Polygamy, the Commodification of Women, and the Erosion of Trust

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Epigraph

Man is more powerful in body and mind than woman, and in the savage state he keeps her in a far more abject state of bondage than does the male of any other animal.

- Charles Darwin, The Descent of Man

Abstract:

Family systems shape social institutions, yet they are rarely considered in histories of economic development. In this paper, we show how market forces act through the dichotomy of polygamy and monogamy, mirroring them in a syndrome of social conventions such as age at marriage, bride price, sequestration, and discrimination and violence against women. We argue that this syndrome, which we call *polygamos* and which we quantify by two different methods, has demonstrable consequences for the development of economic and institutional well-being.

Introduction:

The household is a critical unit of analysis across many of the social sciences, most especially in anthropology, demography and sociology. In contrast, economics and political science have given it considerably less attention, focusing instead on the individual actor/citizen and their interactions with the marketplace or the state. Nonetheless, economic history and family history do sometimes share overlapping scholarly pursuits. Yet they differ sufficiently in both object of study and methodological preference as to limit the potentially fruitful transmission of relevant insights across the scholarly divide. Family history, with its concern for the particular experiences of households over the life course, has leaned heavily and persistently toward explanations of an idiographic nature. It sits comfortably within the broad tent that is the history discipline. Economic history on the other hand has moved increasingly into the orbit of economics, where it takes its primary task to be raising broad questions about long-term processes amenable to nomothetic explanation.

Where then is the family in economic history? While it is not altogether absent, it is nonetheless easy to miss, showing up more often at the fringes of the discipline than as a key explanand. The publication of Gary Becker's *A Treatise on the Family* in 1981 is cited as the final word on this subject by many economists, but historians find in it little that is recognizable. The so-called

'family economics' method is to apply neoclassical concepts to the decision-processes that shape family life, such as marriage, fertility, education, or the sexual division of labor among others. It does not concern itself foremost with how family processes shape the economic behavior of individuals once in the marketplace, nor more importantly how differing family systems contribute to the long-run processes of development that constitute the object of so much work in economic history. One notable exception to this has been a growing economic history literature over the last two decades on the impact of gender equity and the treatment of women in shaping economic outcomes. But the focus of this literature is primarily one about equity rather than family systems *per se*. In particular the European Marriage Pattern has been invoked as a harbinger of both gender equality and modern economic growth (Hartmann, 2004). Likewise, imbalanced sex ratios resulting from sex-selective infanticide, unequal access to resources, and/or abortion are also the object of recent studies on crime, social instability, and economic outcomes. Yet there seems to be little discussion in the literature about polygamy, a practice which yields a related but different imbalance, namely a chronic scarcity of marriageable females. Though widespread — more than half the world's nations practice it or have practiced it for all but the most recent past — it is remarkable how little work has evaluated polygamy as a factor in shaping social and political institutions, or studied its impact on rates of economic growth. It is our goal in this paper to address this absence. In particular we explore how the dichotomy of polygamy and monogamy gives rise to distinct social conventions and individual outcomes with potentially profound impact on economic performance.[1]

Conventions

The sociologist Mark Granovetter (1985) criticizes the utilitarian tradition of neoclassical economics for its assumption that rational, self-interested behavior is the prime mover of economic decision making. As an alternative, he posits that social relations are an ever-present context in which all such decisions are embedded, and in consequence, are an ever-present constraint that must be considered in theories of economic behavior. The development economist Paul Collier (2015) has offered a framework for thinking about how culture constrains decision making; while an individual's decisions may well be rational, they are not necessarily optimal in a utilitarian sense that economists know how to assess. The economic historian Douglass North (1990, 1991) defines institutions as the humanly devised constraints—be they formal, e.g., constitutions or property rights, or informal, e.g., taboos, customs, and conventions—that structure political, economic, and social interaction. Famously, he argued that alongside the usual constraints of economics, institutions are the rules of the game, that is, the determinants of economic performance. While he was not specific about what those usual constraints might be, it would not be unreasonable to assume he meant natural resources in their plenty and scarcity, climate, geography, and the vicissitudes of history, among others.

Social relations, culture, and customs are terms that seem to circle around some not-yet-agreed-upon concept, but we do not go far out on a limb to assert that these influential thinkers, as well as others too numerous to mention, agree that conventions of some kind factor into

[1] In an alternative framing, we explore how microscopic family matters give rise to mesoscopic behaviors of potentially macroscopic economic impact.

economic outcomes.[2] We elucidate here the conventions born of polygamy, for instance sequestration and commodification of women, high fertility, and low trust. In aggregate, we call these *polygamos* (puh·li·guh·mows), and we will measure them such that they may—in other work, by us and by others—be considered among the list of explanands that Granovetter, Solow, Collier, and North recognize as determinants of economic performance.

Our phrasing above, 'conventions of some kind,' begs the question, of what kind? To this we answer, the kind described in *Convention*, a slim 1969 monograph by the American philosopher David Lewis, who defined convention as an equilibrium solution to dynamic social coordination problems.[3] One such problem is co-existence with others. Simplifying Lewis's definition, a convention, ***R***, is a regularity of behavior in response to a circumstance or stimulus, ***S***, among individuals in a group such that:

1. Almost everyone understands ***R***;
2. Almost everyone conforms to ***R***;
3. Almost everyone expects almost everyone else to conform to ***R***;
4. Almost everyone prefers general conformity to ***R***, given 2.[4]

To the extent that conventions (to which almost everyone conforms) influence social outcomes, said outcomes may be expected to be different in societies adhering to different conventions. For instance, a society in which convention has it that no one can be trusted is a society in which no one is trustworthy, because to be trustworthy in such a setting is to be played for a fool. Is general untrustworthiness likely to increase, decrease, or leave unaffected the cost of economic transactions? Predictability is a facet of trustworthiness (Hurley, 2006), and thus untrustworthiness erodes our ability to make informed, efficient decisions on either the supply or demand side. In economics this is framed as a problem of imperfect market information with all of its attendant costs.

We may also ask, do conventions influence the efficacy of institutions that are not themselves conventions, specifically institutions that facilitate economic growth? Consider a banking system. A banking system is not a behavior and therefore is not a convention, though it is an institution because it imposes constraints on economic transactions.[5] Would a convention of

[2] The economist Robert Solow (1985: 23) goes so far as to say that concrete outcomes "are indubitably affected" by a web of social institutions, customs, and beliefs, and that "the end product of economic analysis is likely to be a collection of models contingent on society's circumstances."

[3] Dynamical problems are typically approached with game theory or differential equations. Lewis's approach is much influenced by game theory.

[4] Ought, would, and should are the prescriptive verbs of normative behavior. As we ought to do what we prefer to do, conventions must also be recognized as a species of norms (Lewis, 98-99). Implicit in the notion of preference is that individuals have a choice, that is, there exists an ***R***' that might have been chosen instead, and that all that stands in the way of choosing ***R*** over ***R***' is convention.

[5] The unsolved problem of the evolution of institutions and economic performance demands a dynamic theory, for the simple reason that evolution has no meaning at all without time in it. North's slogan, 'institutions are the rules of the game,' indicates his instinct that the sought-after understanding would yield to a game theory of constraints. It has not. Much more developed than game theory is the dynamical

general untrustworthiness help, hinder, or leave unaffected the formation and operation of a banking system? Institutions which are not conventions and which facilitate economic growth, hereafter called Infrastructure, $\mathcal{I}$, are no less immune to the consequences of distrust in a society where general untrustworthiness is the convention. The behavioral economists Pauline van Esterik-Plasmeijer and Fred van Raaij (2017) have studied trust in banking in a sample of 1079 Dutch adults. Their work shows that a self-assessed level of trust in others is the primary determinant of self-assessed trust in the banking system, and that levels of trust are highest for other persons, intermediate for one's own bank, and lowest for the banking system as a whole. In combination, their findings are consistent with a model of trust whose erosion begins at an arm's length and decreases with ever increasing distance, whether measured in kilometers or kinship. Thus, generalized untrustworthiness, or a low default level of trust in others, undermines banking system trust,[6] which in turn undermines the efficacy of the banking system, which itself is an instance of $\mathcal{I}$, thus answering the question that opened this paragraph.

Furthermore, if trustworthiness is low, then depositors' perceived risk of transacting with the bank will be high, leading them to demand higher rates of return. Meanwhile, the bank's perceived risk of lending will be high, leading the bank to charge higher interest rates. In other words, the transaction costs of banking will increase because of the perceived risks on both sides. Thus the convention of general untrustworthiness imposes a tax on or adds friction to banking transactions, in turn dragging down economic performance, hereafter called $\mathcal{E}$. Going beyond trust in banking, we speculate that where generalized untrustworthiness is the convention, $\mathcal{I}$ will lack public support and be undermined by corruption, meaning the use of $\mathcal{I}$'s assets for the private gain of the individuals entrusted to operate $\mathcal{I}$.[7] Indeed, as Francis Fukuyama has argued so cogently, "widespread distrust in a society… imposes a kind of tax on all forms of economic activity, a tax that high-trust societies do not have to pay (1995:28)."

Conventions, such as generalized trust, are metastable equilibrium solutions to social coordination problems. As such, they are persistent but not infinitely so. For example, convention ***R*** has it that no one mocks the sovereign. Under ***R***, an emperor without clothes invites no mockery. Though everyone might be inclined to mock him, they choose not to because almost everyone prefers conformity given that almost everyone conforms. A panoply of punishments will be inflicted on those few who don't conform, a fact of life under ***R*** known to everyone and which serves to discourage non-conformity. Thus, ***R*** persists in the face of low levels of non-conformity, but how persistent is it? ***R*** demands understanding and tacit approval

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systems theory of coupled differential equations. In as much as systems may impose constraints and constraints guide the formation of systems, we use the terms systems and constraints interchangeably.

[6] They also compare Institutional and Functional theories of trust. The former states that broad trust in the concept of institutions leads to increased trust in specific institutions, and the latter states that broad scope trust is the sum of trust-making or trust-breaking experience with an ensemble of specific institutions. Their data supports Functional Theory and undermines Institutional Theory, which would seem to undermine North's slogan.

[7] We take this definition from Transparency International (https://www.transparency.org/what-is-corruption), a not-for-profit organization based in Berlin that defines itself as the global coalition against corruption.

by almost everyone. In practice, this takes generations to establish.[8] Were the unraveling of ***R*** anything but rare on a time scale of generations, ***R*** would not be established in the first place. Therefore, levels of non-conformity high enough to breach the containment vessel of ***R*** occur, in theory, only once every several generations. In practice, we have evidence that the persistence of convention is measured in centuries, even in the face of occasional concerted efforts to change a convention no longer deemed desirable.

Consider America's Slave Era, ended by proclamation on January 1, 1863. Few would say that discrimination on the basis of race is behind us. Consider, next, the Ottoman Empire. Following its collapse during the First World War, Mustafa Kemal and other Young Turks tried to expunge political Islam, or Islamism, from Turkey. A century later, President Erdogan has "established a one-man rule based on populist Islamism (Kuru 2017)." Thus, metastable ***R*** gives way to a different metastable ***R***' only with great difficulty, at great cost, and usually over great lengths of time. If we were to model the decay of racism in America as an exponential, e.g. $e^{-t/\tau}$, and posit that it had lost half its vigor in 156 years,[9] then $\tau = 225$ years.

Though theory argues that the time constant is long, and the examples given are consistent with that, does *Obergefell v. Hodges*—the Supreme Court case of 2015 that legalized gay marriage in the United States—demonstrate the opposite, that the time constant of conventions can be short, too? We think not. Rather, it demonstrates that judicial rulings or law may change with the stroke of a pen. But laws are not behaviors and therefore are not conventions. Laws are understood by lawmakers, but by no means are they understood by almost everyone, as required by Lewis' Rule 1. As already stated, the latter is a generations-long process.

Lewis's theory of convention may be what underlies Granovetter's embeddedness hypothesis, or Collier's cultural foundations framework (2016), and may guide the collection of socially contingent models that Solow posits, but all that we need to take from it is the knowledge that social convention holds the potential to give rise to persistent differences in $\mathcal{E}$ and $\mathcal{I}$. So we ask, is there some one feature of family structure, family dynamics, family life, or family law that is more or less consistent across the full breadth of a nation and that forges convention with sufficient durability that its presence or absence yields metastable equilibria whose differences we may recognize in their corresponding $\mathcal{E}$ and $\mathcal{I}$? If the answer is yes, then that convention, or the feature driving that convention is a putative explanand for larger economic, social, and political processes that social scientists take as the object of their inquiry.

[8] "Grandchildren are the crown of the aged," (Mishnah/Pirkei Avot 6:8], is a 5th century teaching of Judaic)ethics which we take to mean that the transmission of convention to one's children is only complete when they have, in turn, transmitted it to their children. That scholars devoted time and space to pointing this out highlights the difficulty of accomplishing it. Yet, only if such transmission is accomplished by almost all parents will convention be established.

[9] Racism has neither almost disappeared in the 156-year interim nor has it remained almost unchanged. Were we able to take its measure, call it r, we would be justified in saying 0.1 << r <<0.9. Therefore, it seems reasonable to posit that r=0.5, as we have done.

We devote the remainder of this paper to the exposition of two claims. First, a state that permits polygamy[10]—an asymmetric marriage contract that alters the genetically predetermined balance of marriageable males and females by preferentially removing females from the marriage market—is a state that is fundamentally different than another where the same practice is prohibited, a state where monogamy is both the law and widely enforced. Second, polygamy is and has been sufficiently widespread across the globe that, given the first claim, it deserves consideration as a determinant of economic history. In the sections to follow, we attend to these in reverse order.

Where in the world is Polygamy?

The most comprehensive survey of polygamy today has been generated by the political scientist Rose McDermott (2018). The McDermott Polygyny Scale, summarized in Table 1, is a discrete coding system applied to 176 nations and constructed on the basis of legal code and of *w*, the fraction of women in plural marriages. Said fraction or prevalence is one of two measures we will use here, the other being the plural marriage fraction, *p*, the fraction of all marriages which are polygamous.

Coding	N	Customary Law	National Law	p_w (%)
0	79	Illegal[a]	Illegal	<2
1	4	Illegal[b]	Illegal	<2
2	20	Legal[c]	Illegal	<5
3	56	Legal	Unenforced	<25
4	17	Legal	Unenforced	<25

Table 1: McDermott's Polygyny Scale, illustrating in tabular form, the cleaving of the world along the line of customary law's reading on polygamy. Notes: (a) Multiple cohabitations are rare, (b) Multiple cohabitations are common, (c) Only applies to select minorities and or within enclaves. Data from womenstats.org

[10] Polygyny, the academic term for male plural marriage, is a noun so rare in common usage that the lay reader finds it difficult to pronounce, and English-speaking scholars themselves disagree as to whether it rhymes with misogyny or mahogany. Polyandry, female plural marriage, polygyny's counterpart in the pair of practices that make up polygamy, is practiced in societies numbering less than 2% of the global population, and only in societies where polygyny is also practiced (Trevithick, 1986, and Becker, 1981: 102). Henceforth, we will use polygyny and polygamy—a word so common as to be both a brand of beer from the Wasatch Brewery in Wasatch, Utah, (https://wasatchbeers.com/) and the title of a long-form cable TV drama set in Salt Lake City, Utah (https://www.mylifetime.com/shows/escaping-polygamy)—as synonyms.

The global distribution is mapped in Figure 1.[11] Roughly speaking, McDermott finds the world bimodal, divided along the line of legality of polygamy in customary or religious law, a line separating 4.1 billion people in 93 polygamous countries from 3.3 billion people in 83 non-polygamous countries. Where it is legal in customary law, polygamy is either very prevalent (N=17), less prevalent (N=56), or its practice is limited to certain minority groups or enclaves (N=20). About prevalence within the boundaries of those enclaves, McDermott is silent. Where it is illegal in customary law, polygamy is a criminal offense under civil law and is rare but not unknown.[12]

The map tells us that the legal footprint of polygamy extends across Africa, with the exception of Tunisia, and almost all of Asia. It is practically absent in Europe, the Americas, and also in Australia and New Zealand. The map also shows us that 70 years of Soviet commitment to women's equality was not sufficient to suppress the long-term local commitment to polygamy in a single one of the Central Asian republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, or Uzbekistan. This suggests polygamy and/or its conventions do in fact persist on a time scale greater than a century, consistent with observations of persistent conventions in the US and in Turkey, wherefrom we derive our estimate of $\tau = 225$ years.

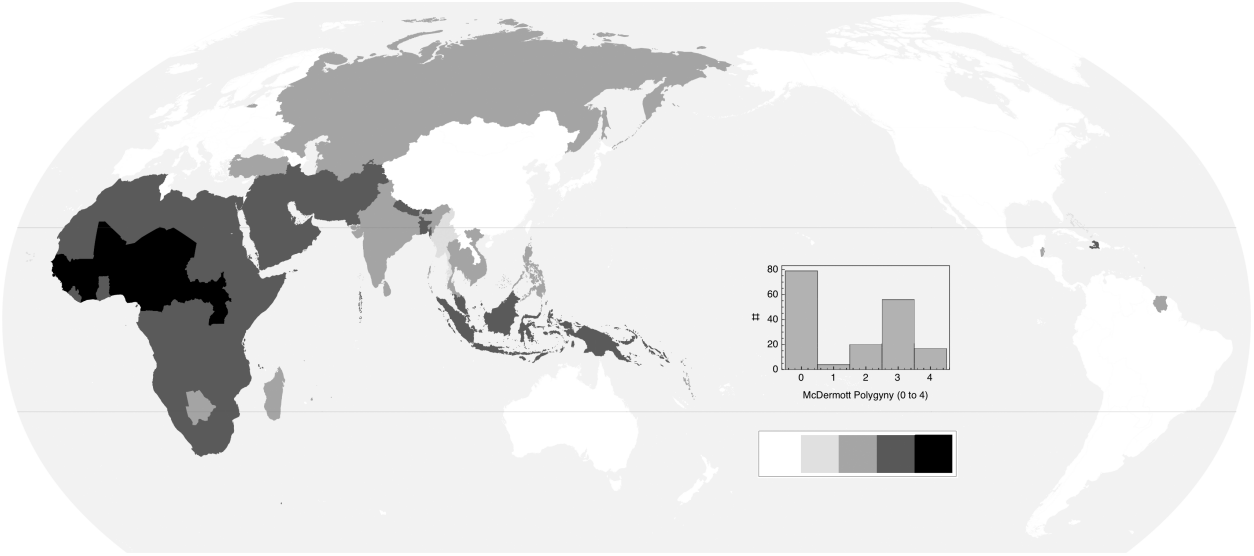

Figure 1: McDermott's Polygyny Scale, a discrete 0 to 4 whose distribution (inset) reveals a pronounced bimodality distinguished by the whether or not customary law permits polygamy.

[11] All data is available upon request.

[12] No US agency private or public compiles statistics on covert polygamous marriages. One source reports, without documentation, that 50,000 to 100,000 Muslims live in polygamous households in 2008. [Barbara Hagerty, NPR]. Al-Krenawi says, also without documentation, that 50,000 to 100,000 Black Muslims live in polygamous relationships (2014). Supposing there is some substance to these claims, we might infer 25,000 polygamous marriages. If half of the 126 million households in the US contain a married family, then the implied prevalence is about 0.04%, from which it seems fair to estimate an upper bound of 0.1% in the US.

The same Communist egalitarianism is relevant in China, too. China is reportedly free of polygamy today though it was prevalent there, at least in the form of concubinage,[13] from the ancient past until the time of Mao (Lee and Feng, 2001 and Zurndorfer, 2016). While this map of contemporary prevalence properly paints China white, a map of recent polygamous history would not. And if in China, then also in Mongolia, which was China until it won independence in 1921. Such a map would also add color to Tunisia, Azerbaijan, Laos, and Myanmar, all states with long histories of customary polygamy.[14] And so too should we see it in the Muslim majority Balkans, Albania and Kosovo, and in Bosnia and Macedonia, where the Muslim population is 35% and 42% of the total. Indeed, in 2000 Albania, 6% of married men were in plural marriages (Gruber, 2002). In 2016, monogamous Germany faced the challenges of integrating polygamous Kosovar immigrants.[15] It is not difficult to see that the utility of contemporary law as a proxy for the conventions associated with polygamy has limitations when law changes ahead of convention, as it sometimes does. Finally, though hardly visible on the map, Fiji is a McDermott 0, though its long tradition of Chiefly Polygamy (Luker, 2015) is historically important, irrespective of contemporary law.

The just-mentioned states are McDermott 0s or 1s, that is, civil rather than customary marriage law prevails and polygamy is illegal. We argue that they have substantial *polygamos*, nevertheless. On the flip side of that non-congruence is Russia, where Muslim populations of , Ingushetia (96%), Chechnya (95%), and Dagestan (83%), for instance[16] make Russia a McDermott 2; that is, civil law gives way to customary law for minorities in certain enclaves. Also, true, Russia is historically Orthodox, and Christendom has been monogamous since its earliest days under Roman rule where polygamy was at first not-normative and then later a crime (Witte 2015: 104-14). The republics, on the other hand, are historically Islamic, under whose regime polygamy is not merely permitted but is a cultural virtue (Elbedour et al. 2002). These differences, and the persistence of convention per Lewis, lead us to conclude that the dominant convention in Russia is monogamous while the dominant convention in Central Asian republics is not, even though the contemporary law is nominally the same in both.

Belize, Suriname, and Haiti are the only states in the Americas that have laws, customary or civil, that permit or at least tolerate polygamy. McDermott rates them 2, 2, and 3, respectively. On the other hand, Guyana is a McDermott 0 but UNICEF reports[17] that the plural marriage

[13] Concubinage is polygamy by our definition, as it binds multiple women to a single man, preferentially removing females from the markets. Calling it concubinage rather than marriage does not alter the essential demographic fact of the resulting imbalance in the marriage market.
[14] Polygamy was legal under customary law, though not necessarily under civil law, as recently as 1999 in Azerbaijan, 1990 in Laos, 2015 in Myanmar, and Tunisia in 1956.
[15] See: https://www.dw.com/en/germany-to-clamp-down-on-religious-polygamy/a-19329733
[16] See https://en.wikipedia.org/wiki/Islam_in_Russia
[17] See https://www.unicef.org/guyana/MICS_5_Final_Report(1).pdf

fraction there is 4%.[18] Also, the linguist Walter Edwards (1982) has reported on the adoption in Guyana of West African marriage traditions, specifically bride price, which are otherwise unique to polygamous society.[19] Guyana, therefore, can be expected to be relatively high in *polygamos*.

The 20th century altered law much faster than convention could follow, so McDermott's snapshot of contemporary law must be only a first approximation to a map of contemporary *polygamos*. However, in the elaboration of these conventions, it will be useful to have in mind a simple if not over-simplified picture of where they might reasonably be expected to reside. Taking the division along a line of customary law to its logical conclusion, we lump the McDermott 2/3/4s together and call them polygamous societies, denoting them $\mathcal{P}$, and we lump the McDermott 0/1s together and call them non-polygamous societies and denoting them $\bar{\mathcal{P}}$. Then we classify China, Azerbaijan, Tunisia, Laos, Myanmar, Albania, Bosnia, Kosovo, Macedonia, and Suriname—McDermott 0/1— as $\mathcal{P}$, and we classify Russia and Belize—both McDermott 2s—as $\bar{\mathcal{P}}$, obtaining the $\mathcal{P}$ /$\bar{\mathcal{P}}$ world map below. Over 5.4 billion people live in $\mathcal{P}$ and approximately 2.0 billion in $\bar{\mathcal{P}}$.

Figure 2: The world in our binary $\mathcal{P}$ /$\bar{\mathcal{P}}$ classification, where gray indicates $\mathcal{P}$ (N=105) and white indicates $\bar{\mathcal{P}}$ (N=71).

[18] Plural marriage fraction, which we will denote p, is distinct from and less than *w*, the fraction of women in plural marriages. Generally speaking, one needs an additional piece of information, the number of wives per plural marriage, to compute p from *w* or vice versa.

[19] Levine and Renelt (1992) report f_m^n, the fraction of state n's contemporary population that originated in state m. For Belize, Guyana, and Haiti, the Africa fractions are 17%, 39%, and 97%, respectively. They do not include Suriname, but we surmise that it is not very different from Guyana. Guyana's population has a rich heritage in South Asia, and similarly Suriname, but this is not the case in Belize and Haiti. Jamaica, Trinidad and Tobago, and the Dominican Republic have higher African population fractions than Guyana, but they outlaw polygamy in customary and civil law, so we may expect that *polygamos* is low in those states.

Algebra and *Polygamos*

As we noted earlier, the persuasiveness of our argument will hinge on two elements. First, we must show that polygamy drives conventions that bear on large scale social outcomes. Second, polygamy must be common enough that it has the potential to move the needle in a global model. McDermott's data on customary law demonstrates the pervasiveness of polygamy, and does so even more strongly when we augment it with historical considerations. We devote this and the next section to elucidating the first point. Let us reframe that as a question, answering it only insofar as to give a prelude of the detailed argument to follow.

How is it that polygamy—a necessarily minority practice resulting in a contract applying to select members of a single family—drives social conventions affecting almost everyone within the sphere where it is legal? Marriage markets exist everywhere, but because polygamy creates an unslakeable and therefore chronic scarcity of marriageable females, we will show that marriage markets and society's response to them in $\mathcal{P}$ are distinctly different than in $\bar{\mathcal{P}}$. In the former, families transfer wealth to the bride's family, women marry young and men marry old, fertility rates are high, women are sequestered like commodities, person-to-person trust is low making institutional trust very low, and these behaviors are normalized in customary and civil law.

In Transactions of the Royal Society, less than 50 years after its founding as the world's first scientific journal, Dr. John Arbuthnot (1710: 186-90) reported on the relative birth rates of girls and boys, finding them approximately identical. He also noted that, "where Males and Females are in equal number, if one man takes twenty wives, nineteen must live in celibacy, which is repugnant to the design of Nature." He would have had no first-hand experience of polygamy in British or European society, but he would have known polygamy was a commonplace in Africa. He might also have known something about its prevalence in the Near East, as his contemporary Montesquieu (1721) did, and in the Far East, as had been reported by Marco Polo in the 13th century (1958: Book 1, Chapter 52). What he may have foreseen as consequences of the celibacy of nineteen he did not say. His claim about the design of Nature would find little scientific support today, but his irreproachable algebra constitutes the First Law of polygamy; when one man takes a second wife, another man goes without. Polygamy creates a chronic scarcity of marriageable females.

That a scarcity of marriageable females can have large scale social consequences will not come entirely as a surprise to Western readers unfamiliar with polygamy. The high sex ratio society, denoted as $\mathcal{H}$—with China being the prime example and *Bare Branches* (Hudson and den Boer, 2005) being the authoritative text—is also driven by Arbuthnot's algebra. Hudson and den Boer report on marauding bands of single males in China who are shut out of the marriage market.[20] In this case, the overabundance of males originates in the One-Child policy and an ancient cultural preference for male children.[21] The scarcity in $\mathcal{H}$ is passing rather than chronic as in $\mathcal{P}$, and as such it will have little effect on convention and therefore little effect on long term

[20] Shut out as they are, they will not reproduce, and thus will leave bare branches on their family tree.
[21] Lee and Feng note that the 4th century BCE philosopher Mencius wrote, "of all unfilial deeds, none is more serious than the failure to produce male descendants (2001: 75)."

economic and institutional development. What we know from *Bare Branches* and other work on $\mathcal{H}$ lays a foundation for understanding the ideas in this section.

We know very well what happens when a community is struck by famine or drought. Those few who possess the commodities hoard them and the many who don't suffer, or they maraud for them. To the extent possible, state and private institutions distribute stored goods to ameliorate the suffering and to protect the interests of the haves. As scarcity and suffering mounts, people grow more restive, flee, or even die. Where redistribution fails to quell civil disturbances, state and private militaries may do so. But scarcity is often driven by weather, and like the weather it passes, first coming, and then going. Like recollections of a great blizzard, the scarcity fades without changing convention. Convention is slow to react, and passing events have little opportunity to engender permanent behavioral change on almost all members of the group, and particularly not at the national level.

Chronic scarcity is altogether different. It doesn't come and go. It comes and stays, like climate, on a time scale of centuries. Within a few generations, no living person has a recollection of the world before the chronic scarcity took hold. If the scarce goods are not so scarce as to threaten existence, forcing a population to flee or die, or if alternatives can be found to alleviate the most obvious consequences of scarcity, then conventions adjust to the new normal and the old cultural system passes into legend.

Marriageable women are not like food or water; a marriageable man will not die in weeks for lack of a mate. On the other hand, the drive to reproduce is intrinsic to all life. Denying an organism its shot at reproductive success is, echoing Arbuthnot, unnatural, and the organism will rebel. Thus, if women are scarce, their value increases in the extant marriage market, with predictable and widely observed consequences.

When marriageable women are scarce, families with daughters will approve their marriage only for a price, the bride price as it is known. Distinct from dowry, which is a transfer of assets from the bride's family to the married couple, bride price is a transfer of assets from the groom or the groom's family to the bride's family. Typically, these accrue to the father, polygamy being nearly synonymous with patriarchy, as we shall discuss at greater length below. Bride price is a convention unique to polygamous society, $\mathcal{P}$, as illustrated in Figure 3.

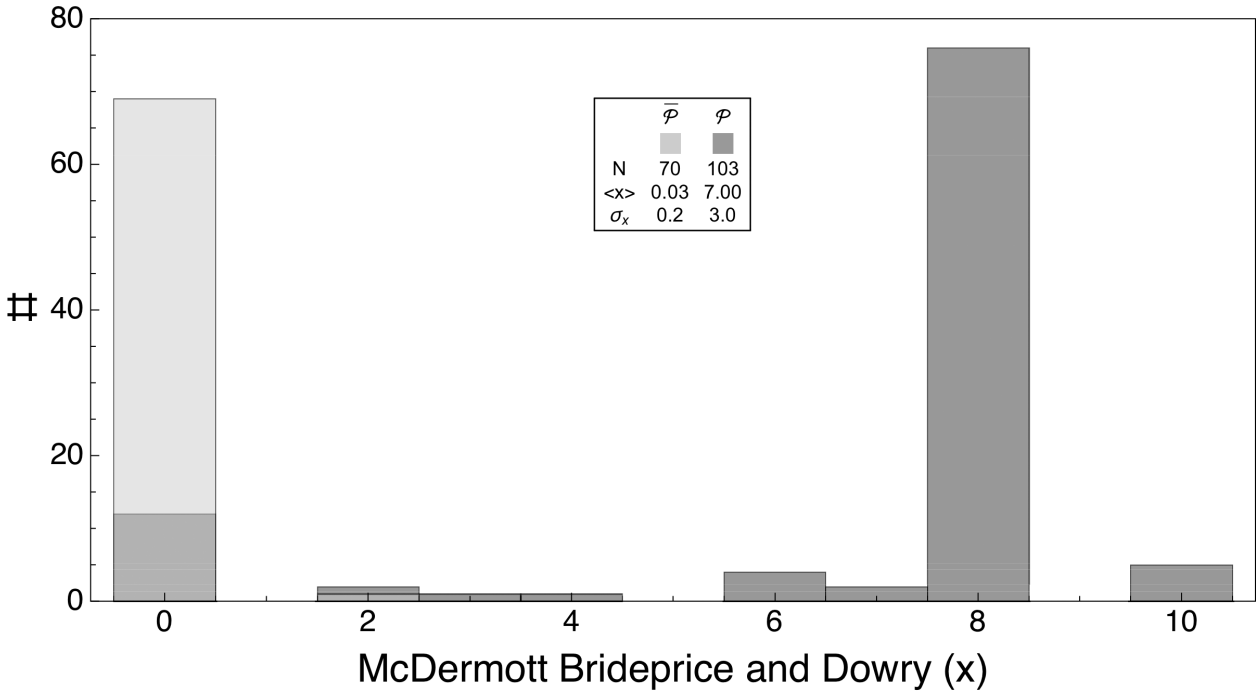

Figure 3: On a scale of 0 to 10, McDermott indexes 173 states according to dowry and bride price practice. 0 means neither dowry nor bride price, 1 to 5 means dowry, and 6-10 means bride price. We sort the data into groups of $\bar{\mathcal{P}}$ (light) and $\mathcal{P}$ (dark), presenting it here as a pair of overlapping histograms. Overlapping regions are of intermediate gray. The world appears to be bimodal in bride price. Source: womanstats.org

In the early days of the Iraq War, when enthusiasm among potential recruits was high, the United States military capped the fraction of recruits with low scores on its aptitude test at 2%. Within 2 years, waning enthusiasm left the military unable to meet its recruitment targets, so it raised the cap to 4% (Kaplan, 2008). Transplanting this example of a familiar pattern—that of adjusting the rules of the game in the face of a changing game—to our context, we think it not unreasonable to expect that when marriageable women are scarce, the definition of marriageable will change and girls will become marriageable sooner after the onset of puberty than they would otherwise.[22] In turn, because women are more valuable, a man may marry only when he has assembled the assets required by bride price, and as this typically occurs later rather than earlier in life, the age of first marriage for men tends to increase in $\mathcal{P}$. Thus the age difference at first marriage of men and women can be expected to be higher in $\mathcal{P}$ relative to $\bar{\mathcal{P}}$. This is shown in Figure 4 where the means of the two distributions are separated by 1.5 years,

[22] A falling age at marriage as a response to gender-imbalanced scarcity can work in the other direction as well. In work done by Abramitzky et al. (2011) on marital behavior in France following WWI they find that the relative scarcity of males increased the likelihood that men would marry, lowered the ages at which they did so, and thereby lowered the age gap between nuptial partners.

or twice the standard deviation of the distribution in $\bar{\mathcal{P}}$. But the discrepancy is in fact greater than this. The data shown is singulate mean age at marriage, and thus does not take into account the age of men when they take a second wife. If 10% of married males take a second wife after 7.5 years of marriage, not unreasonable assumptions, then that increases the average age gap at marriage in $\mathcal{P}$ by an additional 0.75 years, or one standard deviation of the $\bar{\mathcal{P}}$ distribution.

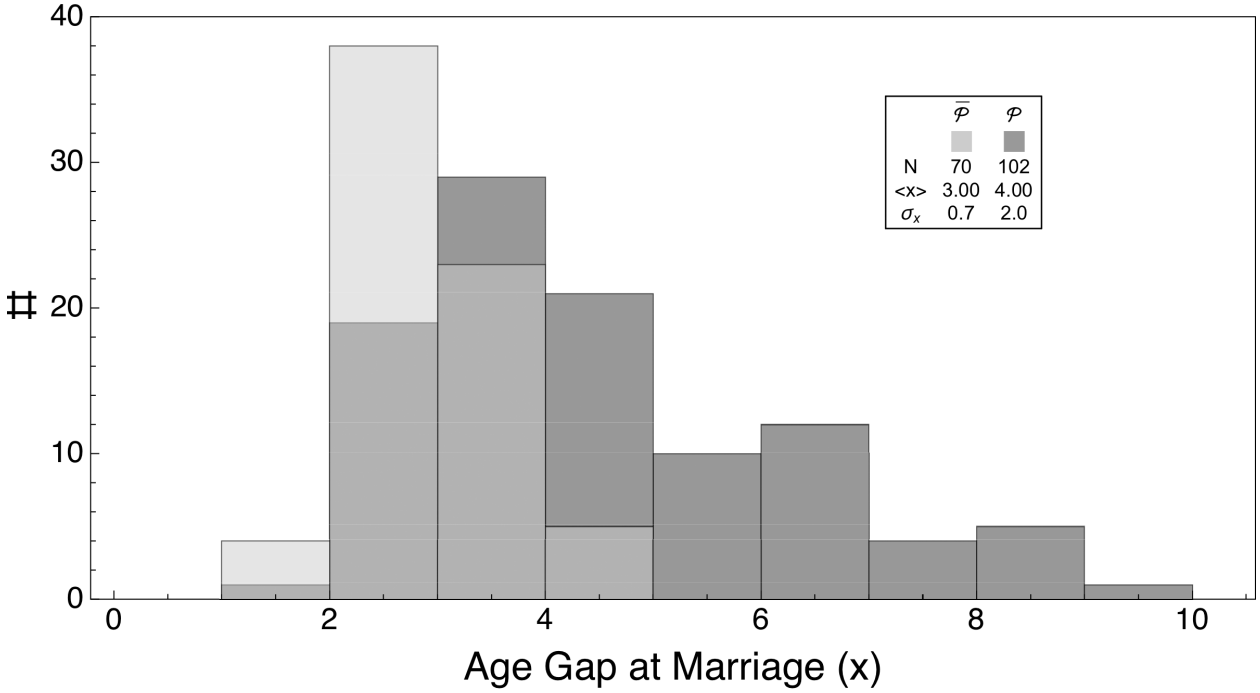

Figure 4: Age Gap in Years at First Marriage in $\mathcal{P}$ and $\bar{\mathcal{P}}$, presented as overlapping histograms. The means are separated by 1.6 years and the maxima by 4.5 years. (UN SNAM)

Where marriageable women are scarce, entrepreneurs will endeavor to increase their supply, leading us to expect that fertility in $\mathcal{P}$ will be greater than in $\bar{\mathcal{P}}$, an expectation confirmed in Figure 5. Though the facts are consistent with our mechanism, and other factors might be influential too, e.g. civil wars, colonial history, climate, and broadly the status of women, economist Michele Tertilt explains that the practice of buying wives and selling daughters in sub-Saharan Africa is explicably market-driven. Locally and immediately optimal, it has longer term negative consequences for economic development. She estimates that banning polygamy could decrease fertility by 40%, increase savings by 70%, and increase output per capita by 170% (Tertilt, 2005). This is strikes us naive, because conventions are persistent, but nevertheless, a 40% reduction would effectively equalize the means of fertility in the $\mathcal{P}$ and $\bar{\mathcal{P}}$ distributions.

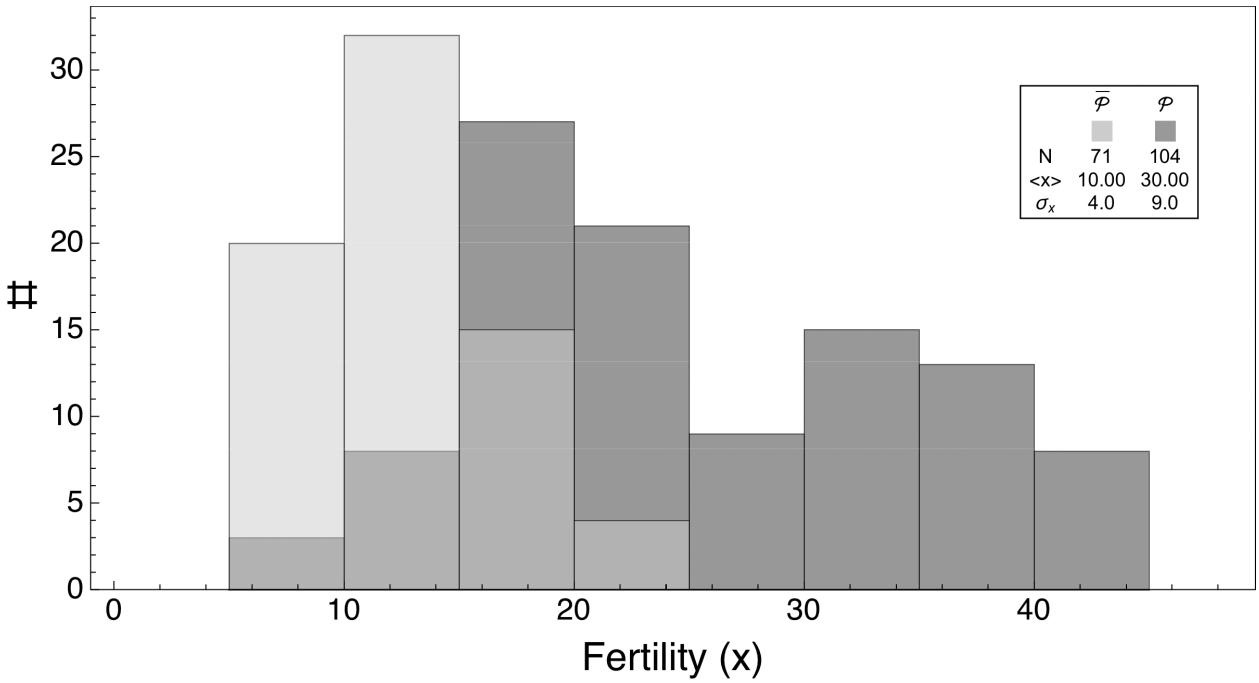

Figure 5: Fertility in live births per thousand. The means are separated by twice the standard deviations of the two distributions.

A different scarcity-mitigation tactic, raids on nearby communities, accomplishes the following: (1) women taken as booty slake the scarcity; (2) fungible material booty increases a man's assets and his position in his community, thus making him more marriageable; and (3) for every man who dies raiding, prospects of reproductive success increase for the survivors. In this light, tribalism may be recognized as a by-product of polygamy; with limited prospects for raiding at long distances, polygamous societies must find cause to raid neighbors for the scarce females they desire, and otherization by tribalization meets the need. A study by evolutionary biologists Luke Glowacki and Richard Wrangham also supports these expectations (2015). Robert Tignor's study (1972) of violence among the Maasai in Kenya and Tanzania emphasizes the centrality of raiding to wealth building, noting that it is a prerequisite to marriage and admission to the circle of elders. Wealth is inseparable from marriage and both are a means to enfranchisement, because it is only the elders who have a vote in community decision-making. Anthropologists and ethnographers know these patterns well.[23]

Males between the ages of 19 and 34 commit the great majority of violent crime (Farrington, 1986). Though the data is sparse if not contradictory, social psychologists and criminologists report that married men commit less violent crime than their unmarried peers, presumably because the bonds of family are sufficiently distracting that these men have less opportunity and

[23]Hartung, et al (1982) reports that among 1170 societies documented in George Murdock's monumental *Ethnographic Atlas*, polygyny is practiced in at least 860.

inclination to commit violent crime.[24] Thus we expect criminality to be higher, other things being equal, in societies with a greater prevalence of unmarried men, as is the case in both $\mathcal{H}$ and $\mathcal{P}$. Rather than endure chronically high criminality in $\mathcal{P}$, harsh policing is likely to emerge to contain it, and we hypothesize that $\mathcal{P}$ will lean toward harsh justice.[25]

Consider the death penalty as an indicator of a harsh judicial system. Using ***A*** to signify an abolitionist state (Amnesty International) and ***nA*** to signify a non-abolitionist or capital punishment state, the left hand side of Table 2 shows that ***A*** and ***nA*** cleave along $\mathcal{P}$ /$\bar{\mathcal{P}}$ boundary.

Amnesty International Data				Amnesty with Honor Killings		
	A	***nA***			***A***	***nA***
$\mathcal{P}$	40	63		$\mathcal{P}$	22	81
$\bar{\mathcal{P}}$	60	10		$\bar{\mathcal{P}}$	51	19

Table 2: Amnesty International's reporting on the abolition of capital punishment (left) shows a clear line of demarcation between $\mathcal{P}$ and $\bar{\mathcal{P}}$ states. When honor-killing of women is recognized as another form of capital punishment, the line of demarcation becomes yet more stark (right).

Violence against women is a global problem, but not uniformly so, as illustrated in Figure 6. In 76 states coded 4 (most violent), 27 of which are abolitionist per Amnesty, honor killings and/or femicides occur and are generally ignored or accepted within the society.[26] A state that outsources the death penalty to the family does not deserve to be included among those that prohibit the death penalty.

[24] Hudson and den Boer (2005:196) corroborate this citing (Kanazawa, 2003), "Criminologists have known that one of the strongest predictors of desistance from criminal careers is a good marriage;" and Mazur and Michalek (1998), "Single men spend more time in male company than do married men, and they are more likely to encounter confrontations and challenges. Lacking the social support of a wife, they are more likely to face situations where they must protect their social prestige in competitive encounters with other males."

[25] The economist and legal scholar John Donohue (2017: 1307) uses the term implicit crime rate to illuminate the dynamic balancing of criminality and enforcement. He notes that the 2014 murder rate in the US, 44 per million, was lower than at any time since 1957, in part as a consequence of increasing incarcerations to the highest level the world has ever seen. The murder rate that would have been observed without exceptional incarcerations and other suppressive forces, what he calls the implicit murder rate, is much higher. Thus, a nation's criminal justice system is a reflection of implicit as well as real or observed criminality within its borders.

[26] Hereafter, we will use the term honor killing as shorthand for honor killing and/or femicide.

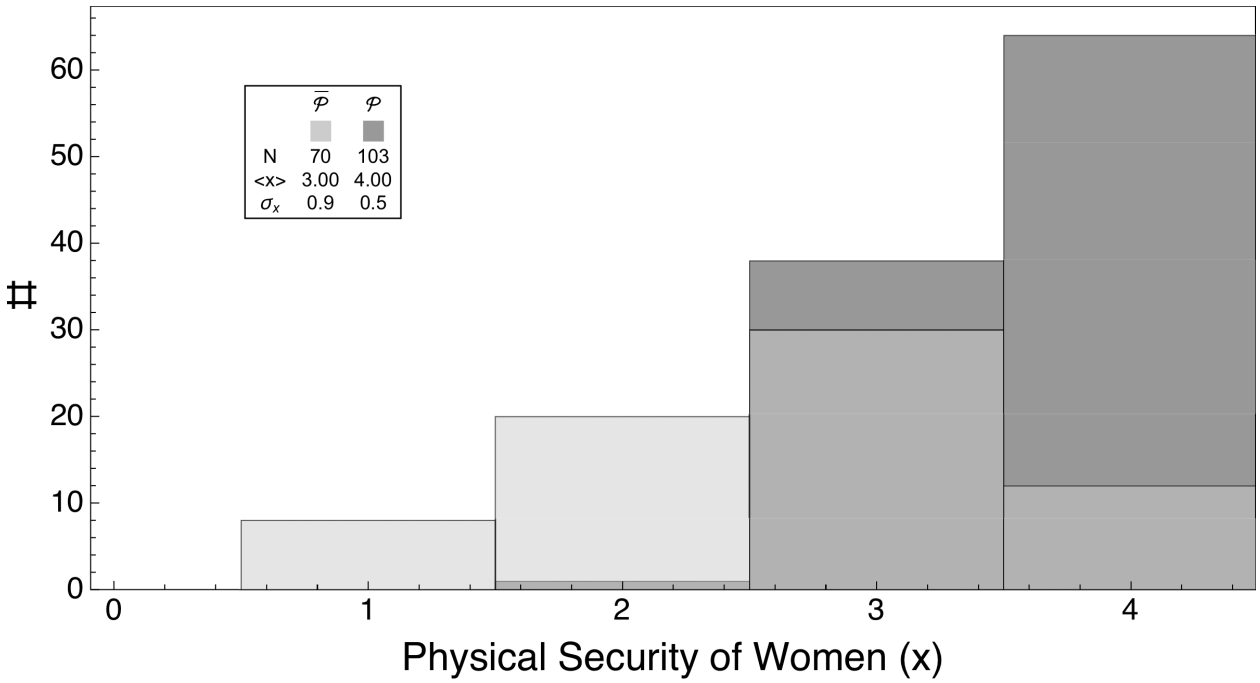

Figure 6: Index of violence faced by women coded such that the US is 2 (Womanstats.org.)

We narrow the definition of abolitionist so as to exclude those states that permit honor killing, and we show the revised data on the right-hand side of Table 2. The new line of cleavage is even more pronounced. Non-abolition of the death penalty, our proxy for harsh justice, is by no means the province of $\mathcal{P}$ alone, but its greater prevalence in $\mathcal{P}$ relative to$\bar{\mathcal{P}}$, 79% as compared to 27%, is a predicted concomitant of the chronic scarcity of women borne on the wings of polygamy. Abolitionism aside, how may we explain the fact that among the 76 honor-killing states, 84% of them are $\mathcal{P}$, or that among all 103 $\mathcal{P}$ states 62% tolerate honor killing whereas among 70 $\bar{\mathcal{P}}$ states the percentage is only 17%? We will come to that in two steps, first showing how polygamy-driven scarcity leads to claustration, and second, showing how failed claustration can lead to honor killing.

It is a well-observed fact that scarce commodities are hoarded and that they must be safeguarded against marauding and decay.[27] In his classic work on the economics of shortage among socialist firms, Janos Kornai (1980: 102) argues that chronic scarcity leads to hoarding and "an almost-insatiable demand" for the scarce commodity. The demand for women in $\mathcal{P}$ is actually insatiable because not only are they the scarce commodity, but they are also the means of its production. A man's wives and daughters, no less so than any other scarce commodity,

[27] Given the value placed on women in polygamous states, it may seem odd that they are commodified, but it seems less odd when we look at the parallels with slavery. Slaves were valuable, being the source of energy that powered multiple industries, and yet slaves were commodified. Had they not been commodified; their value would have accrued to their own selves and not to their owners. On the other hand, the anthropologist Emmanuel Todd opined—in a little read but important book about the origins of ideology in family structure—that the universality of men withholding power from women is more rigidly observed than the nearly universal strictures against incest (1985: 22).

are safe from predation only when isolated, as confirmed by the aforementioned culture of tribal raiding for mates. Men are not to be trusted, at least insofar as women are concerned, so it is predictably prudent that men will isolate their assets behind walls, and that when necessity dictates that these assets mingle in public, the men will insist that the assets be shielded from view beneath formless dress or behind veils, and will demand that they be accompanied by trusted guardians. The overlapping histograms of Figure 7 make plain that conventions of constraining a woman's freedom to move in public are systematically different between $\mathcal{P}$ and $\bar{\mathcal{P}}$ as predicted.

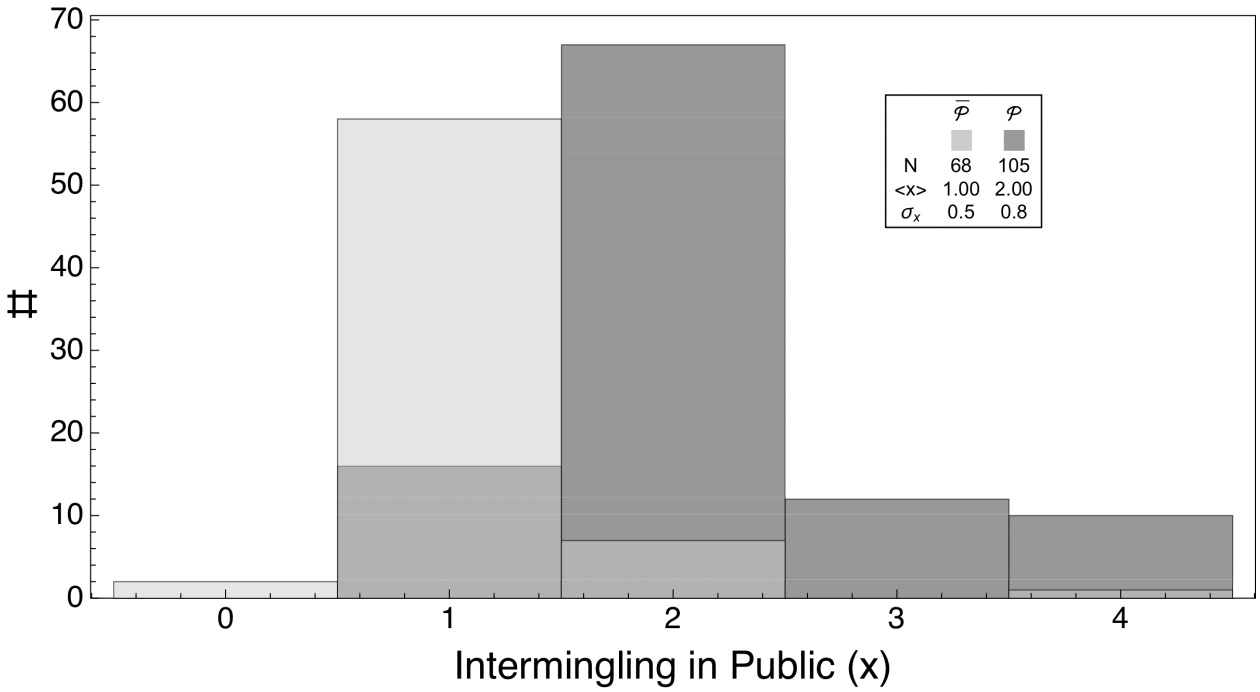

Figure 7: Restrictions on a woman's right to move freely in public are predictable consequences of polygamy. The key distinction between 1 and 2 in this discrete classification system is one of practice, that is of convention, not of law. Women in 2-states need familial male permission to move in public space.

Is the lack of trust men display in other men in $\mathcal{P}$, as evidenced by data on intermingling in public, limited exclusively to the context of women? Because women in $\mathcal{P}$ are commodities exchanged for bride price, and because demand for women in $\mathcal{P}$ is insatiable, it would seem that no fungible assets are safe in $\mathcal{P}$ without precautions that are not evident in $\bar{\mathcal{P}}$, and we take as a hypothesis that the distrust men hold for men vis à vis women carries over to other arenas as well. The still-extant Bedouin credo—Me against my brother, me and my brother against my cousins, us against the clan, the clan against the tribe, and the tribe against the world—suggests that trust ends at arm's length among that influential polygamous group, thus providing anecdotal if not quantitative confirmation of the hypothesis.

Claustration is the convention in $\mathcal{P}$. Social intercourse between marriageable males and females is therefore unconventional and sexual intercourse is taboo unless it is sanctioned by marriage. A man violates convention and becomes taboo if a wife, daughter, or other woman in his charge is suspected of entertaining unsanctioned intercourse. Convention cannot be sustained if the community fails to mete out harsh punishment to violators. If this were the simplest of circumstances, he would be excommunicated, as would his family as they have been contaminated by contact. But he is of high caste by virtue of being male whereas the woman is a commodity. Therefore, he retains the option of preserving his honor and livelihood by laying the blame on her seductiveness, possession by Satan, or some other familiar trope, rather than on his poor shepherding of her. As this option preserves the honor of others in his family, too, it conscripts them all, wives, sisters, cousins, brothers, and so forth, increasing the likelihood that at least one of them will mete out the punishment even if he waivers. Thus, honor killing follows inexorably from the convention of claustration, an aspect of *polygamos*, the set of all conventions originating in the scarcity born of polygamy. Honor killing reinforces the convention, the male primacy, and the commodification of women in the process. Of the states where honor killing and domestic violence against women are tolerated[28] and where intermingling in public is constrained by *polygamos*, 87 of 95 are $\mathcal{P}$.

Were we to contend that female genital mutilation or cutting, fgm/c, restricts a woman's freedom of movement by virtue of intimidation that reinforces male power and is therefore another facet of claustration, we would soon find ourselves mired in argument about unknowable causation. We will not go down that road. Instead we acknowledge that fgm/c is for some a sacred ritual and follow where that leads.

The origins of the sacred and the taboo are lost in time. Their *ex post facto* justifications are taken as a matter of course by those under their dominance and are incomprehensible to those who are not (Freud, 1950: 18). According to Lewis, those properties are hallmarks of convention.[29] Convergent evolution might well yield identical conventions from divergent

[28] We could not begin to be comprehensive in the literature here, but we note two very different studies. In a study on domestic violence in Senegal, anthropologist Scott London (1997: 83) writes that "violence … is used to keep women in a subordinate position vis-a-vis the men in their lives," with beatings and the threat of beatings beginning when a child is very young and continuing, if necessary, until an individual is married. In Oregon, Dena Hassouneh-Phillips (2001) notes that the Arabic word for co-wife is darah, or one who makes trouble. *Orientalism* (Said, 1978) asks, "Who has the power to name?" (Burney, 2012), emphasizing that the namer binds the named. In this case, it is the Arab language that names the plural wife, binding her to the notion of trouble making.

[29] On origins, Lewis notes that though there might, once upon a time, have been an agreement among the members of a group to adopt the behavior ***R*** in response to ***S***, the major effect of that agreement "is transmitted through a growing causal chain of expectations, actions, expectations, actions, and so on. The direct influence fades away in days, years, lifetimes. We forget our agreement. … We are replaced by heirs who were not party to the agreement. But the indirect influence of the agreement is constantly renewed, and in time it comes to predominate," and the as-lived convention bears no trace of its origin (1968: 83). On incomprehensibility, he observed that understanding ***R*** is a low standard of understanding, one that empowers recognition and the enumeration of known instances of ***S*** that provoke the behavior **R**, but not does not empower generalization about instances of ***S*** or what it means in general to be in conformity with ***R***. Such generalized understanding can only be achieved by experiment and analysis, and membership in the group that understands ***R*** conveys no special privileges with respect to

sources, and indeed the United Nations, the World Health Organization, the World Bank, the International Center for Research on Women, Human Rights Watch, and others are at pains to find what unifies the practice of fgm/c across Islamic, Christian, and animist communities, in Jewish communities in Ethiopia (Belmaker, 2012), in areas as geographically separated as West Africa and the Philippines, in countries both in and out of the tropics, and countries above and below global means of income. We identify confirmed fgm/c states (N=39) as those meeting either of the following two criteria: UNICEF (2016) reports greater than 1% prevalence of fgm/c among women of ages 15 to 49, or a study by McDermott reports a prevalence of greater than 25% (Womanstats.org). 100% of confirmed states are $\mathcal{P}$. We identify a second or provisional category (N=11) based on reporting by the Orchid Project or credible news sources.[30] Of these, 100% are $\mathcal{P}$. The 100% congruence of $\mathcal{P}$ and fgm/c favors *polygamos* over convergent evolution by reason of parsimony. As to whether it is incomprehensible to us who are not under its sway, such incomprehensibility being another feature of sacred convention, we draw attention to the work of anthropologist Fuambai Achadu, Minister of Gender and Social Welfare in $\mathcal{P}$-state Sierra Leone, and co-founder of African Women Are Free to Choose. The self-described sole purpose of AWAFC is to rally circumcised women around the world to combat the negative impact of global anti-FGM campaigns and propaganda.[31] Achadu (2015) vigorously defends fgm/c, citing (1) white female privilege as all that separates fgm/c in her home country from labioplasty in upper middle class America, and (2) her own right to cultural self-determination, including the right to choose for her daughter. We assert that this argument is incomprehensible to almost all members of $\bar{\mathcal{P}}$ states, and that being for and against fgm/c is simply a matter of convention, a convention born of polygamy and the commodification of women, *polygamos*.

fgm/c is in decline, thanks to the efforts of many of the organizations named above, and so we may ask, where did fgm/c prevail 30, 50, or 100 years ago? A multitude of $\bar{\mathcal{P}}$-states practicing fgm/c would dent the argument we have made. Unfortunately, there is insufficient data to answer this question. However, we know of no evidence of any kind that would suggest that there was even one such case. On the other hand, some $\mathcal{P}$-states have cut back on their fgm/c practices between 2007 and today, with the Democratic Republic of Congo, Jordan, Kazakhstan, and Sri Lanka, having materially eradicated it (Womanstats.org). The fact that Israel, an $\bar{\mathcal{P}}$-state, was an fgm/c state as recently as 1995 confirms rather than disproves the rule, as the sub-population within Israel that practiced polygamy was a Bedouin one in which the plural fraction of all marriages is between 20% and 36% (Abu Rabia, 2011).

We next mention two other ways in which women's rights are constrained by convention in $\mathcal{P}$, both of them consistent with the core idea that scarcity commodifies women and commodities serve their owners. Firstly, in a patrilocal world, brides move in with their new husband's family. This practice reinforces male power over women as it decouples women from their base of

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experimental technique or analytic acumen (ibid.: 65). Thus, an individual in said group, tasked with explaining ***R*** to an individual outside the group, would be able to offer only a list that would not meet Freud's definition of comprehensibility.

[30] See https://www.orchidproject.org/

[31] See http://www.awafc.org/

family support. Given the notably early age at which women marry in $\mathcal{P}$, it makes new brides especially vulnerable to male dominance; and it is predominantly a $\mathcal{P}$ phenomenon as shown in Figure 8a. Secondly, property and land ownership laws and practice in $\mathcal{P}$-states discriminate against women to a demonstrably greater extent than in $\bar{\mathcal{P}}$-states (Figure 8b). Property rights are recognized by most scholars as a critical component of economic development, and thus this two-tier system puts women at a further disadvantage in society. This outcome is nearly pre-ordained for $\mathcal{P}$-states because women are valuable, being scarce, and their value is held by men. Discrimination is necessary to preserve that value for men, and harnessing the power of the state to enforce discriminatory practices is particularly effective.

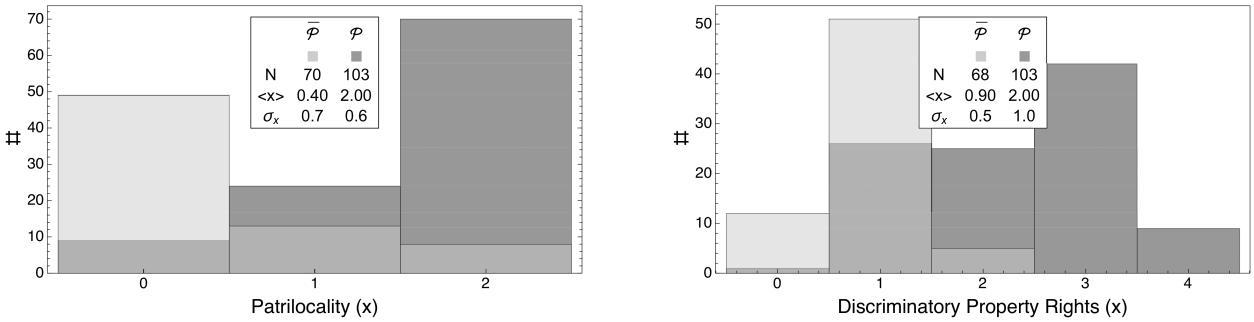

Figure 8: The overlapping histograms of $\mathcal{P}$ and $\bar{\mathcal{P}}$ distributions in this pair of figures illustrate two customary and legal practices that reinforce the dominance of males over females as called for in $\mathcal{P}$.

We conclude this section by examining an easily overlooked measure of life expectancy. The population-weighted, nationally-averaged, median life expectancy in $\mathcal{P}$ is 69.6 years, and in $\bar{\mathcal{P}}$ it is 78.0 years. But the life expectancies of men and women are not attenuated equally. Women live longer than men in general, a fact assessed by what is known as the differential life expectancy of women, or DLE. In contemporary America, DLE is 4.8 years when averaged across all demographic groups.[32] From a coarse-grained coding of DLE across 173 nations (womanstats.org), we ascertain that DLE in $\bar{\mathcal{P}}$ is 6.4 years and 3.7 years in $\mathcal{P}$, a difference too large to be attributed to the difference in mean life expectancies. It is beyond the scope of this paper to parse out how much of that is attributable to $\mathcal{P}$ alone, but the following four polygamous conventions are operative: violence against women, high fertility, high maternal mortality,[33] and, something much discussed in *Bare Branches*, the prejudicial favoring of boys over girls in the delivery of scarce medical and nutritional resources.

[32] See: https://catalog.data.gov/dataset/age-adjusted-death-rates-and-life-expectancy-at-birth-all-races-both-sexes-united-sta-1900

[33] Assessed per 100,000 live births, the median maternal mortality rates for polygamous and non-polygamous states is 11 and 178 respectively. See:https://www.cia.gov/library/publications/the-world-factbook/rankorder/2223rank.html.

Family Dynamics

There is a second mechanism by which polygamy changes society, one which has nothing to do with scarcity of marriageable females, but rather with family dynamics. Other things being equal, a man who has two wives, each with a passel of children, will be poorer than his peer who has but one wife and commensurately fewer children. Unless the polygamist's wealth is so great that this relative impoverishment has no bearing on his ability to provide food, medical care, and education to each wife and child, then he and they will be sicker and less educated than their peers in the monogamous household. In a large study of a Bedouin community in the Negev, where the plural marriage fraction is about 33%, Al-Krenawi (2014) determined that indeed, men, women and children of polygamous households in $\mathcal{P}$ are systematically poorer, sicker, and less well-educated than their peers in monogamous households in the same $\mathcal{P}$ community. The economic situation for these different groups is summarized in Figure 9.

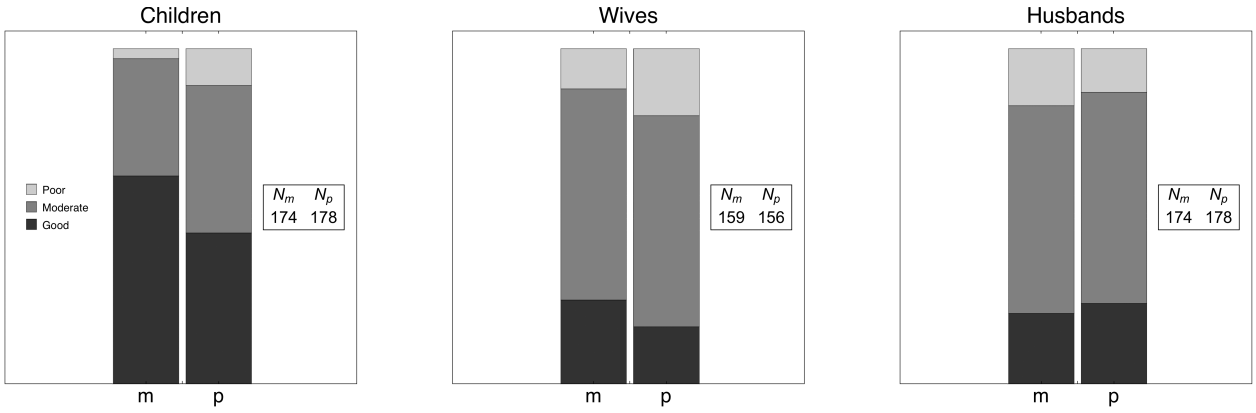

Figure 9: Stacked bar charts compare the economic fortunes of children, wives, and husbands in monogamous families (m) and polygamous families (p). In each column, black indicates the percentage of the group in good circumstances, while gray and light gray indicate moderate and poor circumstances, respectively. Percentages sum to 100. Within each subfigure, the moderate situation is about the same, but among wives and children, the situation is worse in p-families. Polygamous husbands appear to be slightly wealthier than their monogamous peers, whereas their wives and children are significantly poorer. Data source is Al-Krenawi (2014).

His interviews revealed that as a whole, the polygamous families were unhappier than the monogamous ones. The new wife makes the original one unhappy, a fact which is not hard to understand, and her unhappiness spreads to those in closest contact with her, most especially other family members including the husband. The relative poverty, ill health, and lack of education are also sources of unhappiness. As noted earlier, contemporary Arabic gives "dara" the double meaning of second wife and trouble maker. Biblical Judaism permitted polygamy, and in Biblical Hebrew, "tzarah" had the same double meaning as dara (Goldfeder, 2014: 234). In contemporary Yiddish/English slang, tsuris, derived from tzarah, means grief. Thus, Al-Krenawi's findings give quantitative support to the philological evidence that members of

polygamous society have known for three thousand years, that a second wife is synonymous with grief.

The finding that we deem most significant is that adolescents in polygamous families, relative to counterparts in monogamous families in the same community, carry an average of 20% more psychosocial dysfunction, ψ, which in his definition includes but is not limited to somatic illness, obsessive compulsive disorder, paranoid ideation, panic, and depression, and is summarized in the figure below, where bar heights are scores on standardized tests.

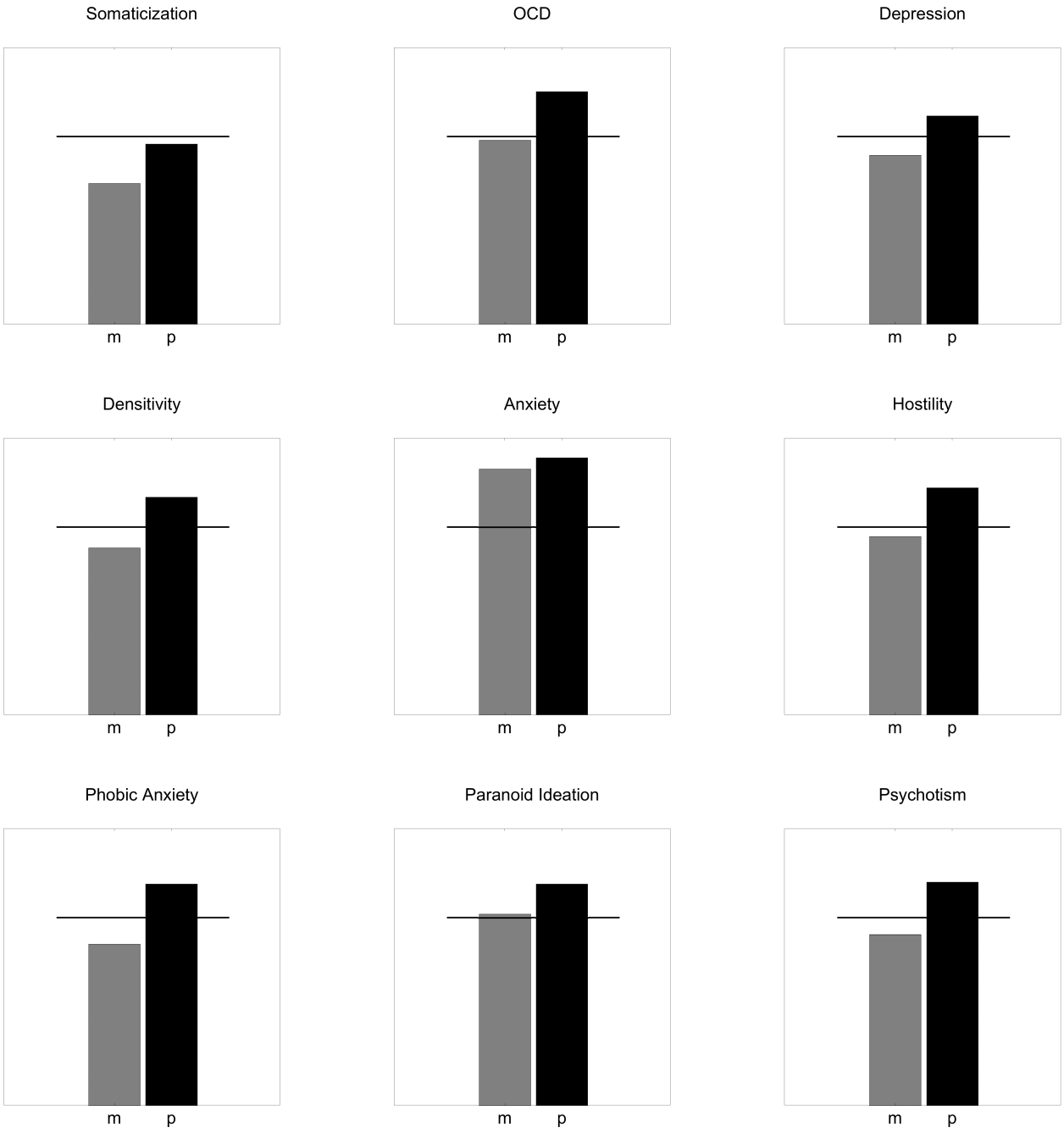

Figure 10: Nine facets of the ψ burden carried by N=352 adolescents in N_m=178 monogamous (m) and N_p=174 polygamous (p) families, quantified by psychological testing per Al-Krenawi (2014). The horizontal line in each figure corresponds to a standard score of 100. Adolescents of p-families carry about 20% more ψ than their counterparts in m-families.

Where does the ψ burden go? We might infer the answer from personal experience, and surely it is already hinted at by the double meanings of dara and tzarah. The unhappy wife transmits her unhappiness to those closest to her.[34] The adolescent with a ψ burden will carry it to school, to work, to friends, or to his mate and children and transfer some part of it to them. We hypothesize that the polygamous family leaks ψ into every household in $\mathcal{P}$, wherein it accumulates.[35] On the grounds that the ψ on tap for transmission to all of $\mathcal{P}$ increases with the plural marriage fraction, *p*, one model of this flow would have it that the incremental □ generated in a time interval *dt* is proportional to the time-dependent plural marriage fraction, *p(t)*. Absent any other mechanisms, a naive translation of the preceding sentences into the language of differential equations leads to the conclusion that ψ grows exponentially in the time integral of prevalence

$$\int p\,(t)\,dt$$

That particular exponential form is unbounded, accelerating, and unrealistic, and cannot be used as written. However, as we will show later, appropriate time integrals of prevalence are key to our measure of *polygamos*.

The previous section was devoted to the mechanism by which scarcity gave birth to convention. The family-driven changes to *polygamos* are less about social convention than about individual temperament. Per Al-Krenawi's measurements and the mechanism we posit, citizens of $\mathcal{P}$ are on average are more inclined to belligerence, more susceptible to paranoid ideation and depression, and generally unhappier than citizens of $\bar{\mathcal{P}}$. Of course, these symptoms will not be evenly distributed across all $\mathcal{P}$-states, nor will each of them be present in equal measure within every member of a given $\mathcal{P}$-state, nor will they be absent from $\bar{\mathcal{P}}$, but the means are predicted to be well separated.

Monogamy and Democracy

A linkage between disenfranchisement and polygamy is central to the work of anthropologist Laura Betzig (1986). Despotism is the ultimate in disenfranchisement because it is a system of governance in which only the voice of the autocrat matters. We thus expect that democratic

[34] The experience of hurting the ones you love the most is hardly unknown outside this sphere, the evidence for which is ample in popular song, popular psychology, and popular literature.
[35] Were this measurable and confirmed, it would constitute direct link from microscopic practice (polygamy) to mesoscopic behavior (individual dysfunction) and from there to macroscopic effect (average dysfunction across an entire community).

impulses towards greater enfranchisement will be suppressed in polygamous society. Through the lens of our $\mathcal{P}/\bar{\mathcal{P}}$ binary, we look at two independently gathered, though highly correlated (R=0.94) measures of democratic institutions; one an annual ranking from *The Economist*[36] and the other from Freedom House.[37] In both cases, the $\mathcal{P}$ and $\bar{\mathcal{P}}$ distributions are separated by about two standard deviations. Corroborating this in the roughly analogous context of ***H***, Hudson and den Boer (2005: 202) claim that, "high-sex-ratio societies are governable only by authoritarian regimes capable of suppressing violence at home and exporting it abroad through colonization or war." $\mathcal{H}$ builds convention less effectively than $\mathcal{P}$ because the former is passing and the latter is chronic. Therefore, what is evidently true here about $\mathcal{H}$ is expected to be even more evident in $\mathcal{P}$.

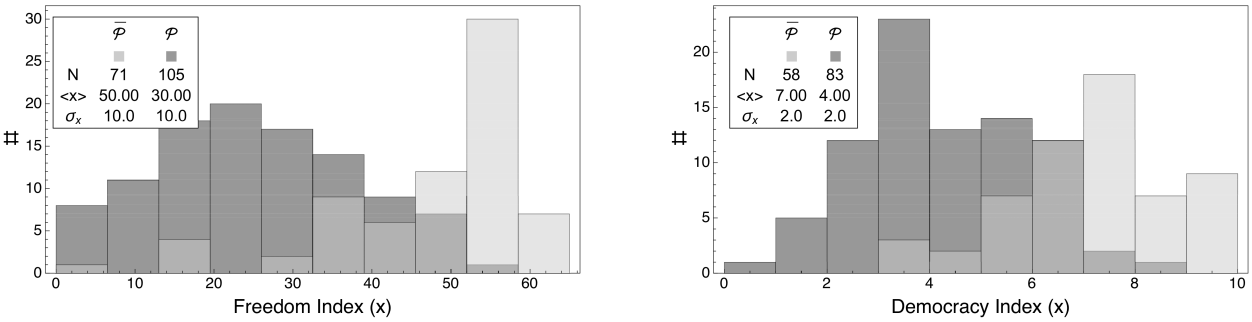

Figure 11: The descriptively named Freedom Index from Freedom House and the Democracy Index from The Economist are ordered such that authoritarian or repressive states score low and democratic or open states score high on their respective scales. The overlapping histograms of $\mathcal{P}$ and $\bar{\mathcal{P}}$ states are well separated for both, as we expect them to be on the basis of scarcity and convention.

The relationship between marriage law and democracy has a history as long as that of democracy itself. Classicists Susan Lape (2002), Walter Scheidel (2009), and Thomas Martin (personal communication, 2019) increasingly emphasize aspects of marriage and inheritance law in Solon's 6th century BCE reforms as being decisive in the establishment of Athenian democracy. Specifically, the reforms denied inheritance to children of all but the first wife in plural marriages, and they linked enfranchisement to income rather than wealth. Noble families who had used plural marriage to concentrate wealth and power were thus denied that avenue, and the enfranchisement of commercial classes further eroded noble power. Martin reminds us that nobility rules on the strength of the privileges it dispenses. The nobility of 7th and 6th century Greece was weak in the aftermath of the great wealth- and culture-destroying calamity that took down Mycenaean civilization in or around the early 12th century. Their weakness, leaving them few privileges to dispense, opened the doors to these reforms. By the time of the Persian War a century later, we must infer that the city states had left polygamy behind, as

[36] See http://www.eiu.com/Handlers/WhitepaperHandler.ashx?fi=Democracy-Index-2016.pdf&mode=wp&campaignid=DemocracyIndex2016
[37] See https://freedomhouse.org/content/freedom-world-data-and-resources

Herodotus makes no mention of it among Athenians or the Spartans.[38] Emphasizing the import of this transition, Scheidel (2009) writes, "Greco-Roman monogamy may well be the single most important phenomenon of ancient history that has remained widely unrecognized." In any event, polygamy among the Greeks is evident in Homer's epics but is absent in Herodotus' *Histories*.

Conventions are metastable, changing slowly in response to slowly changing circumstances or in response to very large impulses. One such impulse is existential threat. Solon's reforms were proposed and then adopted in the context of an existential threat posed by civil unrest and class struggle in Athens (Martin, 2000). We propose here a Second Law of polygamy, $\mathcal{P}$ gives way to $\bar{\mathcal{P}}$ only upon existential threat. History suggests that the appearance of prescriptive monogamy in Greece is its archetype.

Weak "Weak Ties" in $\mathcal{P}$

You know almost everything there is to know about your community—defined by those with whom you have strong social ties—and your community knows almost everything there is to know about you. Therefore, you can learn new things only from people outside your community, people with whom you have weak social ties. This is the essence of Mark Granovetter's influential 1977 paper, "The Strength of Weak Ties." In recent work (2017), he further spells out how this micro mechanism works at the macro level; change agents bring new ideas and insights from the outside to the inside to the extent that they have strong or plentiful weak ties; and they are effective in making change to the extent that they can adapt the resulting new ideas to local conventions.

This has powerful implications for $\mathcal{P}$. The chronic scarcity of marriageable females in $\mathcal{P}$ can be quenched by only by raiding or war. As warring nearby is less costly than warring far from home, and warring on oneself is suicide, one's neighbors are usefully viewed as not-self, that is as foreign, other, or taboo. And if it is not scarcity driving war, it is the paranoia and the tendency towards belligerence, both of which are more abundant in $\mathcal{P}$ per the growth-of-dysfunction model implied by Al-Krenawi's family dynamics. To have ties outside the group[39] is to warrant suspicion and risk being labeled taboo because the outside is taboo. In $\mathcal{P}$, therefore, change agents with strong or plentiful weak ties will be fewer in number than in $\bar{\mathcal{P}}$, making $\mathcal{P}$ more insular than $\bar{\mathcal{P}}$. An insular $\mathcal{P}$ will know little about $\bar{\mathcal{P}}$, so the preponderance of scholarship of one on the other will redound in favor of $\bar{\mathcal{P}}$.[40] An insular $\mathcal{P}$ will know less of $\bar{\mathcal{P}}$'s scientific

[38] His silence cannot be because he was blind to polygamy, for in his descriptions of Asians and Africans, polygamy is a commonplace, with one example being the numerous wives Darius took upon his ascension to the Achemeid throne in 522 BCE.

[39] All ties outside the group are necessarily weak ties.

[40] In *Orientalism* (Said, 1978), the index entry on scholarship is longer than any other, with the exclusion of the self-referential one. The British statesman Arthur Balfour's knowledge of Egypt occupies Said from the first page, and European knowledge of a particular not-Europe, the Orient, is the heart of his book. On the mirror of that discipline, he opines, "no one is likely to imagine a field symmetrical to it called Occidentalism" (ibid, 50). We opine in turn that is not so difficult to imagine Occidentalism, but it is difficult

achievements and adopt fewer of its technological innovations whereas $\bar{\mathcal{P}}$ will adopt materially all of $\mathcal{P}$'s.[41] In confrontations where technology is decisive, $\bar{\mathcal{P}}$ has and can be expected to dominate $\mathcal{P}$. A cyclical view of history argues that the first ones now shall later be last, *ad infinitum*. Though this view holds great appeal to those who teach that the meek shall inherit the earth, or that once-great civilizations will get their second chance, it is not supported by our theory of insularity born of scarcity born of polygamy.

Polygamos: The measure of polygamous conventions

If we are to take seriously the ideas we have elaborated—that the microscopic phenomena of scarcity and internal family dynamics drive mesoscopic conventions we call *polygamos* which in turn drive macroscopic social and economic outcomes—then we need a scalar measure of those conventions so that we may use it in quantitative analysis. This section develops two such measures, g_S and g. The conventions or social symptoms of polygamy consistently occur together, suggesting that they comprise a syndrome. The subscript in g_S denotes the fact that this measure of polygamos is distilled down from all the syndrome's symptoms considered at once. The unsubscripted measure, g, is based on a mechanistic approach to the generation of scarcity and convention. Though constructed by different methods and utilizing data from different sources, the two measures are very highly correlated, as we will show.

Assaying the syndrome: g_S

Each individual convention just described is manifest in different societies to a different extent. *Polygamos* may be thought of as a syndrome whose severity is assayed by some combination of the expression of individual conventions. In the previous sections we presented twelve nation-level datasets (collected by others) on bride price, age gap at marriage, fertility, ethnic fractionalization, physical security, claustration, fgm/c, differential life expectancy, patrilocality, discriminatory civil law, and indices of freedom and democracy. Excluding the Democracy Index (N=141) on the grounds that it is materially the same as the Freedom Index (N=176), we obtain a 10-dimensional dataset for 167 states. The first choice for a scalar measure of the dataset must be its first principal component, which we define as p_S after rescaling to units of zero mean and unit variance, and which we show in Figure 12 using the now-familiar overlapping histograms.[42] Not one of the individual components contains explicit reference to polygamy, and yet, their 1st principal component is bimodal in $\mathcal{P}$ and $\bar{\mathcal{P}}$; the respective medians are separated by 3 times the average of the standard deviations of the respective distributions.

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to find it in History, which serves only to underscore our point because the Orient is manifestly polygamous and the Occident is manifestly not.

[41] The assertion of the first clause is confirmed by the late adoption of the fruits of the scientific and industrial revolutions in polygamous states. As to the second, we note the Meissen manufactory that first produced Chinese-style blue on white porcelain in 1708, improvements in the astrolabe that made their way to Europe through Al-Andalus in the 12th century, and the 10th century adoption of positional Hindu-Arabic numerals.

[42] The components of the principal eigenvector are materially identical. Therefore, the 1st principal component is for our purposes identical to the sum of the individual components themselves, r=0.9995, so long as the components are rescaled to zero mean and unit variance.

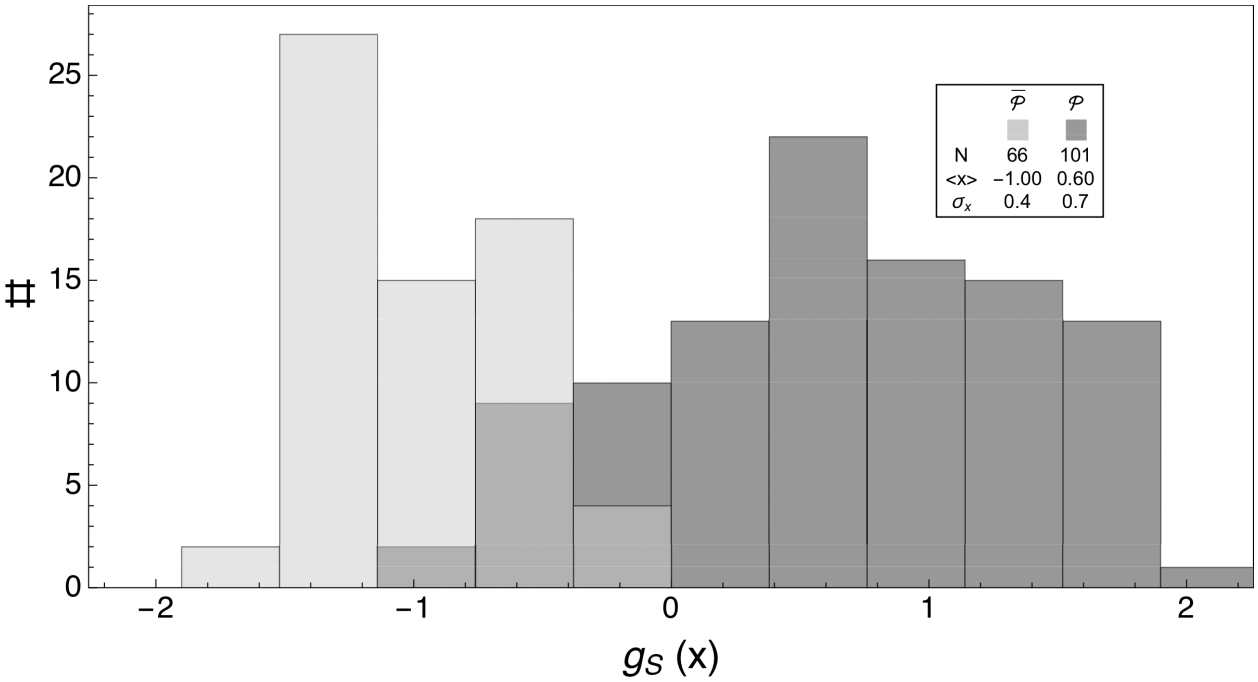

Figure 12: We construct a measure, g_S, of the polygamos syndrome by taking the first principal component of 10 different symptoms, or equivalently, by taking the average of the standardized mean of the symptoms, and then standardizing the result. Shown here as overlapping histograms, the means of the $\mathcal{P}$ and $\bar{\mathcal{P}}$ distributions of g_S are separated by ~3σ, where σ is the average of the σ($\mathcal{P}$) and σ($\bar{\mathcal{P}}$).

g-theory

Upon the introduction or emergence of a convention-inducing ***S***, a convention will not appear fully formed like some Greek god from the head of another. To do so would violate Lewis' 1st rule which states that almost everyone understands a convention, ***R***. Almost everyone understanding ***R*** is the outcome of a process that takes generations. Therefore, conventions evolve to their full or equilibrium form only over many generations and, we presume, in accordance with the magnitude of ***S***.

Let *g* be a scalar measure of conventional behaviors and let *p(t)* be a stimulus.[43] A simple model of the evolution of convention prompted by a stimulus born of polygamy is

Eq 1: $$g = c * \int_{-\infty}^{0} p(t)\, e^{-t/\tau}\, dt$$

[43] Generally speaking, though a given stimulus may be forgotten over the course of time, convention nonetheless remains in place, per Lewis' analysis of persistence.

where *t=0* is the present moment, *p(t)* is the time-dependent plural fraction of all marriages, τ is a time constant governing evolution, and *c* is a scaling constant. Generally speaking, *g* is a time integral of prevalence, such as we encountered in the section above, but with the important difference that in this case prevalence is weighted by a decaying exponential. Though the range of integration is formally from minus infinity to the present, the exponential term renders negligible all contributions from eras more than 2τ before the present.

Using $\tau = 225$ years, as estimated very roughly on the basis of post-slavery racism in America—a value not inconsistent with observations of secularization in Turkey and of the resurgence of polygamy in Central Asia a century after the Communist Revolution—let us now approximate *g*. Assume $p(t) = p_0$, a constant typical of its value over the past 500 years. Owing to the decaying exponential in the integral, $\tau * p_0$ is a very good approximation to g under all reasonable assumptions about *p(t)* prior to 500 years ago.

Now consider $g_0^i = \tau * p_0^i$, an approximation to *g*, where the superscript *i* denotes a specific nation. We include no *i*-designation on τ because it is governed by a human communications problem, that of fulfilling the condition that almost everyone understands ***R***, and not by anything unique to a specific nation *i*. In as much as our concern is with the global distribution of g^i_0 for all nations, and with comparisons of g^i_0 and g^j_0, the absolute scale of g^i_0 is irrelevant. Thus, we absorb τ into the prefactor *c*, obtaining our first approximation to g^i

Eq 2: $$g^i \cong g_0^i = c * p_0^i$$

where p_0^i is representative of the prevalence or plural marriage fraction in nation *i* over the last 500 years. The year 1900 marked the end of a long early modern period that was followed by 120 years of much more rapid and intense globalization or mixing of cultural practices, governance, ideas, laws, and so forth. Thus, relative to the 20th and 21st centuries anyway, we maintain that prevalences in the year 1900 are more or less representative of that long early modern period, and it is those that we seek to deploy in Eq 2.

Prevalences

Polygamy and culture are intimately intertwined, and so are culture and geography. We assert that seven cultural and/or regional traditions provide a sound basis for estimating p_0^i almost everywhere. These are African (within which there are three sub-categories), Chinese, Near Eastern, Islamic, Asian (which we take to be representative of Asia exclusive of China, Islam and the Near East), Pacific Islander, and Western.[44] For each of these, we posit a prevalence, p_0 with $\sigma = p_0/4$ which we present in Table 3 along with a prototypical case for each region.

[44] This categorization is not unlike that of the World Values Survey cultural values map (http://www.worldvaluessurvey.org/wvs.jsp), with the main difference being that those researchers lump Africa and Islam into one zone whereas we separate them into 4 distinct groups having different prevalences, and they subdivide what we call Western, all with p_0=0, into 6 separate zones.

These groupings are intentionally coarse, as warranted by the underlying data, but much finer than the $\mathcal{P}/\bar{\mathcal{P}}$ binary we introduced above. We will show later that these groupings are very informative as a measure of polygamous convention.

Tradition	Prevalence or p_0 (%)	Prototypes
African (low)	10	Namibia
African (mid)	15	Angola
African (high)	22.5	Kenya
Chinese	10	China
Islamic	10	Pakistan
Near Eastern	10	Syria
Asian	6.7	Nepal
Pacific Islander	15	Papua New Guinea
Western	0	Spain

Table 3: Regional and or cultural traditions, nominal prevalences of plural marriage fraction c. 1900, and prototypical states.

The economist James Fenske (2015) has modeled 20th century trends in African polygamy. The distribution of prevalences seems to cluster in three groups that fall from nominal values of 30%, 45%, and 60% at mid-century to about half that at the end of the century. In another study of mid-century tropical Africa, predominantly Africa (high) in our system, William Brass et al (1968: 214) gives a *p*=23.7% (σ=8.0%, N=12). As averages, Fenske's model predictions may be on the high side. We judge them downwards, obtaining *p*=10%, 15%, and 22.5% for Africa.

Polygamy in China before Communism was a mix of formal marriages and concubinage, both of which would have contributed to a scarcity of females, as would have a cultural preference for males. In thousands of peasant marriages in 18th- and 19th-century Liaoning Province in the north and Taiwan in the south, polygamy rates were less than 2% (Lee and Feng, 2001:76), but concubinage would not have been reported, so it is not unreasonable to take 3% as a lower bound. In the uppermost reaches of the social hierarchy, prevalences exceeded 33%, exclusive of concubinage (ibid). Zurndorfer (private conversation and 2016) suggests that half of the

Chinese bureaucracy, employing about □ of the adult male population, would have engaged in concubinage, yielding an equivalent p=10%, a value felicitously equal to the geometric mean of 3% and 33%. On the basis of these expert opinions, we assign p_0=10% for China.

Islam is a world religion whose sectarian and regional differences are vast. But while the prevalence of polygamy among Muslims is highly variable, it does not defy categorization. Among Bedouins in the Negev, contemporary p=30-35%, having increased by 10% over the past decade (Al-Krenawi, 2014). Chamie's study (1986) of latter 20th-century polygamy in 13 Arab countries shows that the p=4.6% (σ=2.4%, N=22). If the long-term decline seen by Fenske is mirrored in these Arab countries, then the prevalence in 1900 was, on average, 9%. Being the case that polygamous marriages are often not civil marriages and thus not recorded, it is fair to assume that actual polygamy is more prevalent than the civil data shows. In our model, we assign 10% to the prevalence of polygamy across Islam, a value that does not stretch credulity.

Islam grew up among Bedouins in the Hejaz, what is now western Saudi Arabia. Polygamy was the custom among Bedouins there, and it is not unreasonable to suppose that the prevalence of polygamy throughout the region was typified by the prevalence among the co-religionists who codified its practices. Thus, we assign p_0=10% for the Near East and for Islam.

The traditions we call Asian derive from Buddhist, Hindu, and other cultures across Central and South Asia and, from there, east to Indonesia.[45] Historian Wendy Doniger's (2009: 296) important work on the Hindus notes that polygyny "was the rule, and men could have several spouses throughout most of Hindu history." Indeed, the absence of polygamy in India's labor-intensive agricultural communities would be anomalous, per Becker's (1973) theory of the family. Census data from the 1960s and 1970s shows that the bigamy rate among upper-class Hindus was 5.8% (Unisa) and somewhat higher among Buddhists and other smaller ethnic groups (Dayal, 2001). The influence of Chinese culture was particularly strong in Southeast and Central Asia. Allowing for the possibility that China's p_0=10% was somewhat attenuated in these regions, it seems reasonable to assign p_0=6.7% for Asia, exclusive of China, Islam, and of Russia.

Migrations, isolation, and small tribal chiefdoms in the Solomon Islands, Papua New Guinea, Samoa, and Fiji are consonant with polygamy on an African scale (Luker, 2015). Consequently, we choose p_0=15% for the Pacific Island tradition.

The Western marriage model is $\bar{\mathcal{P}}$, a statement which we hope needs no more proof than a pair of open eyes, but which is corroborated by McDermott's polygyny scale, and is exhaustively documented in Witte (2015). Therefore, we may write p_0=0 for the Western tradition.

[45] Though Russia is technically and historically Asia, it obeys a different logic because it inherited the p_0=0 prescriptive monogamy of the West (Witte, 2015) from Byzantine missionaries in the 9th century.

Combining Traditions

While the West may be unequivocally p_0=0, Haiti is decidedly polygamous while its island twin, the Dominican Republic, is not. We concern ourselves here, not with how this stark contrast came to be, but only with how to estimate *polygamos* in Haiti today. As mentioned earlier, Haiti's population is overwhelmingly African, or $f_{\text{Africa}}^{\text{Haiti}} = 0.97$ per Levine and Renelt (1992), therefore it seems straightforward to use a value consistent with their African traditions, that is p_0=15%. In the case of Guyana, where the $f_{\text{Africa}}^{\text{Guyana}} = 0.39$, it seems equally reasonable that we should blend an African p_0 with that of other large populations. In Guyana, 50% of the population comes from India, $f_{\text{India}}^{\text{Guyana}} = 0.54$, where the p_0=6.7% in the prevailing Asian tradition. We estimate the blended p_0 on the basis of linear combinations as follows:

Eq 3 $$p_0^i = f_T^i * p_T + f_2^i * p_2 \text{ if and only if } p_2 > p_T, \text{ otherwise } p_0^i = p_T^i.$$

In Eq 3, f_T^i is the population fraction in state *i* practicing the prevailing tradition of state *i*, characterized by p_T, and f_2^i is the fraction of the population practicing a second tradition characterized by p_2. By this logic, low p_0 migrants practice in the tradition of their new homeland, and high p_0 migrants practice as they did at home, to the extent that that practice is legal or tolerated in the new location. This is consistent with the world as McDermott has characterized it. Specifically, in the Philippines, Thailand, Sri Lanka, Russia, India, Singapore, Suriname, and Mauritius, minority Muslims (5% to 16%) are free to practice customary Islamic marriage law, typically p=10%, even though national civil law prohibits it and p_T=0. In Belize, Guyana, and Haiti, this procedure yields p_0=2.9%, 9.6%, and 14.6%, respectively. The UN estimate for Guyana, 4%, is low compared to our estimate. However, given the 20th-century decline reported by Fenske, and given that our aim is to estimate p_0 in 1900, the UN value seems corroborating rather than low.

We use the table of Traditional Prevalences and Eq 3 to estimate g_0^i for each country, normalizing the results such that they range from 0 to 4, facilitating comparison with McDermott's Polygyny Scale. The inset histogram of Figure 13 demonstrates that the means of the $\mathcal{P}$ and $\bar{\mathcal{P}}$ distributions are well-separated, 0.05 and 2.42, relative to their respective standard deviations, 0.22 and 1.1. The low spot of the histogram, $0.5 < g < 1$, marks the bimodal divide or gap between $\mathcal{P}$ and $\bar{\mathcal{P}}$. It originates in the fact that 6 of the 7 dominant traditions have prevalences greater than or equal to 6.7%, translating to $g \geq 1.2$, while in the 7th tradition, p_0=0. The gap makes the core of our argument, that $\mathcal{P}$ and $\bar{\mathcal{P}}$ are truly distinct, difficult to assail.

Our final concern would be to explain any anomalies, such as low g $\mathcal{P}$ states or high g $\bar{\mathcal{P}}$ states. Of the former, there are none. Of the latter, there is 1 out of 177, Israel. Israel's g=1.78 derives from its Near Eastern and Islamic traditions, both of which would have been in full force in 1900. By McDermott's scale, Israel is a 0, meaning polygamy is illegal and extremely rare. On the other hand, states whose g~1.8 are typified by Afghanistan. Is Israel indistinguishable from

Afghanistan in this important social dimension?[46] Israel's hardly unknown 20th century history was marked by immigration. Monogamous Jews from Europe set the social tone and the law for modern Israel, though Jewish migrants from North Africa, the Near East, and Central Asia were not necessarily monogamous. On the basis of Israel's Jewish population, we would estimate *g*=0. But 18% of Israel's population subscribe to Near East or Islamic traditions, suggesting *g*=0.31. With this correction, the means and standard deviations of the $\mathcal{P}$ and $\bar{\mathcal{P}}$distributions become *g*=0.03, σ=0.08 and *g*=2.42, σ=1.05, respectively.

What can we say about the states in the gap? These are Bosnia, Macedonia, and Belize. They carry substantial population fractions for whom polygamy is customary, but not so large that they are unambiguously $\mathcal{P}$ or $\bar{\mathcal{P}}$. *Polygamos* is a syndrome, a set of symptomatic behaviors or conventions. Its index, *g*, is intended to increase when more of the symptoms are present and when they are more keenly expressed. We expect that states in the gap will express fewer of the symptoms. Those that are expressed will depend on local conditions, for instance a state's neighbors or its climate. We leave them as they are, in the middle.

We conclude this section by noting that the correlation between the two measures, g_S and *g*, is 0.85, and that between g_s and McDermott's polygyny scale is 0.86.

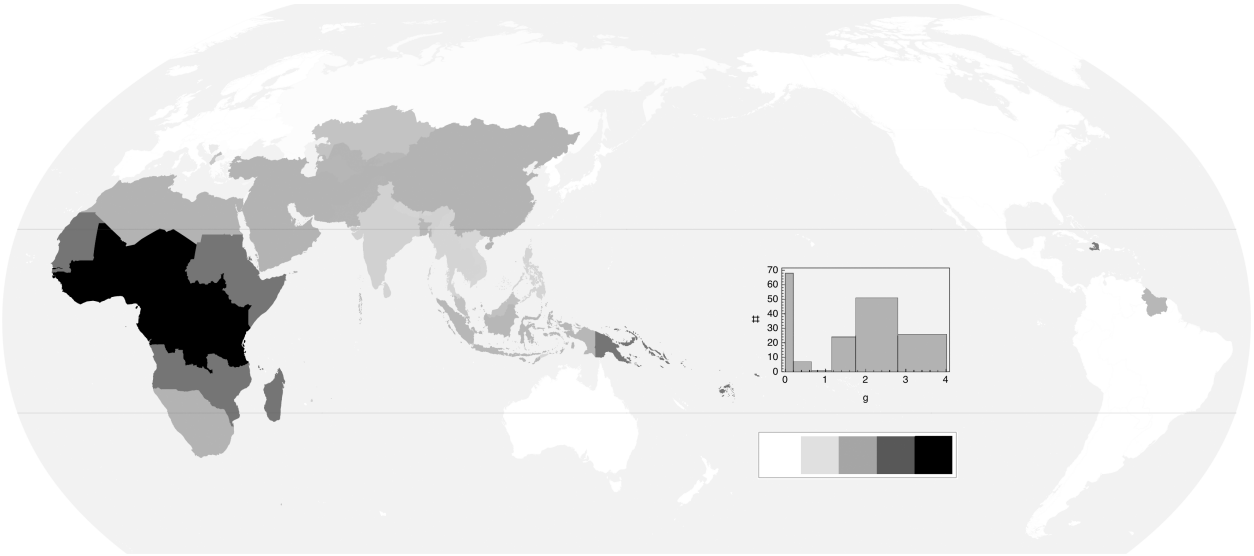

Figure 13: 177 states mapped in our primary measure of *g*, *polygamos*, on a continuous scale from 0 to 4. The colors in the legend correspond to $g = \{0, 0.3, 0.9, 1.7, 2.8, 4.0\}$. The inset distribution illustrates the bimodality.

[46] The journalist Åsne Seierstad lived with an Afghani family in 2001/2. In the preface to her account, *The Bookseller of Kabul* (2003: xiv) she writes, "The same thing was continually provoking me: the manner in which men treated women. The belief in male superiority was so ingrained that it was seldom questioned." Then, the book opens with the bookseller's plural marriage and its effects on his first wife and the family. The book may be read, in fact, as a series of case studies on *polygamos*.

l'Affaire Mormon

In the 1830s and 1840s in Illinois and Missouri, Joseph Smith, a Christian who became the prophet of a new religion, preached that male plural marriage was ordained by God and that his flock, nearly all of whom were (monogamous) Christian converts, should adopt the practice. Christian marriage doctrine and the definition of polygamy itself has evolved and bifurcated along with Christianity itself, though with few exceptions[47], Christianity has taught that polygamy leads to disaster in this life and hellfire in the next. Thus, Mr. Smith's teachings were generally met with horror by Americans on the frontier who did not accept him as a prophet. In 1844 a mob removed him from jail in Nauvoo, Illinois and murdered him.

For another 50 years, Mormons, the followers of the church of which he was the first prophet, gradually adopted and practiced polygamy far from angry mobs, in the Utah Territory (Ulrich, 2017). Various accounts estimate the plural marriage fraction at about 15% (Becker, 1981: 81), qualifying that group as a McDermott 3. When Mormons vied for statehood and were informed that the US Cavalry would have their way with them if they didn't abandon polygamy, they made their choice in favor of statehood, granted in 1896 (Ulrich, 2017).

If everything that we have said here about *polygamos* and the persistence of convention is correct, we might wonder how is it that in 21st century America, Salt Lake City is both prosperous and world renowned for its educational excellence and technological innovation. Simply, Utahan *polygamos* is and always has been well shy of the value in the gap between $\mathcal{P}$ and $\bar{\mathcal{P}}$ distributions, $g = 0.75 \pm 0.25$, a value that deserves to be called a threshold. First, its population grew from 12,000 to 280,000 between 1850 and 1900, almost entirely from immigration. Scarcity as we have described it assumes endogenous growth over a very long period. In Utah, scarcity was quenched by importing the missing women. Thus, *polygamos* would not have developed to its equilibrium level consistent with 15% prevalence, that is, *g*=2.67. If the full flowering of *polygamos* evolves over a period of $2\tau = 450$ years then in 50 years, we'd see *g*=0.61. Second, the decay weighted time integral of prevalence Eq 1 is only well-approximated by Eq 3 if p_0 is fairly constant over the interval 1500 to 1900, and if the population distribution is relatively constant over the period 1900 to the present. The fact that Utah's population grew 10-fold over the next century, mostly by immigration from $\bar{\mathcal{P}}$ European states, ensured that these conditions were not satisfied. The violation would further dilute *g* by at least 80%, leading to *g*<0.12. Thus, on the basis of scarcity, the expectations generated by our model are consistent with the fact that Utah conforms to $\bar{\mathcal{P}}$ convention despite its early 50 year-long experiment with polygamy.

On the other hand, the family dynamics syndrome should express itself and be visible in every generation, and the illegal encampments of the so-called Fundamentalist Latter-Day Saints (FLDS) offer continuing evidence of that. A few prophets, who would go by the name of elders or alphas in other contexts, hold sway over dozens of women (Lapidos, 2008). Every newborn

[47] Most notable among the exceptions is John Beukels, an Anabaptist leader in Münster who "decreed [on May 25, 1534] that the city should adopt polygamy in emulation of the Old Testament Patriarchs." (Witte, 2015: 221).

girl is potentially a new wife, and every newborn boy is a potential threat to the prophet. Very few of those boys can expect to have a life in the encampment, an algebraic fact that escapes no one. They are, in anthropological parlance, peripheral, junior, or disenfranchised males. In colloquial American usage, they are "Lost Boys" (Borger, 2005). There is no systematic psychosocial study of these boys, but a teenage boy abandoned on a roadside is at risk for Attachment Disorder if nothing else. Left untreated, there will be lifelong implications for him, his peers, his mates, and his children. This is Al-Krenawi's mechanism in plain view.

Much more might be said, particularly about the lives of FLDS women and the violence against them. Historian Tara Westover (2018: 245) writes that the 1890 abandonment of polygamous practice did not lead to abandonment of concomitant social expectations. By implication, contemporary Mormonism is infused with some measure of *polygamos*, whose existence she imputes by another name, social policy (ibid, 280). Her account of contemporary life in a monogamous FLDS household—with its intolerance of change, its insularity, its distrust of strangers and institutions, its psychosocial dysfunction, and its demonization and claustration of women—is what you would expect to see in $\mathcal{P}$, but we cannot draw larger inferences from one account. In summary, the Mormon affair with polygamy confirms the family dynamics mechanism and is consistent with predictions of the scarcity mechanism. The spectrum of conventions enumerated above is a syndrome. Not all $\mathcal{P}$ communities manifest all of the conventions, but some of them are present in all $\mathcal{P}$ communities.

Conclusion

We began this paper by asking the question, where is the family in economic history? We conclude it by saying, at the center. Work in economic sociology as well as in economic history has demonstrated again and again that social convention matters to economic outcomes. This insight is often shorthanded (imprecisely as we argue elsewhere) as 'institutions matter.' We agree that they do, but which ones in particular, and in what ways do they matter? We have shown here that family law/practice, specifically the dichotomy between monogamy and polygamy, generates a strongly bimodal set of linked conventions governing relations and interactions between individuals, households, the state or marketplace, and of course, between the sexes. We have identified a set of polygamy-born conventions which typically occur together, a syndrome we call *polygamos*. It is associated with the commodification of women at the expense of their health, wealth, education, and personal agency. It is also associated with authoritarian rule, greater belligerence, and lower levels of trust beyond the smallest circle of kin. If polygamy shapes the conventions in which all economic activity is embedded, then we must expect *polygamos* to matter for economic outcomes. That marriage law has not been incorporated as an explanand in standard models of economic development or inequality strikes us as a hobbling omission. Our work develops two plausible measures (based on two independent datasets) of *polygamos* for more than 160 nations; advances an estimate of the distribution of polygamy in 1900; explores ten salient conventions and compares them with the more widely discussed but less potent economic impact of high sex ratios; and identifies the substantial drag of *polygamos* on the capacity for trust at a distance that is critical for both economic exchange and scientific and technological advance. What remains for future work is

to incorporate *polygamos* into a broader model of economic development. Our exploration of the multiple mechanisms at work within polygamous society—mechanisms generated by scarcity as well as those by stress within the family unit itself—leads us to expect that polygamy generates significant drag on the economic, political and social attainment of the societies which share its conventions. The family may well be the most important omitted variable, one that that has been staring us in the face all along.

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