conflict. The FA hypothesis suggests that personal frustration ought to lead to aggression and violence as an *individual* response, which arguably will rarely extend beyond a narrow local context. In order to evolve to a larger local or even societal

[48] Hudson, Bowen, and Nielsen, "Clan Governance and State Stability."

[49] Gurr, *Why Men Rebel*, and Paul Collier and Anke Hoeffler, "Greed and Grievance in Civil War." *Oxford Economic Papers*, Vol. 56, No. 4 (2004), pp. 563-595.

[50] In (WORKING PAPER REFERENCE), case studies on mobilization and violent events associated with polygyny and/or obstructed marriage markets are discussed. They range from violent cattle raids in South Sudan connected to bride prices to Boko Haram (see Hudson and Matfess, "In Plain Sight") and the Lord's Resistance Army (see Erin Baines, "Forced Marriage as a Political Project: Sexual Rules and Relations in the Lord's Resistance Army." *Journal of Peace Research*, Vol. 51, No. 3 (2014), pp. 405-417) organizing weddings for fighters to Islamist suicide terrorists believing in virgins after death (see Thayer and Hudson, "Sex and the Shaheed").

conflict, similar personal frustrations must be felt by larger groups in society. To actually result in a conflict, at least two conditions need to be fulfilled: first, like-minded (frustrated) non-elite men need to join and form an in-group that starts a rebellion against the elite (the out-group); and second, the collective-action problem[51] needs to be overcome.

Unless some broader identity issues (e.g., ethnic divides) are involved, sufficiently large groups are relatively unlikely to be mobilized into larger-scale conflicts. Therefore, it is reasonable to assume small-scale conflicts and social unrest as the natural outcomes of polygyny-induced grievances. Furthermore, as most pressure is on young and unmarried men, we expect unrest, if it occurs, to be violent and organized. In practical terms, we expect to see young men raiding, starting protests against the (local) elite, and being easy recruits for those actors who are interested in organized violence.

For our subsequent empirical analysis, we summarize these arguments in our first hypothesis:

Hypothesis 1: *Vertical inequality (in terms of reproductive and/or economic inequality) between elite and non-elite men increases the likelihood of social unrest in polygynous societies.*

2.2 Horizontal inequality within the polygynous elite

At first glance, being part of the elite appears to be a privilege, seemingly providing each single (male) elite member with access to power and resources. In a polygynous society, however, this very access might be highly unequally distributed among members of the elite, implying *horizontal inequality,* and possibly leading to elite-internal conflicts which result from personal frustrations of elite members. More specifically, there is often unequal treatment within

[51] Mancur Olson, *Logic of collective action: Public goods and the theory of groups* (Harvard University Press, 1965).

polygynous families with respect to the rank of wives, which translates to a similar ranking of sons. Typically, one observes 'favorite wives', 'first wives', or wives who are considered 'lesser wives', e.g., because of infertility. This ranking ought to be reflected in the allocation of resources within the family, too.

Examples comprise consequences of the ranking of wives for children's body height[52], education[53], or bride price allocation among sons[54]. Hence, sons effectively compete today for resources available to them tomorrow[55]. Experimental evidence shows that altruistic behavior between spouses is smaller in polygynous unions than in monogamous marriages[56]. In addition,

[52] Natascha Wagner and Matthias Rieger, "Polygyny and Child Growth: Evidence from Twenty-six African Countries." *Feminist Economics*, Vol. 21, No. 2 (2015), pp. 105-130.

[53] Caroline Uggla, Eshetu Gurmu, and Mhairi A Gibson, "Are Wives and Daughters Disadvantaged in Polygynous Households? A Case Study of the Arsi Oromo of Ethiopia." *Evolution and Human Behavior*, Vol. 39, No. 2 (2018), pp. 160-165.

[54] Mhairi A Gibson and Eshetu Gurmu, "Land Inheritance Establishes Sibling Competition for Marriage and Reproduction in Rural Ethiopia." *Proceedings of the National Academy of Sciences*, Vol. 108, No. 6 (2011), pp. 2200-2204.

[55] John Hartung, Mildred Dickemann, Umberto Melotti, Leopold Pospisil, Eugenie C Scott, John Maynard Smith, and William D Wilder, "Polygyny and Inheritance of Wealth [and Comments and Replies]." *Current Anthropology*, Vol. 23, No. 1 (1982), pp. 1-12.

[56] Abigail Barr, Marleen Dekker, Wendy Janssens, Bereket Kebede, and Berber Kramer, "Cooperation in Polygynous Households." *American Economic Journal: Applied Economics*, Vol. 11, No. 2 (2019), pp. 266-283, and Richard Akresh, Joyce J Chen, and Charity T Moore, "Altruism, Cooperation, and Efficiency: Agricultural Production in Polygynous Households." *Economic Development and Cultural Change*, Vol. 64, No. 4 (2016), pp. 661-696.

competition among co-wives may lead to strategic fertility choices with an attempt to be particularly fertile or have a son[57].

Another dimension of conflict-inducing inequality between elite members is related to generational succession[58]. Once the elite leader or clan chief passes away, a successor must be found. Violent conflict may arise when candidates for the leading position in the elite are hostile toward each other. In addition to the struggle for power, most of these conflicts are also about resources. Polygyny enters the picture once the successor is to be selected among the sons of the late leader, who may again try to secure—possibly violently—as many assets as possible as their share of the bequest.

The resulting conflicts may intensify when inheritance is organized unequally from the outset, e.g., when the ranking of wives translates into the heirs' claims or when one person is strongly preferred and selected to be the sole heir[59]. More generally, any unequal treatment during the patriarch's lifetime and any inequality-inducing inheritance rule may aggravate conflict within the elite. For instance, unequal inheritance rules feed back into today's parental investment in education in Ethiopia[60].

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[57] Pauline Rossi, "Strategic Choices in Polygamous Households: Theory and Evidence from Senegal." *The Review of Economic Studies*, Vol. 86, No. 3 (2019), pp. 1332-1370.

[58] Andreski, *The African Predicament.*

[59] A recent example on such conflicts can be seen in South Africa. Here, the late Zulu king named his favorite (not his first) wife as his successor in his will, which already caused some family-internal quarrel. However, after she died herself only one month later, succession is again unclear and family conflicts over inheritance continue (Daily Mail Online, May 8, 2021, https://www.dailymail.co.uk/news/article-9557111/New-King-Zulus-whisked-away-public-unveiling-chaotic-scenes-South-Africa.html.

[60] Gibson and Gurmu, "Land Inheritance," and Gibson, Mhairi A, and David W Lawson, "Modernization Increases Parental Investment and Sibling Resource Competition: Evidence from a Rural Development Initiative in Ethiopia." *Evolution and Human Behavior*, Vol. 32, No. 2 (2011), pp. 97-105.

Note that while we stick to the grievances literature in most of our paper, this type of inequality—although certainly causing individual-level grievances—may also be interpreted as 'greed' in the terminology of Collier and Hoeffler[61]. In this respect, the death of the clan chief ought to be seen as "atypical circumstances that generate profitable opportunities"[62] for utility-maximizing or *greedy* family members to increase their share by starting a violent family feud.

Often, inheritance follows institutionalized rules which are either codified in family or inheritance law or constitute (religious) traditions. Below, we will propose inheritance rules in polygynous societies as a proxy for within-elite conflict, so it is worthwhile to take a closer look at these rules[63]. In general, we can distinguish between rather equal provisions of bequests among heirs, such as in Islamic family law[64], or regulations where the first wife and her children are treated preferentially, such as in Uganda[65]. Most unequal is the practice of *primogeniture*, where one heir (usually the oldest son of the first wife; e.g., in South Africa) gets most or everything. In yet other countries, differentiated inheritance practices due to, e.g., the existence of ethnic groups with their own traditions can be found[66].

In case of differential inheritance or primogeniture, those sons who receive little or nothing may feel deprived and therefore be tempted to violently push away the sole heir or heirs receiving larger shares, respectively. Given that there are multiple wives of the old leader, the number of

[61] Collier and Hoeffler, "Greed and Grievance."

[62] Ibid, p. 564.

[63] We discuss different categories of inheritance rules and practices in the WORKING PAPER.

[64] Matthias Rohe, *Islamic Law in Past and Present* (Koninklijke Brill NV, Leiden, 2015).

[65] Ugandan Marriage and Divorce Bill from 2009.

[66] In our collection of inheritance laws and patterns at the country level, we apply a conservative coding rule and assign lower levels of inequality in inheritances when a sub-population with unequal inheritance rules is relatively small and/or there are other groups with equal inheritance rules. More details on the coding will be provided in section 3. The complete coding is available upon request.

potential heirs is large, and family (or kin) bonds are more often competitive or even hostile than friendly. This is mainly due to the fact that the sons are half-brothers who are not next-of-kin and who have different mothers who themselves may compete with each other. Note, however, that even a strictly equal treatment of all sons with respect to the allocation or inheritance of assets, resources and wealth may not shield the polygynous elite from internal conflict. In particular, this ought to be a problem when the number of heirs is so large that individual shares turn out to be very small. Then, some heirs could try to (violently) reduce the number of competitors in order to seize as much power and resources as possible, e.g., by plotting a coup. This would again speak more to *greed* as the main motivation and polygyny would have a direct rather than indirect effect (via inheritance) on ensuing unrest.

So far, the described mechanisms speak to small-scale feuds, which are limited to a relatively small group within a society, the elite. As long as the elite accommodates the broader population's basic needs and provides security (similar to Olson's 'stationary bandit'[67]), the limited within-elite feuds may not spread to the rest of society. However, it is doubtful that those who aim to start a fight against other elite members will refrain from involving broader parts of population to increase their power, while those who need to defend themselves will almost certainly resort to the help of loyal supporters. Conditional on all involved elite members having access to sufficient influence and—even without having inherited—resources for mobilization or organization[68], larger rebellions, coups, and civil wars become more likely.

In sum, unequal treatment within polygynous elites and clans ought to foster social unrest and destabilization of societies in at least two ways: first, through the distribution of resources during the lifetime of the patriarch, and second, through inheritance and succession of the late

[67] Olson, Mancur, "Dictatorship, Democracy, and Development." *American Political Science Review*, Vol. 87, No. 3 (1993), pp. 567-576.

[68] Collier, Hoeffler, and Rohner, "Beyond greed and grievance."

leader. These effects may be conditional on the availability of resources. Accordingly, we formulate our second hypothesis as follows:

Hypothesis 2a: *Horizontal inequality within polygynous families—directly or indirectly—increases the risk of social unrest.*

Hypothesis 2b: *For horizontal inequality within the elite to extend to broader parts of the population, sufficient resources for mobilization are necessary.*

2.3 Gender inequality

Conflict and war are usually associated with men, as societies typically assign roles in conflict and war according to gender, with men as the primary—and usually the only—fighters[69]. Summarizing the reasons for this role played by men, Goldstein[70] mentions, i.a., biological and evolutionary aspects (e.g., men's physique or hormonal endowment), women's status in society (e.g., whether their more peaceful approaches of conflict resolution are valued; see below) and marriage patterns (e.g., patrilocality vs. matrilocality).

Similarly, more general gender norms have been argued to be rooted in specific past circumstances, which became relevant in the course of evolution[71]. Furthermore, norms and constructions of masculinity serve functional roles in war systems[72]. Therefore, after discussing the conflict-inducing inequality between men (i.e., potential fighters), we now turn to the role

[69] Joshua S. Goldstein, "War and Gender." In *Encyclopedia of Sex and Gender*, 2003, pp. 107-116. Springer.

[70] Ibid.

[71] See for example Ester Boserup, *Woman's Role in Economic Development* (New York St. Martins Press, 1970), Alberto Alesina, Paola Giuliano, and Nathan Nunn, "On the Origins of Gender Roles: Women and the Plough." *The Quarterly Journal of Economics*, Vol. 128, No. 2 (2013), pp. 469-530.

[72] Goldstein, "War and Gender."

of inequality between sexes as a potential trigger for destabilization and social unrest, especially in polygynous societies.

Polygyny is—by definition—an unequal gender norm, since men can have more than one wife but women cannot have several husbands. Polygynous marriage systems are associated with patriarchal values[73], the subordination of women[74], bride prices (which hardly ever go to the bride) and patrilineality[75]. Henrich, Boyd, and Richerson[76] link polygyny to higher spousal age gaps, higher fertility rates and lower gender equality. Thus, polygyny may be seen as a subset of misogynous practices in a society or might help to reinforce misogyny. This would speak to the argument by Gleditsch et al.[77] that polygyny needs to be interpreted as a proxy for misogyny only. Hence, the question needs to be answered whether and how polygyny and misogyny—after accounting for vertical and horizontal inequality between men—interact to explain social unrest.

In order to answer this question, let us start by investigating the theoretical arguments for the nexus between gender inequality and conflict or violent behavior in societies. Hudson et al.[78] assume that when a society discriminates against women, this can make discrimination and violence in general more acceptable. Persistent subordination of women in private and public

[73] McDermott and Cowden, "Polygyny and Violence against Women."

[74] Hudson, Bowen, and Nielsen, "Clan Governance and State Stability," and Valerie M. Hudson, Donna Lee Bowen, and Perpetua Lynne Nielsen, *The First Political Order: How Sex Shapes Governance and National Security Worldwide* (Columbia University Press, 2020).

[75] Jack Goody, "Bridewealth and Dowry in Africa and Eurasia." In *Bridewealth and Dowry*, pp. 1-58 (Cambridge University Press, 1973), and Hudson and Matfess, "In Plain Sight."

[76] Henrich, Boyd, and Richerson, "The Puzzle of Monogamous Marriage."

[77] Gleditsch et al., "Polygyny or misogyny?".

[78] Valerie M Hudson, Bonnie Baliff-Spanvill, Mary Caprioli, and Chad F. Emmet, *Sex and World Peace* (Columbia University Press, 2012).

life shapes the political order and has consequences for stability, peace, and governance[79]. Even more pessimistic is Caprioli[80] who argues that gender inequality is a form of systematic discrimination and inequality due to its association with subordination, strict hierarchies, and the limiting of women's participation in society. Empirically, several studies find that for various measures of gender inequality, the likelihood of participating in interstate and violent intrastate disputes increases with gender inequality[81]. Bjarnegård and Melander[82] link attitudes that favor gender equality to more peaceful attitudes in general and less hostility towards other groups or nations.

The reason for the pacifying effect of gender equality is often seen in the empirical observation that women show—on average—less violent behavior and are opposed to fighting by nature[83]. Empirically, one would therefore expect to see a pacifying effect of increased gender equality. The effects of gender inequality on social unrest may be further aggravated in polygynous societies because polygyny reinforces patriarchal structures and further increases inequality between the sexes, e.g., when women are 'sold' into marriages by their families in order to earn a bride price.

[79] Hudson, Bowen, and Nielsen. *The First Political Order.*

[80] Mary Caprioli, "Primed for Violence: The Role of Gender Inequality in Predicting Internal Conflict." *International Studies Quarterly*, Vol. 49, No. 2 (2005), pp. 161-178.

[81] Ibid., Valerie M. Hudson, Mary Caprioli, Bonnie Baliff-Spanvill, Rose McDermott, and Chad F Emmett, "The Heart of the Matter: The Security of Women and the Security of States." *International Security*, Vol. 33, No. 3 (2009), pp. 7-45, and Hudson, Baliff-Spanvill, Caprioli, Emmet, *Sex and World Peace*.

[82] Elin Bjarnegård and Erik Melander, "Pacific Men: How the Feminist Gap Explains Hostility." *The Pacific Review*, Vol. 30, No. 4 (2017), pp. 478-493.

[83] For details, see Goldstein, "War and Gender", or Rose McDermott, "Sex and Death: Gender Differences in Aggression and Motivations for Violence." *International Organization*, Vol. 69 (2015), pp. 753-775.

There are ostensible measures of gender equality, such as assumed political participation, empowerment of women through a higher share of women in parliament[84] or female labor force participation, which measure *de jure* gender equality. However, without (physical) security and equal rights and liberties regarding, e.g., marriage, mobility or property rights, the possibilities for women to participate actively in the political process are likely to still be bounded[85]. This is even more so the case when discriminatory family laws or limited efforts to enforce physical security of women come into play, both of which reinforce high levels of gender inequality despite the de jure political participation of women.

For instance, gender inequality may be deeply rooted and bolstered in a society with physical and social insecurity, which would be, e.g., the case when legal consequences for sexual violence—in and outside of (polygynous) marriage—are absent. Under such circumstances, there may be too little influence of women on the (internal) political process and on groups engaged in conflict to promote peaceful solutions[86]. In addition, behavior that is more hostile in general[87] could reinforce the direct effects of polygyny or the other two mechanisms of vertical and horizontal inequality as mobilization and use of violence are more likely. Thus, interacting polygyny and measures for gender inequality is reasonable.

[84] Aksel Sundström, Pamela Paxton, Yi-Ting Wang, and Staffan I. Lindberg, "Women's Political Empowerment: A New Global Index, 1900-2012." *World Development*, Vol. 94 (2017), pp. 321-335.

[85] Hudson, Bowen, and Nielsen, "Clan Governance", Ingrid Robeyns, "Sen's Capability Approach and Gender Inequality: Selecting Relevant Capabilities." *Feminist Economics*, Vol. 9, No. 2-3 (2003), pp. 61-92, and Senem Ertan, Catalina Monroy, Juan Pablo Vallejo, Germán Romero, and Ana Catalina Erazo, "The Status of Women's Political Empowerment Worldwide." In *Measuring Women's Political Empowerment across the Globe* (2018), pp. 55-76. Springer.

[86] Caprioli, "Primed for Violence."

[87] Bjarnegård and Melander, "Pacific Men."

By reinforcing misogyny in a society, polygyny thus contributes to one-sided and uniform strategies for conflict and unrest resolution. The lack of gender diversity in political leadership increases the probability of open conflict and social unrest. In sum, when gender inequality keeps women from participating in political, social or economic spheres of society, the unrest-inducing effects of vertical and horizontal inequality due to polygyny might become even more severe. In turn, when unequal treatment of women in family and marriage laws is reduced and gender equality is more advanced in political participation, this could reduce unrest potential. If this leads to less prevalence of violence, we expect this effect to be particularly strong for violent unrest. This adds up to our third hypothesis:

Hypothesis 3: *Gender inequality increases the likelihood of social unrest in polygynous societies.*

3. Data and Methodology

In the following, we will introduce the data and explain the empirical strategy employed to test our theoretical predictions from Section 2.

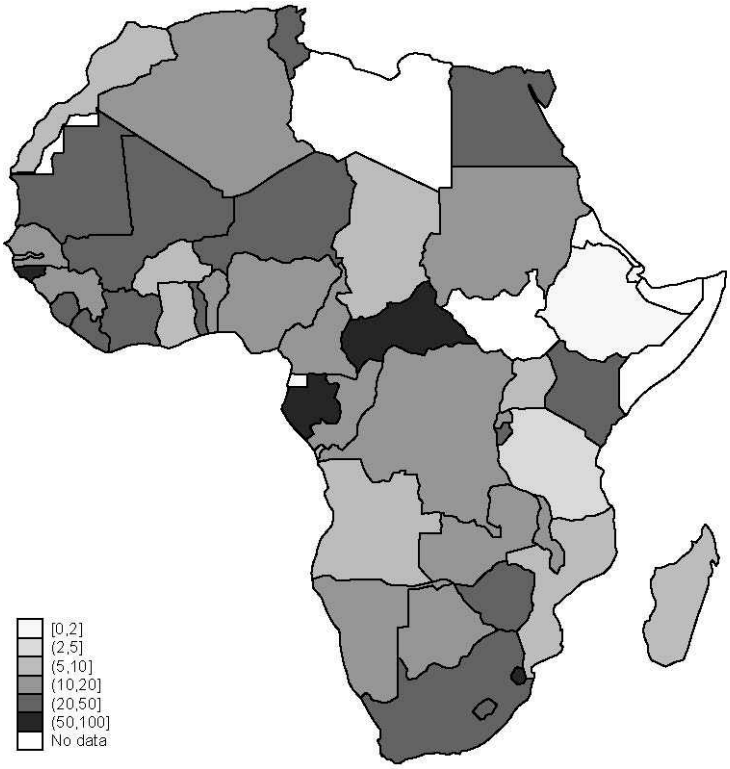
3.1 Dependent variable

Our dependent variable is a dummy for the presence of a social unrest event, using data from the *Social Conflict in Africa Database* (SCAD, Version 3.2) for the period 1990-2014[88]. First, we code whether at least one violent unrest event took place in a specific country-year. In addition, we create a count variable of how many such events took place within a country-year,

[88] Idean Salehyan, Cullen S Hendrix, Jesse Hamner, Christina Case, Christopher Linebarger, Emily Stull, and Jennifer Williams, "Social Conflict in Africa: A New Database." *International Interactions*, Vol. 38, No. 4 (2012), pp. 503-511.

measuring the intensity of social unrest. As shown in Figure 3, we see large variation in the intensity of social unrest across Africa.

Figure 3: Sum of unrest events in relation to population, 1990-2014, Africa



Note: Own map using data from SCAD, summing all unrest events over the time period in a country and dividing it by the average population size in this period. Darker colors indicate more events per capita.

We code four different types of social unrest to allow for a more fine-grained analysis of our hypotheses. First, *violent unrest* includes organized violent riots, spontaneous violent riots, pro-government violence, anti-government violence as well as extra- and intra-government violence. Second, we create a dummy that is '1' whenever *non-violent* unrest occurred. Here, we consider organized and spontaneous demonstrations as well as general or limited strikes[89]. Furthermore, we create a dummy for *organized unrest*, comprising organized violent riots,

[89] Table A-1 in the Appendix shows summary statistics for all our variables. Table A-5 gives an overview on variable definitions and sources.

organized demonstrations as well as strikes. Lastly, *spontaneous unrest* considers the existence of spontaneous violent riots and spontaneous demonstrations.

3.2 Main independent variables

Polygyny

For the prevalence and legality of polygyny, we use the respective measure from WomanStats. Its scale ranges from '0' (no polygyny) to '4' (polygyny is legal or, if it is illegal, it is common nevertheless)[90]. Figure 1 in the introduction has already shown the prevalence of polygyny in Africa in the year 2010, with a clear clustering along the so-called *polygyny belt* in Sub-Saharan Africa.

Since time-dependent data on polygyny is unavailable, we rely on WomanStats' time-invariant variable, which was collected between 2005 and 2010. It is rather unlikely to see fast changes in the prevalence of polygyny, i.e., today's prevalence should not differ significantly from decades ago. Reasons for this persistence may be that bans are not enforced[91] and that deeply rooted norms and traditions favoring polygyny rarely change[92]. Hence, if at all, the pattern of polygyny ought to change only very slowly over time.

[90] Further details, including the data points underlying the coding of the indicator, are available from WomanStats Project (2016), http://www.womanstats.org/.

[91] For examples, see Tertilt, "Polygyny, Women's Rights, and Development," or Gould, Moav, and Simhon, "Lifestyles of the Rich and Polygynous."

[92] John T. Dalton and Tin Cheuk Leung, "Why is Polygyny more Prevalent in Western Africa? An African Slave Trade Perspective." *Economic Development and Cultural Change*, Vol. 62, No. 4 (2014), pp. 599-632, and James Fenske, "African Polygamy: Past and Present." *Journal of Development Economics*, Vol. 117 (2015), pp. 58-73.

Vertical inequality (H1)

In order to capture vertical inequality among men in society, we employ two different measures. *Reproductive frustration* is approximated by a continuous variable of the prevalence of a *son bias* from the *Social Institutions and Gender Index* (SIGI)[93] for the year 2014. This variable includes whether there are 'missing women', i.e., deviations from normal sex ratios, and whether fertility preferences show that sons are preferred to daughters. We further include the estimated *sex ratio for the cohort aged 15-49 years*[94]. Values above 100 (men per 100 women in the total population) imply a 'surplus' of men or 'missing women'. If the sex ratio is skewed towards men, the scarcity of women becomes even more severe, when some men have several wives. Both patterns often coincide[95].

For *economic inequality*, we include the time-invariant measure of the *dispersion of economic power resources* from Vanhanen[96]. A higher value implies that economic resources are less centralized but more dispersed across society. Alternatively, we include the *Gini coefficient* for post-tax income[97] in a robustness check (available in the Online Appendix). While this measure

[93] OECD. 2014. *SIGI Methodological Background Paper*, available here https://www.oecd.org/dev/development-gender/Backgroundpaper_cover.pdf.

[94] Data from the UN Department of Economic and Social Affairs. 2017. *World Population Prospects: The 2017 Revision*.

[95] Hudson and den Boer, "A Surplus of Men."

[96] Tatu Vanhanen, *The Process of Democratization: A Comparative Study of 147 States, 1980-88* (Taylor & Francis, 1990).

[97] Data described in Frederick Solt, "The Standardized World Income Inequality Database." *Social Science Quarterly*, Vol. 97, No. 5 (2016), pp. 1267-1281.

is available on a yearly basis, its availability reduces the sample significantly and has certain drawbacks, especially for Africa[98].

To capture extreme levels of inequality, we furthermore include the share of population that has *access to electricity* (from the World Development Indicators, WDI). Arguably, if there is little electricity coverage, it will be available mostly for the (ruling) elite but not for non-elite men. Hence, this time-variant measure may capture more fundamental forms of economic inequality, with a lack of access to basic resources such as clean water and electricity being decisive for the prospect of getting married[99].

Horizontal inequality (H2)

For horizontal inequality among polygynous (elite) men, we include a newly compiled measure for *unequal inheritance*. For this measure, we coded information on family and succession laws as well as information on practices, traditions and customary laws. The information comes from the *Food and Agriculture Organization* of the United Nations, family laws and reports from NGOs as well as the CIA Factbook, among other sources. We have assigned a country to one of the following categories only when an inheritance rule in a country is confirmed by more than one reliable source. First, a reference category, coded '0', for countries in which there is no polygyny and/or polygyny is illegal. Because there is no polygyny in these countries, inheritance laws do not include any provisions leading to polygyny-induced inequality[100]. We

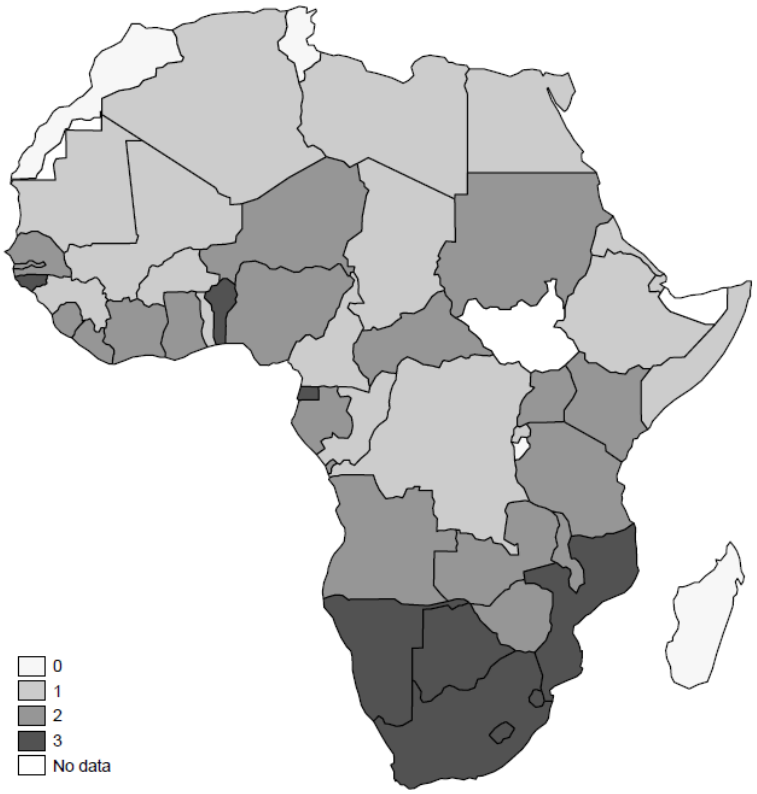
[98] Martin Wittenberg, "Problems with SWIID: The Case of South Africa". *The Journal of Economic Inequality*, Vol. 13, No. 4 (2015), pp. 673-677.

[99] Yaniv Stopnitzky, "No Toilet no Bride? Intrahousehold Bargaining in Male-skewed Marriage Markets in India." *Journal of Development Economics*, Vol. 127 (2017), pp. 269-282.

[100] Note that we also include countries (such as Morocco) here, in which polygyny is illegal but still practiced, for which, however, we could not identify any sources describing unequal inheritance rules.

assigned ‘1’ when equal or almost equal treatment is common and/or legally prescribed[101]; ‘2’ when inheritance includes a certain degree of inequality or ranking (e.g., when sons born out of wedlock have almost no chance to be considered as heirs; or a transfer of the wives’ ranking to their sons; or favoritism towards one son, often the first-born); finally, ‘3’ implies *primogeniture*, i.e., the concentration of the bequest on only one single heir. Figure 4 shows that the degree of inequality in inheritance varies substantially across African countries.

Figure 4: Inheritance, Africa



Note: Own map using our indicator of inheritance laws and practices. Darker colors indicate inheritance rules that are more unequal.

[101] Countries with Islamic family law are coded in this category unless traditions or practices deviate from the law. We also include countries here in which concubines and lesser wives might receive less, but with equal treatment of all legal spouses.

Gender inequality (H3)

In our baseline estimation, we use two standard measures of gender inequality. *Female labor force participation* (FLFP, taken from the WDI) measures the visibility of women in economic life. In addition, the indicator *female political participation* from V-DEM comprises the influence of women in legislature and the power distribution by gender[102]. The latter is a sub-indicator of the Women's Political Empowerment Index[103]. By using this sub-indicator, we aim to capture whether and how women are integrated in the political process, which we consider decisive in order to test the (pacifying) effect of female participation in politics.

Arguably, simple participation in politics would not provide the full picture of gender (in)equality. If women lack social, legal and physical rights in society, pure participation remains a de jure measure that is insufficient for our purposes. However, combining such a measure with the level of polygyny might be informative, as polygyny reflects gender inequality in private (family) life, which may extend to or be influenced by gender inequality in the political arena, too. To capture this, we use a summary indicator (*CIRI*) that combines women's economic and political rights. The data are taken from Cingranelli and Richards[104] and range continuously from '0' (gender inequality) to '1' (gender equality).

[102] Described in Michael Coppedge, John Gerring, Carl Henrik Knutsen, Staffan I Lindberg, Jan Teorell, David Altman, Michael Bernhard, M Steven Fish, Adam Glynn, Allen Hicken, et al. 2019. *V-dem codebook v9.*

[103] Sundström, et al., "Women's Political Empowerment."

[104] David L. Cingranelli and David L Richards, "The Cingranelli and Richards (CIRI) Human Rights Data Project." *Human Rights Quarterly*, Vol, 32, No. 2 (2010), pp. 401-424.

Control variables

We control for a variety of factors that capture the state of the economy, a nation's political and demographic structures as well as geographic characteristics. All of them may influence the probability of a country experiencing social unrest as they are related to either general societal cleavages (such as fractionalization), conflict history or the (opportunity) cost of rebellion. Our controls have been frequently used in the analysis of internal armed conflict and civil war. Arguing that social unrest may be a first step towards more severe forms of conflict, we believe that these factors are important for our analysis, too.

If a country is already in an episode of armed conflict, further events of social unrest are more likely. Thus, we control for the *presence of an ongoing armed conflict* in a country using data from the UCDP/PRIO Armed Conflict Dataset. We create a binary variable that is '1' whenever there is an armed conflict incidence with more than 25 battle deaths[105]. To control for contagious conflict, we include a count variable for the *number of neighboring countries that experience unrest* in the country-year, using SCAD data.

Turning to the political system, we control for the *level of democracy*, using the Polity2 indicator from the Polity IV Database. This variable ranges from –10 (autocratic regime) to +10 (democratic regime)[106]. Furthermore, we code a variable for *political instability* following

[105] Therése Pettersson and Peter Wallensteen, "Armed Conflicts, 1946-2014." *Journal of Peace Research*, Vol. 52, No. 4 (2015), pp. 536-550, and Håvard Strand, *Onset of Armed Conflict: A New List for the Period 1946-2004, with Applications*. Technical Report (2006), https://www.prio.org/global/upload/cscw/data/onset.pdf.

[106] As a robustness check, we replace the Polity2 indicator with the electoral democracy indicator from V-DEM. Results remain comparable and are available in the Online Appendix.

Fearon and Laitin[107] that is '1' when a country has had a change of more than 3 points on the Polity2 scale in the last 3 years.

To account for the feasibility of social unrest, we include *income (GDP) per capita*, and *population size* for demographic pressure. Data on both variables are taken from the Penn World Tables (in logs). Further, we control for geographic conditions that could impede or foster social unrest, specifically, *mountainous terrain*[108] and a dummy for *OPEC countries*.

As our argument on vertical inequality is closely tied to hierarchies within a society, we control for the *share of population belonging to excluded groups* using the Ethnic Power Relations Data[109]. Finally, *religious fractionalization*[110] is included to account for religious diversity.

For robustness checks, we include further demographic variables that are potentially associated with social unrest and polygyny: the *share of rural population* (norms and traditions could be practiced differently in rural and urban areas) and the *share of males in the age group 15-19 years* in total population. This ought to capture demographic pressure resulting from a 'youth bulge' that arguably increases conflict risk[111].

[107] James D. Fearon and David D. Laitin, "Ethnicity, Insurgency, and Civil War." *American Political Science Review*, Vol. 97, No. 1 (2003), pp. 75-90.

[108] Ibid.

[109] Girardin, Luc, Philipp Hunziker, Lars-Erik Cedermann, Nils-Christian Bormann, and Manuel Vogt. 2015. *GROWup – Geographical Research On War, Unified Platform*. http://growup.ethz.ch/.

[110] Fearon and Laitin, "Ethnicity."

[111] Henrik Urdal, "A Clash of Generations? Youth Bulges and Political Violence." *International Studies Quarterly*, Vol. 50, No. 3 (2006), pp. 607-629.

Estimation strategy

For our country-level analysis of *incidences* of social unrest in African countries, we use a logit model with robust standard errors that are clustered at the country level. The binary dependent variables are the prevalence of (i) violent social unrest, (ii) non-violent social unrest, (iii) organized social unrest, and (iv) spontaneous unrest. Our set of baseline control variables includes ongoing conflict, GDP per capita, population size, mountainous terrain, OPEC membership, unstable government, democracy, religious fractionalization, population belonging to excluded ethnic groups, and neighboring countries with events of social unrest. To account for time dependence, we use cubic time polynomials for the time since the last unrest episode took place[112]. Finally, we add the scale values '3' and '4' of the polygyny scale as dummies; value '2' serves as the base category here as there are no countries with values '0' or '1' in Africa.

Furthermore, we include our main independent variables to identify the effect on conflict activity of each of the three inequalities under consideration. The dimensions of vertical inequality (H1) will be tested by including *son bias*, *sex ratio*, the *dispersion of resources*, and *access to electricity*[113]. For horizontal inequality (H2), we use our newly compiled *unequal inheritance* variable. Finally, gender inequality (H3) is represented by *female labor force participation* and *female political participation*. All time-variant variables are included with a one-year time lag. Furthermore, GDP per capita as well as population size are in logs to reduce the influence of potential outliers.

[112] In this, we follow David B. Carter and Curtis S. Signorino, "Back to the Future: Modeling Time Dependence in Binary Data." *Political Analysis*, Vol. 18, No. 3 (2010), pp. 271-292.

[113] As a robustness check, we replace the Polity2 indicator with the electoral democracy indicator from V-DEM. Results remain comparable and are available in the Online Appendix.

Using the same set of variables, we also estimate a model for the *intensity* of social unrest. Here, we use a negative binomial regression (NBR) model for the number of social unrest events per country-year. This is justified because the count data on social unrest events is over-dispersed.

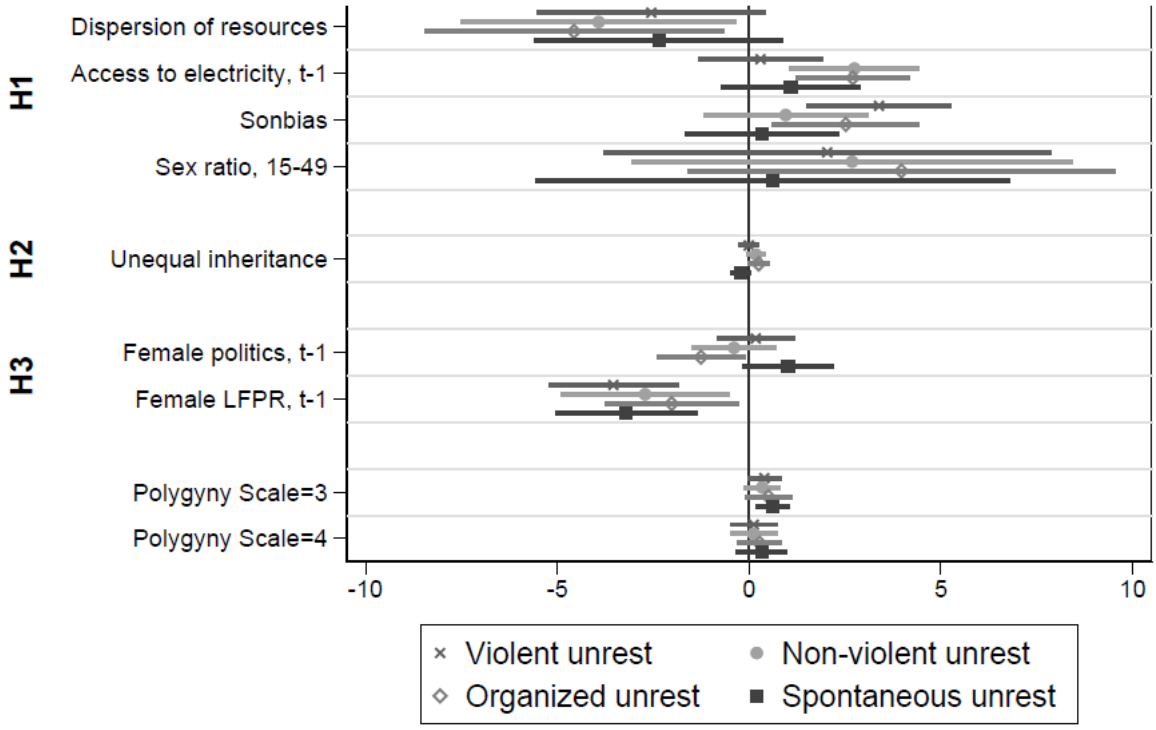
4. Results

Incidence of Social Unrest

Figure 5 summarizes the estimated coefficients of our measure of polygyny and the three types of inequality according to hypotheses H1, H2 and H3 for four different logistic regressions, which reflect the *incidence* of the four different types of social unrest under consideration. In all four regressions, the main set of control variables has been included. The coefficients are from table A-2 in the Appendix[114].

[114] Note that the step-wise inclusion of variables shows that the fit of the model is indeed best (based on the Aikake Information Criterion) when all variables are included. Details are available from the authors upon request.

Figure 5: Incidence of social unrest, polygyny and inequality



Note: The figure shows the coefficients from our preferred specifications for the incidence of social unrest forms (i.e., results from four different logistic regressions, shown in detail in Table A-2). Controls, constant and time controls are included but not shown in the figure. 90% confidence intervals displayed.

Regarding *Hypothesis 1* (vertical inequality), the estimated coefficients show mixed results. With respect to the measures of *economic inequality*, a more equal distribution of power resources is negatively associated with the presence of non-violent and organized social unrest, which supports H1. For violent and spontaneous unrest, the sign is in the same direction but slightly insignificant. Our alternative measure of economic inequality, access to electricity, shows a positive sign, implying that countries with more coverage of electricity exhibit more unrest. At first sight, this contradicts our hypothesis. However, a possible explanation is that with more households having access to electricity, mobilization and participation in events of unrest becomes feasible and thus more likely.

Turning to *reproductive inequality*, we observe that norms and traditions reflected in son bias are positively associated only with violent and organized social unrest, while the sex ratio, indicating tight marriage markets, is not significant. Notice, however, that the standard errors are high, indicating measurement problems, which facilitate rejection of the hypothesis. All signs are in the expected direction but effects are only sometimes significant, lending only weak support to H1 with respect to reproductive inequality[115].

The conflict-inducing effect of horizontal inequality, as postulated in *Hypothesis 2a*, is not significant. There does not seem to be a direct correlation of unequal treatment within polygynous families and social unrest. However, according to *Hypothesis 2b* the spillover from within-elite feuds to society is conditional on its feasibility, i.e., the availability of sufficient resources. We will test this conditional effect below.

Gender inequality, as stated in *Hypothesis 3* and measured by female labor force participation, has a strongly negative and significant effect on all forms of social unrest, unequivocally supporting H3. Support is weaker when considering female participation in politics, which has a negative and significant effect on organized social unrest but an opposite effect on spontaneous unrest. Still, one could interpret this as indirect support for our hypothesis: if women are more present in political life, this raises awareness of structural inequality and discrimination, thereby increasing the likelihood of protest[116].

[115] As a robustness check, we include the share of rural population and the sex ratio in the youth cohort. Results hardly change. If we replace the economic inequality measures with the Gini, most of the results remain the same: medium levels of polygyny are then positive and significant for all kinds of social unrest except non-violent unrest. Details can be found in the Online Appendix.

[116] If we replace these measures with a composite indicator comprising both economic and political rights (CIRI), it is negatively associated (i.e., fewer unrest incidences and lower intensity) with increasing women's rights and significant for violent unrest (Online Appendix).

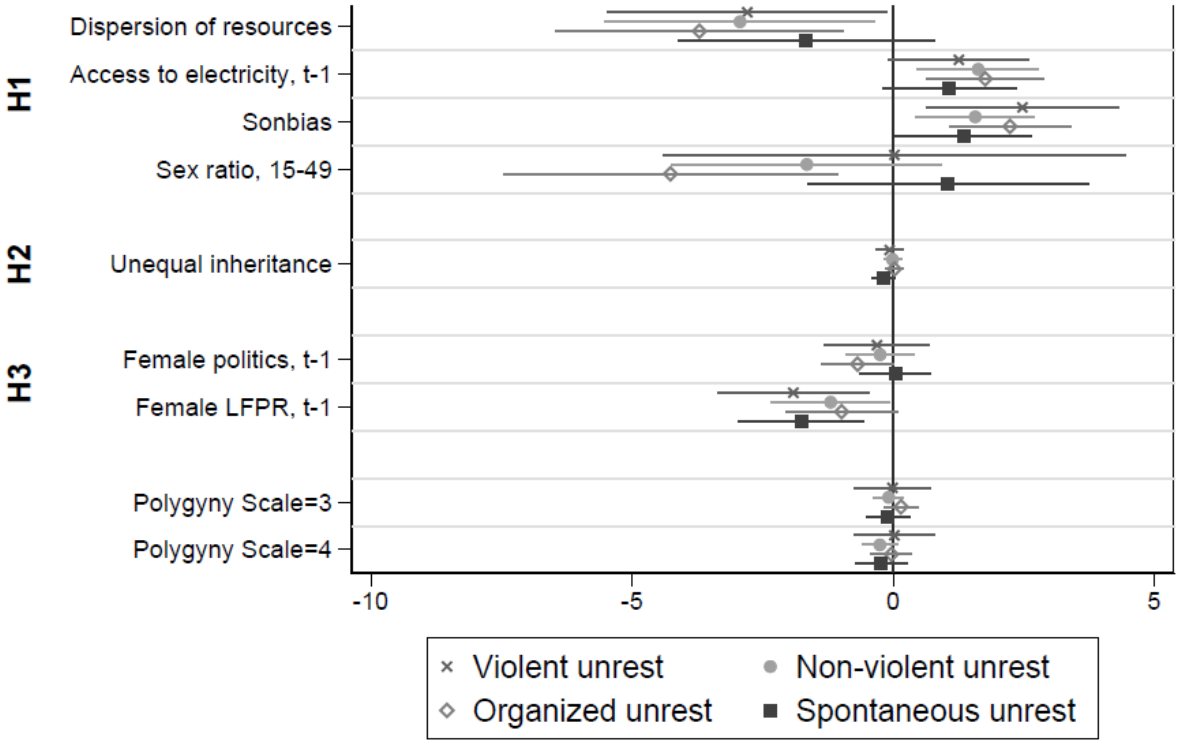
Finally, the sign of the direct effect of medium and high levels of polygyny on social unrest is positive as predicted (relative to lower levels of polygyny), but it is—with one exception—insignificant.

Intensity of Social Unrest

Next, we consider the relationship between polygyny, inequality and the *intensity* of events of social unrest. The coefficients of our variable of interest are displayed in Figure 6 and, in terms of direction and significance, are comparable to those in the previous analysis of the incidence of social unrest. Again, our hypothesis on vertical inequality (H1) is supported when looking at economic power resources and son bias. For horizontal inequality (H2), i.e., unequal inheritance, there is again little evidence for a direct effect. Gender inequality (H3) as measured by female labor force participation is significantly correlated with social unrest as before, while political participation is only significant for spontaneous unrest events (again with a positive sign). For easier interpretation, we calculate incidence rate ratios (see Appendix, table A-3).[117] For example, an increase in son bias by one unit is associated with an increase in the incidence rate of organized (violent) unrest by a factor of 9 (11). If female labor force participation increases by one unit, the incidence rate of violent unrest decreases by more than 50 percent.

[117] The results are only associations and should not be interpreted in a causal way. However, the robustness of the results to different estimators (logistic, negative binomial and OLS) and the variation in the choice of variables suggest that they are meaningful. Extensions and robustness checks are provided in the Online Appendix.

Figure 6: Intensity of social unrest, polygyny, and inequality



Note: The figure shows the coefficients of our variables of interest using our preferred specifications for the intensity of social unrest (i.e., the number of events per country-year). The count models (negative binomial regressions) are displayed in detail in Table A-2. Controls, constant and time controls are included but not shown. 90% confidence intervals displayed.

Feasibility

If polygyny induces individual-level grievances, conflict activity needs to be feasible, i.e., there need to be sufficient resources for mobilization or organization. According to Collier, Hoeffler, and Rohner[118], feasibility is even more significant in determining civil wars than participants' motivation. As social unrest is less costly than civil war or armed conflict, the influence of resources on the feasibility of such events—if there is any—is not yet fully understood. To approximate feasibility, we interact a country's mean income (GDP per capita) with polygyny to test whether there are any combined effects. In line with *Hypothesis H2b*, we want to shed

[118] Collier, Hoeffler, and Rohner, "Beyond Greed and Grievance."

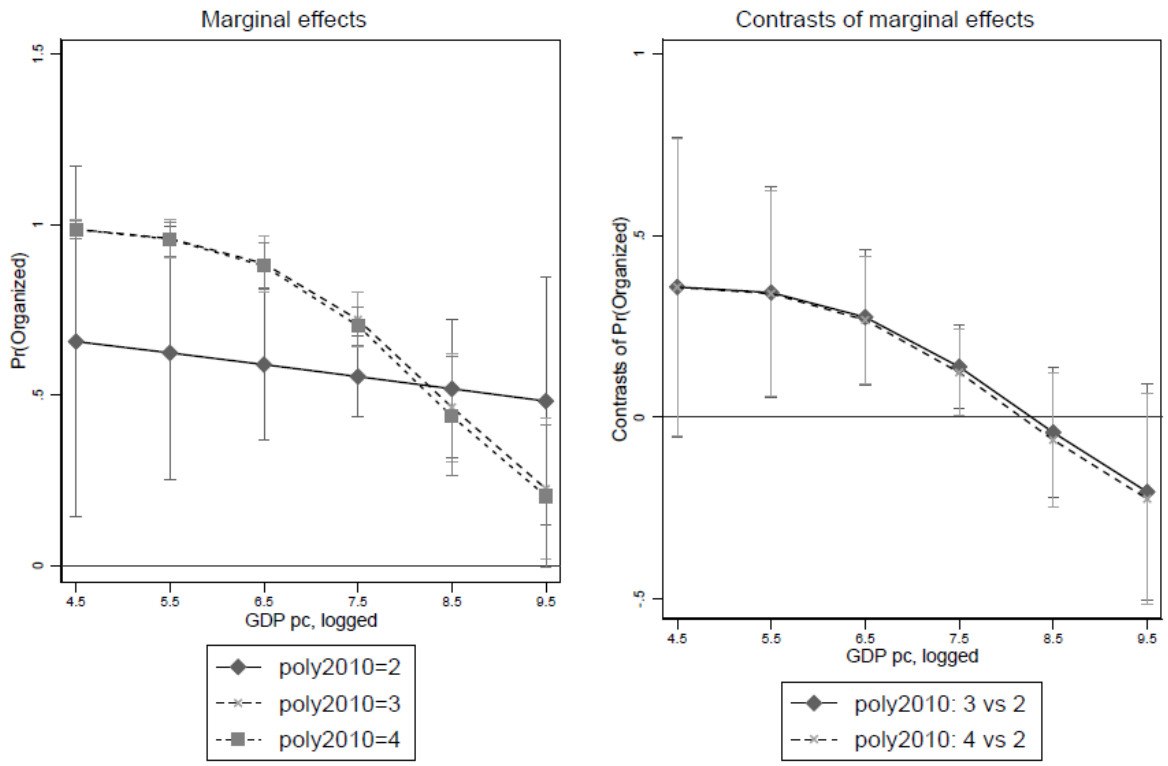
light on whether there is an association between polygyny and social unrest only when sufficient resources are available. We calculate in the following the marginal effects for different levels of polygyny and GDP per capita (keeping all covariates at their means).

The left panel of Figure 7 shows the marginal effects on organized social unrest for different levels of polygyny coinciding with various levels of income. The graph shows a declining probability of organized social unrest when GDP per capita rises. This pattern varies with the different levels of polygyny. Organized social unrest is more likely in relatively poor countries that exhibit a high prevalence of polygyny. The difference between high (medium) and low levels of polygyny is significant for low to medium levels of GDP per capita but not above a certain threshold, as shown by the contrasts of margins in Figure 7 (right panel). Hence, individual-level grievances related to polygyny matter, especially in poor countries. This implies that a lack of resources does not seem to be a major obstacle to organizing social unrest. Thus, the feasibility hypothesis that matters for larger-scale conflicts does not apply to low-level conflicts. Analogous graphs for the other three types of social unrest, which show similar patterns, are presented in the Online Appendix.

Here, the difference between high and low or medium and low levels of polygyny are not significant[119].

[119] A similar picture arises in the count model. Results are available in the Online Appendix.

Figure 7: Organized unrest: Polygyny and GDP interacted



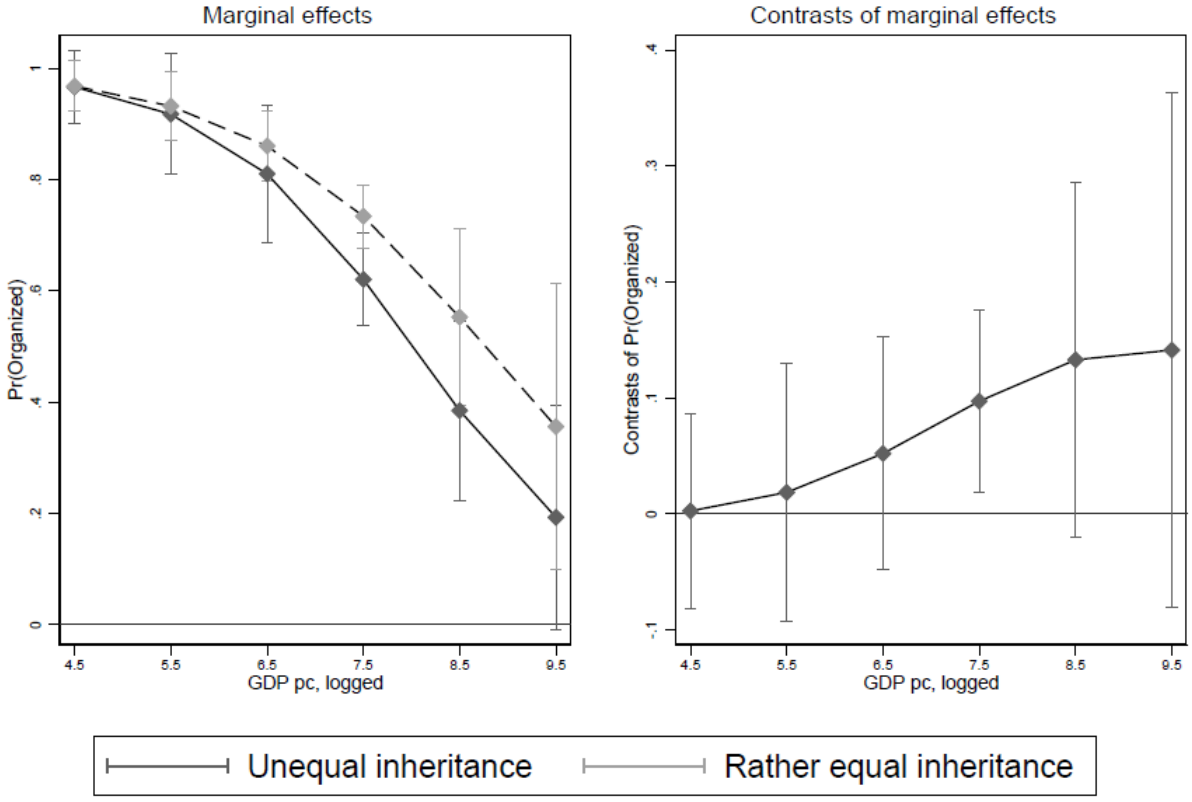
Note: The figure on the left shows marginal effects for the three levels of polygyny for various levels of GDP per capita, holding all control variables at their means. The right panel shows the contrasts of the marginal effects, i.e., the difference across the levels of polygyny (category 3 versus 2 and 4 versus 2) for the interaction effects. The interaction effects are integrated in the baseline specification as shown in Table A-2. 90% confidence intervals displayed.

Hypothesis 2b states that within-elite feuds extend to the rest of population only when elite men can effectively mobilize non-elite men. A change in leadership could be attractive for non-elite men if it is linked to future monetary or non-monetary benefits. Therefore, conflict-seeking elite men need sufficient resources. Again, we approximate this resource availability by considering GDP per capita, which we interact with horizontal inequality within the elite. For this, we create a binary variable for the presence of very high/high levels of unequal inheritance versus no/light unequal treatment in polygynous situations.

Figure 8 shows the marginal effects of this interaction. Considering again only organized forms of social unrest here (with other forms presented in the Online Appendix), there is a significant

difference between the different levels of horizontal inequality above median levels of GDP (also for non-violent unrest but not the other two forms). If there is inequality within the polygynous elite, the probability of a decrease in organized social unrest is smaller. Or, put differently, the pacifying effect of higher income is smaller in a rich country, when horizontal inequality is high[120].

Figure 8: Organized unrest: Inheritance and GDP interacted



Note: The figure on the left side shows marginal effects of unequal inheritance and equal inheritance at various levels of GDP per capita, holding all control variables at their mean. The right panel shows the contrasts of these marginal effects (i.e., unequal inheritance versus no unequal inheritance). The interaction effects are integrated in the baseline specification as shown in Table A-2. 90% confidence intervals displayed.

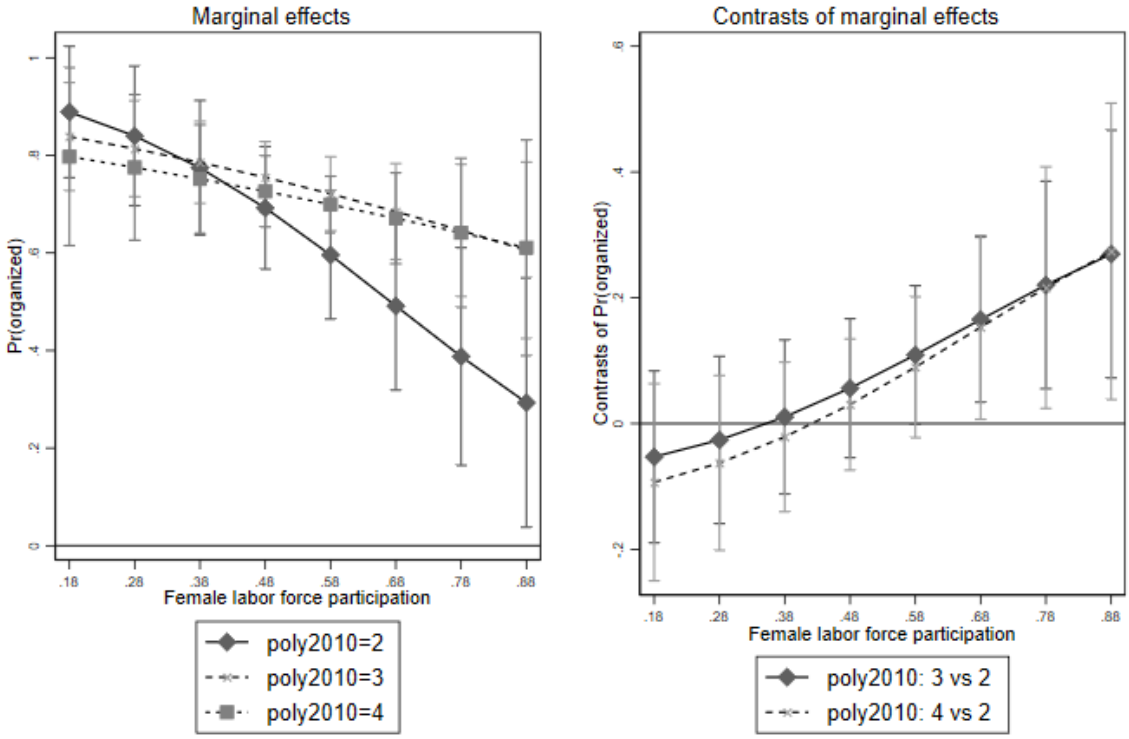
[120] Similar results apply to the analysis of the intensity of social unrest (available in the Online Appendix).

Gender inequality

The lack of women's voice or deeply rooted beliefs and attitudes favoring gender inequality may reinforce the potential for social unrest especially at high levels of polygyny. Therefore, we also consider the interaction of polygyny and gender inequality. Again, we calculate the marginal effects with respect to organized social unrest for different levels of polygyny and gender inequality and present them in Figure 9[121]. If female labor force participation is low (i.e., gender inequality is high), organized social unrest is more likely. If female labor force participation increases, but polygyny is highly prevalent, the decrease in organized unrest is significantly smaller compared to low levels of polygyny. Thus, gender equality that reaches only parts of societal life (but not family life) cannot fully stabilize society. For gender equality in politics, no significant differences between high and low levels of polygyny exist.

[121] Findings for other forms of social unrest are analogous in direction, though not significant. For those and for the count model, see the Online Appendix.

Figure 9: Organized unrest: Polygyny and female labor force participation



Note: The figure on the left shows marginal effects for the three levels of polygyny for various levels of female labor force participation, holding all control variables at their mean. The right panel shows the contrasts of the marginal effects, i.e., the difference across the levels of polygyny (category 3 versus 2 and 4 versus 2) for the interaction effects. The interaction effects are integrated in the baseline specification as shown in Table A-2. 90% confidence intervals displayed.

5. Discussion of Alternative Hypotheses

In this section, we analyze the plausibility of the mediating effects of different types of inequality that we proposed in hypotheses H1, H2 and H3 by discussing whether there could be valid alternative hypotheses possibly leading to the same outcomes.

Strategic behavior of the elite

In *Hypothesis 1*, we argue that polygyny is closely tied to vertical inequality between men who belong to the local or ruling elite and who can afford to marry several women, and men who cannot. The resulting grievances, either reproductive or economic, may lead to destabilization,

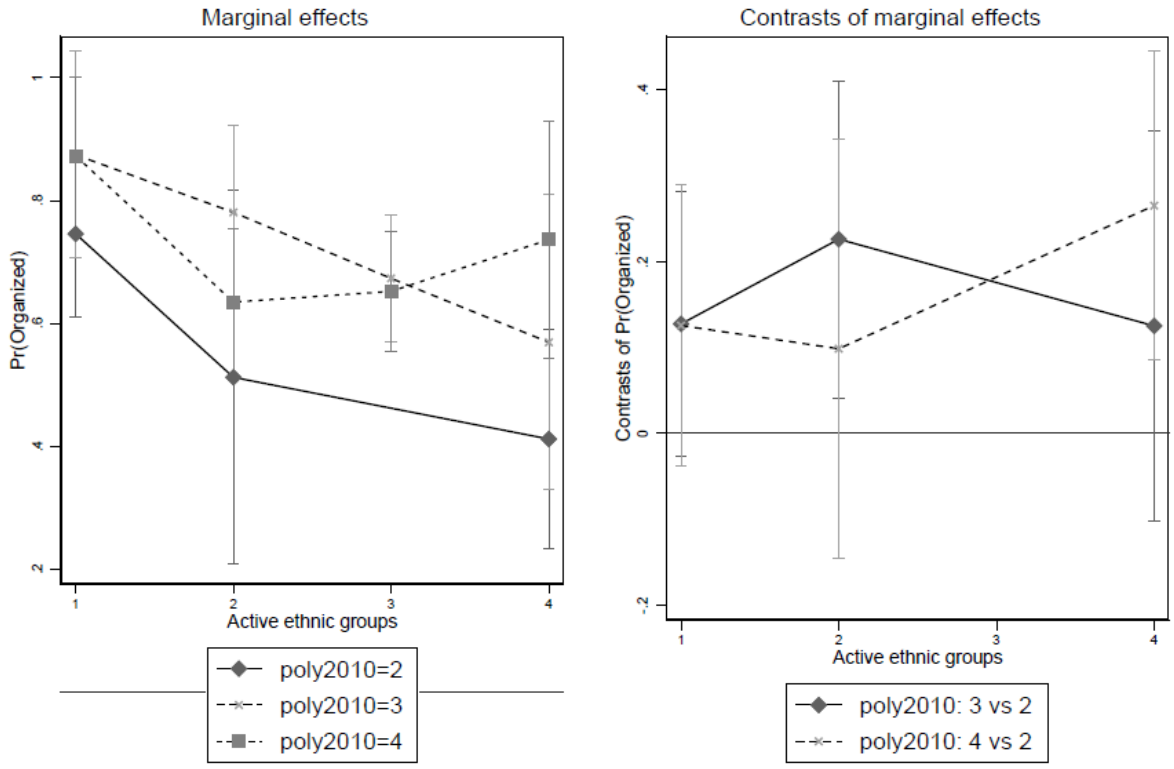
a finding that is supported by our empirical results. If the elite men are (rationally) expecting this outcome, they have several choices to stabilize their status and power, in particular when there is a stable network of elite families helping each other. One way to foster elite networks or 'clan governance'[122], is the strategic use of polygyny. That is, elite families could strategically marry their daughters to other families' patriarchs and sons in order to stabilize ties between clans.

Empirically, this behavior implies that the estimated effects of polygyny in Section 4 are in fact downward biased, as polygyny may be a tool to stabilize societies. We test this by using data from Girardin et al.[123] on the number of active ethnic groups per country. We create a categorical variable that is '1' if there are one or two groups, '2' if there are three or four groups, '3' for five and six groups and '4' for more groups. Interacting this variable with the level of polygyny sheds some light on strategic marriages. If strategic marriages were happening, we would expect to see a decreasing probability of social unrest if more groups are active and, at the same time, polygyny is more present. However, the marginal effects do not show such a clear picture, as Figure 10 indicates.

[122] Hudson, Bowen, and Nielsen, "Clan Governance."

[123] Girardin et al, *GROWup.*

Figure 10: Organized unrest: Polygyny and female labor force participation



Note: The figure on the left shows marginal effects of the three levels of polygyny for four categories of active ethnic groups, holding all control variables at their mean. The right-hand panel shows the contrasts of the marginal effects, i.e., the difference across the levels of polygyny (category 3 versus 2 and 4 versus 2) for the interaction effects. The interaction effects are integrated in the baseline specification as shown in Table A-2. 90% confidence intervals displayed. Note that the categories of active ethnic groups are not the actual number of ethnic groups. A higher number indicates more groups.

Another option for elite men would be to restrict themselves, in line with the male compromise theory. This would imply that it would be rational to limit the number of wives per man or to ban polygyny altogether in order to avoid rebellions[124]. However, polygyny levels are rather stable[125], bans arguably do not work[126], and the limitation to four wives per man in Islamic

[124] Alexander, *The biology of moral systems*, Betzig, *Despotism and differential reproduction*, and Lagerlöf, "Pacifying Monogamy."

[125] See for example, Dalton and Leung, "Why is polygyny more prevalent in Western Africa?."

[126] Tertilt, "Polygyny, Fertility, and Savings," and "Polygyny, Women's Rights, and Development."

family law still results in considerable inequality in marriage markets, leaving many men without the possibility to marry.

Population growth as a factor to ease tight marriage markets

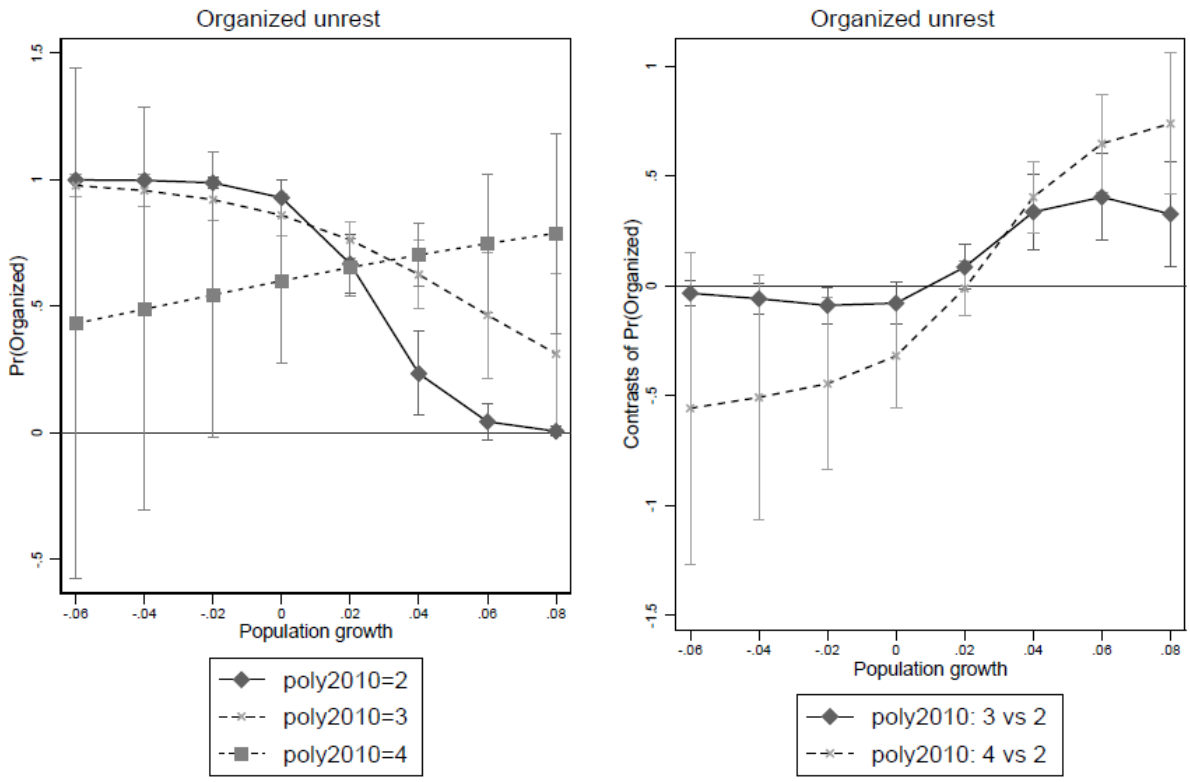
Through the monopolization of women by the elite, polygyny leads to a marriage market squeeze that implies vertical inequality with respect to reproduction. Potentially, population growth could ease this problem. If enough (young) women are born and married, men could simply marry younger women, implying a reduced or no shortage of brides[127]. If population growth could reduce reproductive frustration from polygyny, the association between social unrest and polygyny should be lower at higher levels of population growth. However, Figure 11 does not support this argument. On the contrary, for organized social unrest, high population growth coinciding with high levels of polygyny has a significantly higher probability of unrest compared to a situation with low levels of polygyny[128].

In section 2.1, we have already discussed that a high population growth may not resolve the problem of tight marriage markets for *young* men because they must be patient and wait until the marriage market imbalance eventually vanishes through larger cohorts of young women. Figure 2 indicates that men rarely marry at young ages, while women do (see also footnote 27). Hence, the conflict potential resulting from a large pool of frustrated and violence-prone 'young' men remains despite population growth (and is aggravated when the additional young women ultimately end up in polygynous unions with older men).

[127] See for example Scott J. Cook and Cameron G. Thies, "In Plain Sight? Reconsidering the Linkage between Brideprice and Violent Conflict." *Conflict Management and Peace Science*, Vol. 32, No 2 (2019), pp. 129-146.

[128] For the other forms of social unrest, results are available in the Online Appendix.

Figure 11: Organized unrest: Polygyny and population growth



Note: The figure on the left shows marginal effects of the three levels of polygyny for various levels of population growth, holding all control variables at their mean. The right-hand panel shows the contrasts of the marginal effects, i.e., the difference across the levels of polygyny (category 3 versus 2 and 4 versus 2) for the interaction effects. The interaction effects are integrated in the baseline specification as shown in Table A-2. 90% confidence intervals displayed.

Polygyny as a consequence of violence

Polygyny implies that women are scarce because some men are married to several of them at the same time. If social unrest is violent and eventually extends to more severe armed conflicts, the risk of dying on the battlefield increases for men, turning our previous argument upside

down. Because of war, it may be men, not women, who become scarce. In this case, polygyny could be a solution to resolve a 'surplus of women', as, e.g., Ember[129] suggests.

Empirically, this would imply a problem of reverse causality that would weaken our analysis and argument. However, several arguments speak against this. First, Urdal and Che[130] find that female death rates are also abnormally high in times of war because maternal health is strongly negatively affected by violent conflicts. Second, several studies find that after conflict periods, fertility increases but not necessarily marriages, such that fewer registered unions seem to be likely[131]. Finally, since we only consider social unrest, the number of deaths typically ought to be too low to significantly change the sex ratio.

Nevertheless, we test whether the number of conflict years or related variables (until 2009) are correlated with polygyny (in 2010) using a simple linear regression. Empirically, we do not find support for this causal direction. Appendix table A-4 does not support this link. We test several variables related to social unrest and conflict. Neither the number of fatalities in conflict episodes nor the number of violent unrest events per year or the sum of all social unrest events is significant. The number of violent unrest events and ongoing conflict are only significant when we also include absolute latitude. This measure is highly significant, which seems reasonable given the geographic location of the polygyny belt.

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[129] Melvin Ember, "Warfare, Sex Ratio, and Polygyny." *Ethnology*, Vol. 13, No. 2 (1974), pp. 197-206; and Melvin Ember, "Alternative Predictors of Polygyny." *Behavior Science Research*, Vol. 19, No. 1-4 (1984), pp. 1-23.

[130] Urdal and Che, "War and Gender Inequalities in Health."

[131] Victor Agadjanian and Ndola Prata, "War, Peace, and Fertility in Angola." *Demography*, Vol. 39, No. 2 (2002), pp. 215-231, Dirk Bethmann and Michael Kvasnicka, "World War II, Missing Men and Out of Wedlock Childbearing." *The Economic Journal*, Vol. 123, No. 567 (2013), pp. 162-194, and Kati Schindler and Marijke Verpoorten, "Armed Conflict, Sex Ratio and Marital Outcomes: Evidence from Rwanda. (2013) Unpublished Manuscript, available here: https://www.diw.de/documents/vortragsdokumente/220/diw_01.c.425211.de/v_2013_schindler_armed_eea.pdf

We also test whether skewed sex ratios are correlated with polygyny, an argument put forward by Dalton and Leung[132]. They follow Nunn and Wantchekon[133] in arguing that slave trade was, depending on the destination, focused heavily on males. Thereby, it created a sex-ratio shock and led to (or increased) polygyny, which is then assumed to have persisted until today. However, we do not find evidence for this mechanism in our much larger sample (see column 5). Similarly, including income inequality as a predictor does not have any impact.

6. Conclusion

This paper provides a comprehensive theoretical and empirical analysis of the linkages between polygyny and conflict with a special emphasis on the role of inequality. We extend the theoretical arguments put forward by the existing literature by clearly distinguishing three different channels through which different dimensions of inequality mediate polygyny to trigger instability. Each channel refers to a specific type of inequality: vertical inequality between elite and non-elite men, horizontal inequality within the elite, and gender inequality.

We argue that personal grievances related to frustrations from polygyny-induced inequality lead to small-scale social unrest in the first place; only under particular circumstances might they also lead to larger-scale conflict. In this respect, we differ substantially from the existing literature with its sometimes ambiguous results regarding the polygyny-conflict nexus. In contrast, our correlative results mostly support the initial statement that polygyny 'breeds inequality' and 'begets violence'.

[132] Dalton and Leung, "Why is Polygyny More Prevalent in Western Africa?."

[133] Nathan Nunn and Leonard Wantchekon, "The Slave Trade and the Origins of Mistrust in Africa." *American Economic Review*, Vol. 101, No. 7 (2011), pp. 3221-52.

More specifically, all three types of inequality lead to specific grievances or induce 'greed', which may then result in social unrest. Polygyny consistently has a positive, but not always significant, effect on social unrest. Vertical and gender inequality are particularly correlated with social unrest, mostly organized and non-violent. As for horizontal inequality, our results indicate that a certain income level needs to be present for elite-internal conflicts to spread to the public. Reduced gender inequality, measured by higher female labor-force participation rates, is negatively associated with unrest; however, this effect is smaller for high levels of polygyny.

Furthermore, we consider alternative hypotheses and test whether they change our results. Here, we find no support for the idea that strategic polygyny may pacify societies, nor do we find evidence that population growth reduces the destabilizing effects of polygyny.

Overall, we show that the societal dynamics surrounding polygyny are complex and that they interact. While the previous literature has already provided interesting insights into the polygyny-conflict nexus, we are able to extend the focus of this field of research in a comprehensive manner by systematically developing a theory of the polygyny-inequality-conflict nexus and testing it. Taken together, the results support the view that effectively banning polygyny may not only be worthwhile in order to improve gender rights, but also for reducing other dimensions of inequality. Equally important, the political and social stability of nations may benefit as well.

Polygyny, Inequality, and Social Unrest

Appendix

Table A-1: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Dependent variables					
Violent unrest incidence	0.700	0.459	0	1	932
Peaceful unrest incidence	0.756	0.429	0	1	932
Organized unrest, incidence	0.665	0.472	0	1	932
Spontaneous unrest, incidence	0.704	0.457	0	1	932
Peaceful unrest, events per year	5.327	16.18	0	358	932
Violent unrest, events per year	6.231	19.449	0	290	932
Organized unrest, events per year	3.158	7.296	0	160	932
Spontaneous unrest, events per year	4.369	15.566	0	311	932
Control variables					
Ongoing conflict, t-1	0.218	0.413	0	1	932
GDPpc, t-1	7.515	0.834	4.959	9.771	932
Population, t-1	2.299	1.188	-0.148	5.152	932
Mountainous	1.647	1.448	0	4.421	932
Opec	0.07	0.255	0	1	932
Instability	0.039	0.193	0	1	932
Polity	0.109	5.287	-10	9	932
Religious frac.	0.464	0.205	0	0.783	932
Population share excluded, t-1	0.208	0.281	0	0.92	932
Nr neighbors unrest, t-1	3.639	2.008	0	9	932
Polygyny & Mechanisms					
Dispersion of resources	0.379	0.082	0.13	0.575	932
Sonbias	0.164	0.125	0	0.478	932
Sex ratio, 15-49	0.975	0.039	0.784	1.136	932
Unequal inheritance	1.698	0.878	0	3	932
Female politics, t-1	0.659	0.199	0.088	1	932
Female LFPR, t-1	0.594	0.188	0.188	0.893	932
Access to electricity, t-1	0.276	0.265	0	1	932
Polygyny Scale	3.376	0.736	2	4	932

Table A-2: Incidence and intensity of social unrest

	Incidence				Intensity			
	Violent	Non-violent	Spontaneous	Organized	Violent	Non-violent	Spontaneous	Organized
Ongoing conflict, t-1	0.318*	–0.187	–0.114	–0.182	0.495**	–0.111	–0.054	–0.215
	(0.175)	(0.236)	(0.251)	(0.259)	(0.247)	(0.127)	(0.149)	(0.155)
GDPpc, t-1	–0.405	–0.993***	–0.491**	–0.941***	–0.265	–0.203	–0.159	–0.188
	(0.304)	(0.228)	(0.245)	(0.217)	(0.208)	(0.152)	(0.186)	(0.164)
Population, t-1	0.446***	0.154	0.643***	0.018	0.473***	0.331***	0.443***	0.271***
	(0.130)	(0.118)	(0.123)	(0.129)	(0.133)	(0.088)	(0.099)	(0.095)
Mountainous	0.075	0.179*	–0.012	0.154	0.053	–0.093	–0.069	–0.073
	(0.100)	(0.099)	(0.121)	(0.099)	(0.117)	(0.074)	(0.099)	(0.076)
Opec	0.240	0.250	0.218	0.157	0.130	–0.216	0.036	–0.250
	(0.306)	(0.572)	(0.563)	(0.352)	(0.315)	(0.315)	(0.337)	(0.326)
Instability	0.886**	0.728**	1.248***	0.288	0.368**	0.966***	0.783***	0.903***
	(0.364)	(0.367)	(0.302)	(0.311)	(0.171)	(0.198)	(0.170)	(0.227)
Polity	0.036	–0.000	–0.018	–0.004	0.047**	0.010	0.020	0.016
	(0.027)	(0.027)	(0.025)	(0.029)	(0.020)	(0.015)	(0.016)	(0.016)
Religious frac.	2.412**	1.720*	1.522	1.891**	1.724*	0.812	1.132	1.372*
	(0.959)	(0.970)	(1.027)	(0.959)	(0.952)	(0.761)	(0.741)	(0.792)
Population share excluded, t-1	0.052	0.177	–0.170	–0.122	0.425	0.235	0.225	0.122
	(0.439)	(0.521)	(0.413)	(0.566)	(0.391)	(0.250)	(0.282)	(0.286)
Nr neighbors unrest, t-1	0.054	0.169**	0.059	0.086	0.004	–0.008	0.002	–0.012
	(0.066)	(0.081)	(0.081)	(0.059)	(0.059)	(0.040)	(0.047)	(0.032)
Dispersion of resources	–2.548	–3.922*	–2.350	–4.566*	–2.791*	–2.930*	–1.664	–3.708**
	(1.813)	(2.182)	(1.968)	(2.372)	(1.628)	(1.572)	(1.494)	(1.670)
Access to electricity, t-1	0.298	2.746***	1.085	2.704***	1.257	1.628**	1.078	1.762***
	(0.976)	(1.027)	(1.099)	(0.894)	(0.818)	(0.706)	(0.779)	(0.683)
Sonbias	3.388***	0.952	0.337	2.518**	2.475**	1.571**	1.346*	2.238***
	(1.140)	(1.301)	(1.213)	(1.158)	(1.119)	(0.687)	(0.797)	(0.705)
Sex ratio, 15-49	2.038	2.688	0.613	3.973	0.023	–1.651	1.051	–4.264**
	(3.547)	(3.491)	(3.754)	(3.383)	(2.695)	(1.569)	(1.631)	(1.946)
Unequal inheritance	–0.008	0.180	–0.223	0.251	–0.067	–0.012	–0.195	0.024
	(0.163)	(0.145)	(0.151)	(0.173)	(0.157)	(0.103)	(0.136)	(0.109)
Female politics, t-1	0.173	–0.393	1.016	–1.253*	–0.311	–0.249	0.043	–0.682
	(0.619)	(0.676)	(0.722)	(0.699)	(0.606)	(0.398)	(0.414)	(0.419)
Female LFPR, t-1	–3.538***	–2.711**	–3.201***	–2.017*	–1.910**	–1.196*	–1.759**	–0.987
	(1.029)	(1.325)	(1.118)	(1.051)	(0.886)	(0.691)	(0.727)	(0.652)
Polygyny Scale=3	0.397	0.342	0.624**	0.507	–0.011	–0.085	–0.098	0.152
	(0.261)	(0.279)	(0.263)	(0.368)	(0.448)	(0.176)	(0.253)	(0.198)
Polygyny Scale=4	0.122	0.119	0.328	0.278	0.023	–0.254	–0.225	–0.034
	(0.375)	(0.368)	(0.399)	(0.351)	(0.468)	(0.212)	(0.294)	(0.240)
Time Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	932	932	932	932	932	932	932	932
Countries	41	41	41	41	41	41	41	41
Pseudo-R2	0.168	0.133	0.191	0.118	0.109	0.093	0.118	0.087
Log likelihood	–474.031	–448.378	–458.311	–523.862	–2187.681	–2253.164	–2008.797	–1888.162

Notes: Dependent variable: Incidence (using a logistic regression) or number of events (using a negative binomial regression) of social unrest, 1990-2014, from SCAD. Clustered (by country) standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table A-3: Intensity of social unrest: Incidence Rate Ratios

	Violent	Non-violent	Spontaneous	Organized
Ongoing conflict, t-1	1.640*	0.895	0.948	0.807
	(2.00)	(-0.87)	(-0.36)	(-1.39)
GDPpc, t-1	0.767	0.816	0.853	0.828
	(-1.28)	(-1.33)	(-0.85)	(-1.15)
Population, t-1	1.605***	1.392***	1.557***	1.311**
	(3.55)	(3.75)	(4.45)	(2.85)
Mountainous	1.055	0.911	0.933	0.930
	(0.46)	(-1.25)	(-0.69)	(-0.96)
Opec	1.138	0.806	1.036	0.779
	(0.41)	(-0.69)	(0.11)	(-0.77)
Instability	1.445*	2.628***	2.188***	2.468***
	(2.15)	(4.89)	(4.61)	(3.99)
Polity	1.048*	1.010	1.020	1.016
	(2.38)	(0.66)	(1.24)	(0.94)
Religious frac.	5.606	2.253	3.103	3.944
	(1.81)	(1.07)	(1.53)	(1.73)
Population share excluded, t-1	1.529	1.266	1.252	1.130
	(1.09)	(0.94)	(0.80)	(0.43)
Nr neighbors unrest, t-1	1.004	0.992	1.002	0.988
	(0.06)	(-0.21)	(0.04)	(-0.37)
Dispersion of resources	0.0613	0.0534	0.189	0.0245*
	(-1.71)	(-1.86)	(-1.11)	(-2.22)
Access to electricity, t-1	3.516	5.093*	2.937	5.823**
	(1.54)	(2.31)	(1.38)	(2.58)
Sonbias	11.88*	4.813*	3.841	9.379**
	(2.21)	(2.29)	(1.69)	(3.18)
Sex ratio, 15-49	1.024	0.192	2.861	0.0141*
	(0.01)	(-1.05)	(0.64)	(-2.19)
Unequal inheritance	0.936	0.988	0.823	1.024
	(-0.42)	(-0.11)	(-1.44)	(0.22)
Female politics, t-1	0.733	0.779	1.044	0.506
	(-0.51)	(-0.63)	(0.10)	(-1.63)
Female LFPR, t-1	0.148*	0.302	0.172*	0.373
	(-2.16)	(-1.73)	(-2.42)	(-1.51)
Polygyny Scale=3	0.989	0.918	0.906	1.164
	(-0.03)	(-0.48)	(-0.39)	(0.77)
Polygyny Scale=4	1.024	0.776	0.799	0.967
	(0.05)	(-1.20)	(-0.76)	(-0.14)
lnalpha	1.385**	1.000	1.007	1.053
Observations	932	932	932	932
Time Controls	YES	YES	YES	YES
Observations	932	932	932	932
Countries	41	41	41	41

Notes: Exponentiated coefficients (incidence rate ratios) shown. Dependent variable: Number of unrest events per country-year, 1990-2014, from SCAD. Clustered (by country) standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table A-4: Testing reverse causality

	(1)	(2)	(3)	(4)	(5)	(6)
Ongoing conflict	–0.206	–0.173	–0.165	–0.187*	–0.202**	–0.217*
	(0.146)	(0.134)	(0.134)	(0.101)	(0.096)	(0.112)
GDPpc	–0.044	–0.059	–0.063	0.089	0.122	0.257*
	(0.106)	(0.102)	(0.101)	(0.100)	(0.096)	(0.148)
Population	–0.200**	–0.220**	–0.209**	–0.176**	–0.142*	–0.180**
	(0.095)	(0.100)	(0.096)	(0.079)	(0.079)	(0.080)
Mountainous	–0.233***	–0.230***	–0.231***	–0.247***	–0.276***	–0.263***
	(0.056)	(0.054)	(0.054)	(0.055)	(0.059)	(0.059)
Opec	0.158	0.160	0.150	0.228	0.177	0.263
	(0.328)	(0.308)	(0.309)	(0.205)	(0.223)	(0.225)
Instability	–0.167	–0.171	–0.169	–0.123	–0.108	–0.009
	(0.133)	(0.133)	(0.133)	(0.114)	(0.105)	(0.139)
Polity	0.007	0.003	0.003	0.003	–0.001	0.018
	(0.012)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)
Religious frac.	1.324***	1.298**	1.322***	0.318	0.376	0.149
	(0.477)	(0.487)	(0.480)	(0.457)	(0.426)	(0.434)
Population share excluded, t-1	–0.118	–0.166	–0.160	–0.328	–0.342	–0.098
	(0.184)	(0.201)	(0.200)	(0.200)	(0.203)	(0.177)
Nr neighbors unrest, t-1	0.124**	0.126**	0.127**	0.092*	0.089*	0.064
	(0.049)	(0.049)	(0.048)	(0.048)	(0.046)	(0.042)
Any unrest incidence	–0.025					
	(0.096)					
Fatalities in conflict, log	0.011	0.004	0.010	0.006	0.009	–0.002
	(0.021)	(0.020)	(0.017)	(0.016)	(0.016)	(0.019)
Violent unrest events		0.004	0.005	0.007**	0.007**	0.007**
		(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Sum of conflict events			–0.011			
			(0.020)			
Absolute latitude				–0.042***	–0.045***	–0.054***
				(0.014)	(0.013)	(0.016)
Distance to coast(km)				0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
Sex ratio, age 15-49					–0.026	
					(0.020)	
Mean GINI						–1.724
						(1.541)
Time Controls	YES	YES	YES	YES	YES	YES
Observations	335	335	335	335	335	256
Countries	34	34	34	34	34	32
Log likelihood	–203.229	–201.884	–201.467	–157.199	–151.264	–117.228
AIC	432.457	429.768	430.935	344.398	334.528	266.455
BIC	482.041	479.351	484.332	401.610	395.554	323.178

Notes: Includes observations of unrest only for years before the observed polygyny level. OLS regression with polygyny scale as dependent variable. Clustered (by country) standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table A-5: Variable Definitions and Sources

Variable	Definition	Source
Polygyny	Prevalence and legal status of polygyny in a given state. In Africa, the smallest value is a 2: Polygyny is generally illegal, except for certain minority ethnic or religious enclaves, but this represents < 5% of women being in such marriages. 3: Polygyny is legal under customary/religious law, but < 25% of women are in such arrangements. 4: Polygyny is legal under customary/religious law (though it may or may not be illegal under national law; if it is illegal, the government does not enforce the law), but it is common (more than > 25% of women are in such relationships).	The WomanStats Project, scale designed by Rose McDermott, coded in 2010.
Unequal inheritance	No polygyny (0). (Rather) Equal (1): Widows and sons all receive an equal share. Sons may get more than widows. Inheritance claims are secure and valid. Customary/informal/lesser wives and their sons may get less, Unequal (2): Ranking of wives translates to theirs and their sons' inheritance (also among legally married wives). Very unequal (3): One (male) heir gets all, maybe with some kind of support duty for dependent family members.	Own data collection and coding.
Dispersion of resources	This index includes the prevalence of family farms (weighted with the share of agricultural population) and the degree of centralization of the public and private sector (weighted with the share of the non-agricultural population).	Constructed by Vanhanen (1990). Data from Finnish Social Science Data Archive.
Sonbias	Subcategory of the Social Institutions and Gender Index (SIGI). Prevalence of marriage practices favoring sons as well as missing women, and ranges from '0' (no son bias) to '1'.	SIGI (OECD 2014 ; Branisa et al. 2014)
Sex ratio, 15-49	Males per 100 females in a country for the age group 15 to 49.	UN World Population Prospects 2017
Females in politics	Lower chamber female legislators and power distributed by gender, created by Sundstr¨om et al. (2017).	V-DEM version 7.1
Female labor force participation	Labor force participation rate is the proportion of the female population ages 15 and older that is economically active.	World Development Indicators
Access to electricity	Access to electricity is the percentage of population with access to electricity.	World Bank Development Indicators
Ongoing conflict	Binary variable, '1' if the country-year experiences an intrastate conflict, '0' if not.	UCDP/PRIO Armed Conflict Dataset version 4, 2015
Unrest incidence	Binary variable, '1' if one ore more events of the specific unrest type took place in that country year. Types of unrest: Violent and non-violent, spontaneous and organized event.	Social Conflict Analysis Database (SCAD), Version 3.2
Unrest intensity	Number of unrest events of the specific unrest type.	Social Conflict Analysis Database (SCAD), Version 3.2
GPC per capita	Real GDP (PPP) per capita.	Penn World Tables v.9
Population size	Population.	Penn World Tables v.9
Mountainous	Percent of mountaineous terrain.	Fearon and Laitin (2003)

Variable	Definition	Source
Opec	Binary variable, '1' if a country is OPEC member, '0' if not.	Own coding.
Polity	Polity2 indicator from the PolityIV Project: from −10, i.e., autocracy to +10 democracy.	Polity4 version 2016
Instability	Own coding based on Polity2 indicator following Fearon and Laitin (2003): '1' if the Polity2 indicator changed by three or more points in the last three years.	Polity4 version 2016
Religious fractionalization	Probability that two randomly drawn individuals are from different religious groups.	Fearon and Laitin (2003)
Population share excluded	Fraction of total population belonging to excluded groups.	EPR (Ethnic Power Relations) Core Dataset 2018
Nr. neigbhors unrest	Own coding using data on neighboring countries' unrest incidence: count variable for number of neighbors with unrest events in a year.	SCAD Version 3.2 combined with contiguity from CEPII
Gini	Mean GINI, post tax income	SWIID, Version 6.1 (Solt 2016)
Active ethnic groups	Own coding based on count variable of ethnic groups: '1' if one or two groups, '2' if three or four groups, '3' if five or six groups, '4' if more than '6' groups.	EPR (Ethnic Power Relations) Core Dataset 2018
Population growth		Penn World Tables v.9
Polyarchy	Electoral democracy index (from '0', least electoral democracy to 1, most electoral democracy	V-DEM version 7.1
Male youth bulge	Sex ratio (males per 100 females) for the ages 15 to 24.	UN World Population Prospects 2017
Share rural population	Percentage of population living in rural areas.	World Bank Development Indicators
CIRI	Women's economic and political rights (from '0', no rights, to '1', full rights).	Cingranelli and Richards (2010)