

# Market exposure and human morality

Received: 30 November 2021

Benjamin Enke<sup>1,2</sup>✉

Accepted: 12 October 2022

Published online: 21 November 2022

 Check for updates

According to evolutionary theories, markets may foster an internalized and universalist prosociality because it supports market-based cooperation. This paper uses the cultural folklore of 943 pre-industrial ethnolinguistic groups to show that a society's degree of market interactions, proxied by the presence of intercommunity trade and money, is associated with the cultural salience of (1) prosocial behaviour, (2) interpersonal trust, (3) universalist moral values and (4) moral emotions of guilt, shame and anger. To provide tentative evidence that a part of this correlation reflects a causal effect of market interactions, the analysis leverages both fine-grained geographic variation across neighbouring historical societies and plausibly exogenous variation in the presence of markets that arises through proximity to historical trade routes or the local degree of ecological diversity. The results suggest that the coevolutionary process involving markets and morality partly consists of economic markets shaping a moral system of a universalist and internalized prosociality.

Social scientists and philosophers have long debated the interaction between markets and human morality. A prominent body of theories posits that market interactions and a universalist internalized prosociality go together because anonymous market-based cooperation benefits from a different type of morality than production networks that predominantly involve kith and kin<sup>1–11</sup>. This broad body of theories is consistent with the ‘doux commerce’ argument made by classical thinkers such as Montesquieu<sup>12</sup>, who noted that “Commerce ... polishes and softens barbaric ways as we can see every day.”

Thus far, evidence on the medium- or long-run association between markets and morality largely stems from behavioural experiments conducted across a relatively small number of (mostly small-scale) contemporary societies<sup>4,13</sup>. Ideally, one would like to complement this experimental evidence with data from ecological settings in which rich information on the morality of a large and diverse set of societies can be observed. Ecological data are of particular relevance here because moral psychologists emphasize that understanding human morality requires studying entire moral systems: packages of interrelated behaviours, beliefs, values and biological responses in the form of moral emotions<sup>14–17</sup>.

An attractive approach to make progress on these questions is to study the morality of historical pre-industrial societies. This is because ethnographic accounts, such as those assembled in the ‘Standard Cross-Cultural Sample’ (SCCS), suggest that historical societies

exhibited substantial variation in their degree of market interactions. However, recovering the moral systems of pre-industrial societies was long thought to be impossible due to data limitations. In particular, commonly used ethnographic datasets contain very limited information about local values and beliefs, and only for a small number of societies. This renders a large-scale econometric analysis infeasible.

To overcome this problem, this paper leverages a recently released dataset on historical folklore to construct detailed measures of markets and morality for nearly 1,000 pre-industrial societies. A major advantage of folklore data is that they allow making those societal characteristics visible, that were long thought to be lost due to their absence in ethnographic data. Using these data, I show that markets—proxied by the presence of intercommunity trade and/or money—are strongly associated with a high cultural salience of prosociality, trust, moral emotions and a universalist system of values that emphasizes impersonal concepts such as justice, tolerance, equality and fairness.

This correlation probably reflects a coevolutionary process in which markets and morality shape each other. To make some progress on identifying one of the causal effects in this process, I study whether the presence of markets may cause a more universalist and internalized morality. For example, some theories posit that morality is functional and evolved to support human cooperation<sup>8,9,18</sup>. According to this argument, the presence of markets may induce a more universalist internalized prosociality because market-based cooperation may benefit

<sup>1</sup>Department of Economics, Harvard University, Cambridge, MA, USA. <sup>2</sup>National Bureau of Economic Research, Cambridge, MA, USA.

✉e-mail: [enke@fas.harvard.edu](mailto:enke@fas.harvard.edu)

from such a psychology. Using a variety of empirical approaches such as instrumental variable estimations, I provide tentative evidence that at least a part of the correlation between markets and morality-related variables is driven by an effect of exposure to markets on morality.

## Results

### Data

“Folklore is the collection of traditional beliefs, customs and stories of a community passed through the generations by word of mouth.”<sup>19</sup> Such stories and narratives are increasingly attracting interest in the social sciences<sup>20,21</sup>. The anthropologist and folklorist Y. Berezkin<sup>22</sup> assembled a dataset that codes the presence of 2,564 motifs, each of which is given by a short text that summarizes a story, image or lesson. These data cover 958 ethnolinguistic groups from across the globe, for 943 of which at least five motifs are available. Given that “folklorists are interested in collecting stories that are untouched by modernization”<sup>19</sup>, this catalogue could be thought of as capturing pre-industrial societies’ culture. On the basis of Berezkin’s catalogue of motifs, Michalopoulos and Xue used text analysis to construct a dataset that codes the presence of a large number of economic, psychological and cultural concepts in a society’s oral tradition<sup>19</sup>. In these text analyses, a concept is said to appear in a motif if either the seed word itself or one of the 50 most closely related terms—according to the knowledge representation project ConceptNet—is mentioned.

**Markets measure.** For the purposes of this paper, I quantify the importance of ‘markets’ as the degree to which intercommunity trade and/or money are present. A main advantage of this definition is that the SCCS contains information on the presence of trade and money in a small set of pre-industrial societies, which allows me to cross-validate my folklore measure of markets. Accordingly, I quantify the importance of markets in two steps. First, I identify those concepts in the folklore database that are related to trade or money, for a bag-of-words of 30 concepts. Examples include ‘market’, ‘trade’, ‘money’ and ‘profit.’ Second, I aggregate the concepts into an index ‘Importance of markets’ that captures the fraction of the market-related concepts that appears in a society’s folklore. See Supplementary Information section 1.2 for details.

Figure 1 displays the global variation in pre-industrial markets<sup>23</sup>. While the data exhibit some geographical clustering, the map also reveals large heterogeneity within relatively narrow geographical units. This is important because it enables statistical analyses that only compare societies that are in close geographical proximity to each other, which helps rule out potential concerns about omitted variables.

**Morality measures.** Quantifying morality based on folklore rests on the premise that occurrences of morality-related concepts are indicative of the types of values and behaviours that a society cherishes and inculcates into its children. This is plausible given that folklore largely captures popular folktales and narratives. Because moral psychologists highlight that morality consists of an entire package of interrelated psychological adaptations, I construct a comprehensive picture of historical societies’ morality by devising four summary statistics, each of which relates to a different aspect of morality: prosocial behaviour, trust beliefs, values and emotions.

1. ‘Prosociality’ is constructed as the difference between prosocial concepts (for example, ‘sharing’, ‘helping’ and ‘cooperate’) and selfishness-related concepts (‘selfish’, ‘self-interested’). This measure relates to behavioural experiments that assess the sociability of small-scale societies<sup>24</sup>.
2. ‘Trust’ quantifies the fraction of interpersonal trust-related concepts that appear in a society’s folklore.
3. ‘Moral universalism’ quantifies the nature of underlying moral values. Moral psychologists and anthropologists have long pointed out the difference between (i) universalist values

and (ii) communal, particularist concepts that are tied to certain relationships or groups<sup>8,14,18,24</sup>. Accordingly, my measure is constructed as the relative occurrence of universalist and group-based particularist concepts. Universalist values include concepts such as ‘justice’, ‘fairness’, ‘equality’ and ‘tolerance’, among others. Group-based concepts include ‘family’, ‘homeland’, ‘obedience’ and ‘cohesion’, among others.

4. ‘Moral emotions’ capture the frequency of guilt-, shame- and anger-related concepts. These emotions are among the most widely emphasized internalized biological responses that are believed to enforce cooperation and sociality<sup>25</sup>.

Supplementary Information section 1.2 contains details on the construction of these measures. While the word count exercise that I implement has the advantage of being simple and transparent, a caveat is that it does not account for the valence or context in which a given word or concept is mentioned.

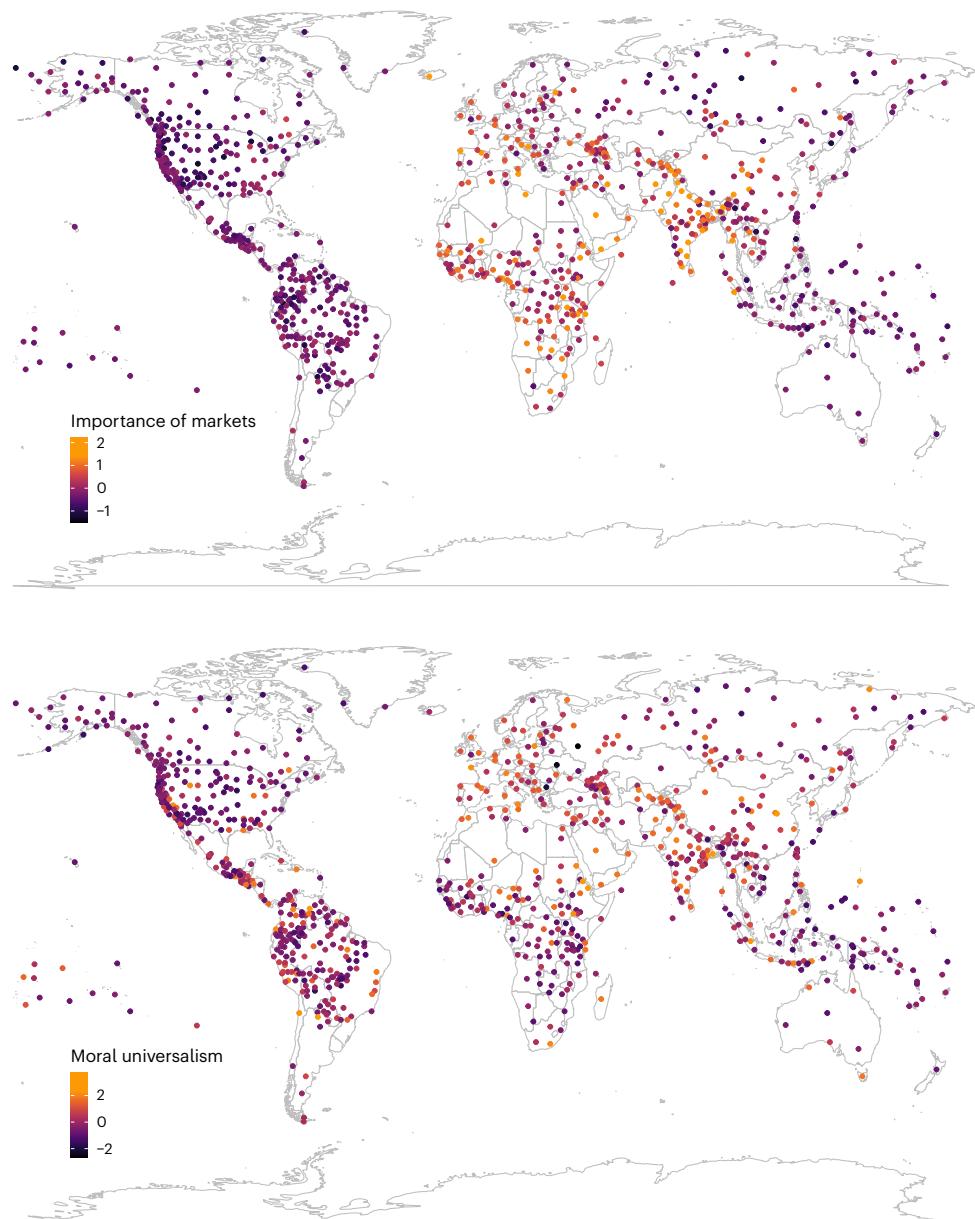
Figure 1 illustrates the global variation in moral universalism. Again, a key takeaway from this map is that there is large heterogeneity in moral values even across societies that reside in close proximity to each other. This enables high-powered econometric analyses that only compare societies that reside on the same continent, within the same contemporaneous country borders or even within a smaller geographical unit with each other.

**Cross-validation of folklore measures.** Michalopoulos and Xue provide initial evidence for the validity and meaningfulness of Berezkin’s folklore dataset, both by cross-validating it with independent ethnographic accounts and by showing strong correlations between external data on ecological conditions (such as the occurrence of earthquakes) and the frequency of corresponding concepts in a society’s folklore<sup>19</sup>. Here I describe additional validation steps that I undertook with respect to the indices described above.

The SCCS contains various variables that capture the presence or importance of intercommunity trade and money in a pre-industrial society. Supplementary Table 1 cross-validates the folklore markets measure by showing strong and statistically significant correlations with the measures in the SCCS. Of course, a major advantage of the folklore measure is that it is available for about nine times as many societies as those in the SCCS.

The SCCS contains insufficiently rich information about the moral traits that I desire to capture (for example, the generosity variable in the SCCS is only available for 104 societies, and the SCSS contains no information about moral universalism or moral emotions). Thus, I instead validate the moral measures in an indirect way, by correlating them with the presence of belief in a moralizing deity, as coded in the Ethnographic Atlas. Several literatures have argued that moralizing religions give rise to higher prosociality, trust and universalist values<sup>26,27</sup>. Thus, a plausibility check for my folklore measures is whether they are meaningfully correlated with belief in a moralizing god. Supplementary Table 2 shows that this is indeed the case for all four moral indices.

**Regression framework.** The baseline statistical analyses relate the moral indices to the importance of markets using Ordinary Least Squares (OLS) regressions. Because it is plausible that omitted variables confound this analysis, I proceed in five steps. In a first step, all analyses control for a rich set of covariates, including local living conditions. Second, I present analyses that include country fixed effects, meaning that I only compare societies that reside within the same contemporaneous country borders and are therefore similar to each other, which reduces the scope for omitted variables. Third, I similarly present analyses that only compare neighbouring ethnic groups whose geographical centroid is in close proximity to each other such that the analysis relies on even more fine-grained variation in markets and morality. Fourth, I explicitly assess the role of education and institutions for the results. Fifth, I present instrumental variable estimates



**Fig. 1 | Importance of markets and moral universalism across pre-industrial societies.** The markets (top panel) and universalism (bottom panel) measures after they are normalized by the number of motifs in a society's folklore. The maps are constructed through the following procedure. First, the markets index and universalism measure are normalized into z-scores. Then, the z-scores are residualized by regressing each variable on the total number of motifs in a society and its square to control for potential mechanical relationships between the

number of market- or morality-related motifs and the total number of motifs in a society's folklore. The maps display the residuals of these regressions. Colours represent the size of residuals. Dots with warmer colours, that is, closer to orange, have larger residual values. The values on the colour legend indicate cut-offs for the colour coding. For example, in the top panel, light purple indicates values between -1 and 0.

that only leverage variation in markets that is due to historical trade routes or ecological features that are plausibly unaffected by the moral values of a society.

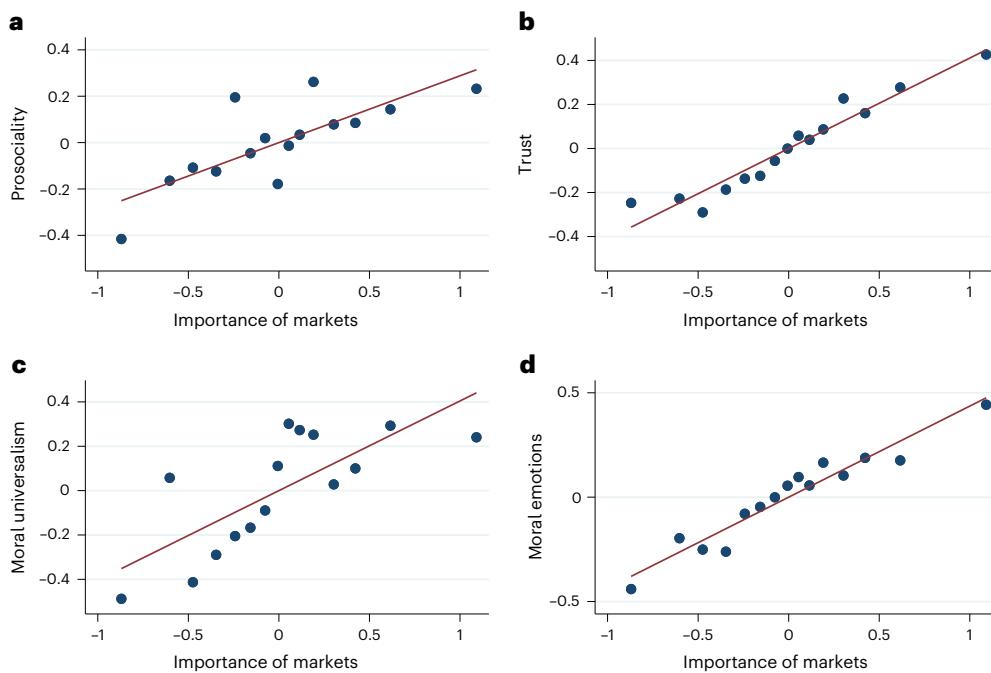
Regarding covariates, given that societies exhibit large variation in the total number of motifs in the folklore database, it is important to flexibly control for the number of motifs to make sure that the markets index does not spuriously pick up an effect driven by the volume of a society's folklore. In addition, I construct measures of the cultural salience of agriculture, pastoralism and hunting-gathering from the folklore database to control for heterogeneity in subsistence mode.

**Addressing Galton's problem.** As in all cross-cultural analyses, a potential issue is Galton's problem of spatial correlation, which refers

to the observation that different historical societies may not all be independent from each other, for example, because they share common ancestry. If this is the case, standard errors that are computed on the basis of the assumption of independence will be too small, which inflates the level of statistical significance. To address this, all analyses reported in this paper cluster the standard errors at the level of the language subfamily variable in Berezkin's folklore dataset, which codes 75 subfamilies.

#### Baseline results on markets and morality

Figure 2 summarizes the first set of results on the link between markets and morality. Each panel in the figure contains a binned scatterplot that shows average levels of the different morality variables for a given range



**Fig. 2 | Binscatter partial correlation plots for the relationships between morality and markets.** In each plot, a unit of observation is a society in the folklore database,  $N = 943$ . Each dot shows the average of the relevant morality variable for a given range of values of the markets index. All variables are standardized into  $z$ -scores for ease of interpretation. Each binscatter is constructed by controlling for the total number of motifs in a society, its square and continent fixed effects. Results from regressing response variables on the

importance of markets after partialling out control variables are presented as fitted lines. **a**, Relationship between prosociality and markets, with partial correlation of  $\rho = 0.18$ . **b**, Relationship between trust and markets, with partial correlation of  $\rho = 0.25$ . **c**, Relationship between moral universalism and markets, with partial correlation of  $\rho = 0.22$ . **d**, Relationship between moral emotions and markets, with partial correlation of  $\rho = 0.38$ .  $P < 0.001$  for all partial correlations. Note that axis ranges vary across panels.

of the markets index ( $N = 943$  societies). The figures are constructed by controlling for continent fixed effects as well as the number of motifs in a society's folklore and its square. The coefficient estimate of the markets index is 0.29 for prosociality (95% confidence interval 0.19, 0.39), 0.41 for trust (0.31, 0.51), 0.40 for universalism (0.29, 0.52) and 0.44 for moral emotions (0.37, 0.50). These results are statistically significant with  $P < 0.001$  (rounded to three digits) for all estimates. Partial correlation coefficients are presented in the figure legend.

Figure 3 presents the results of different specifications for these regressions. First, I report the estimates of OLS regressions that only control for the number of motifs and its square as well as continent fixed effects ('baseline'). Second, I show the estimates of regressions that additionally control for the set of covariates discussed above. Third, I present the estimates of OLS regressions that control for the covariates plus country fixed effects. The figure reports point estimates, 95% confidence intervals,  $t$ -statistics and  $P$ values. The underlying regressions are reported in Supplementary Table 3.

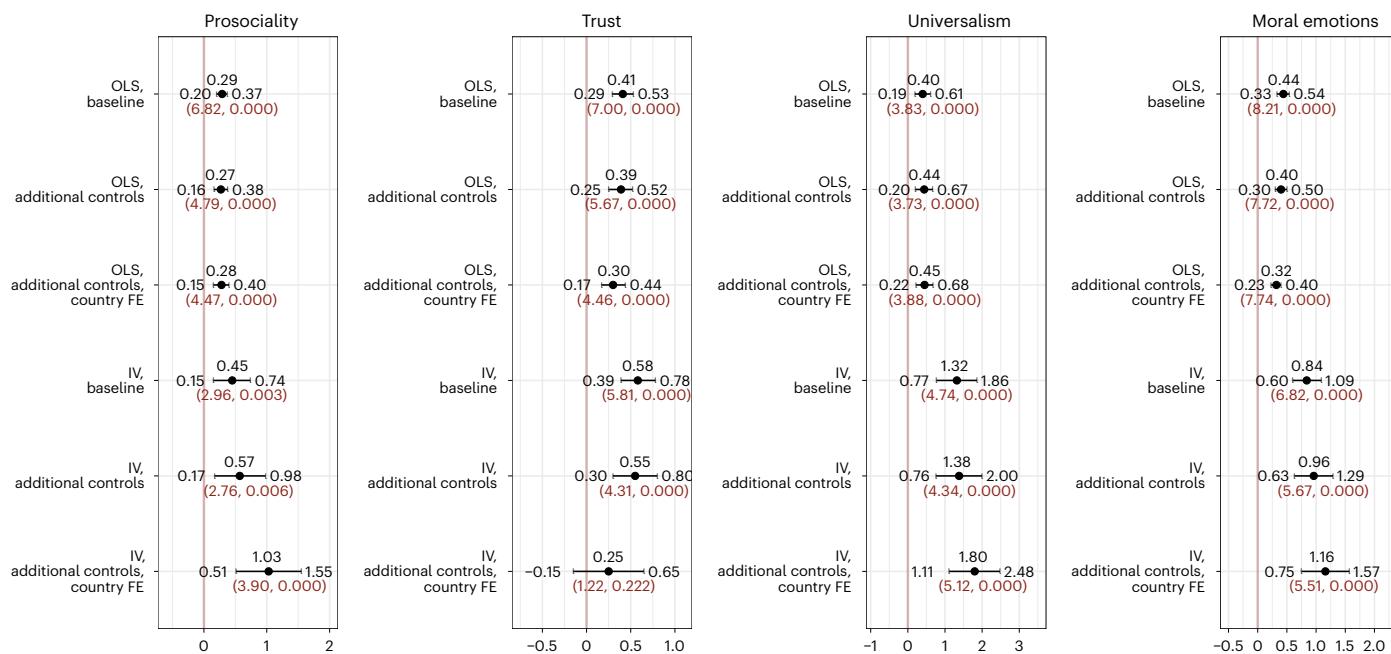
Across regression specifications and outcome variables, we see a very consistent pattern according to which the markets index is always strongly predictive of morality. The point estimates are always similar, regardless of whether the analysis does or does not condition on country fixed effects. Because societies that reside within the same contemporaneous country borders will generally be similar to each other in terms of broader cultural heritage and geographic conditions, this further bolsters confidence that the patterns are not driven by omitted variables.

**Neighbouring societies analysis.** An even tighter analysis compares societies that reside in close geographic proximity to each other. While country fixed effects are a useful first step in this regard, some contemporaneous countries are sufficiently large that the analyses

summarized above still compare societies that are relatively distant from each other. To make further progress, I conduct a neighbouring ethnic groups analysis of the type proposed by Michalopoulos and Papaioannou<sup>28</sup>. Here I restrict attention to pairs of societies that reside less than 100 kilometres from each other. Supplementary Information section 3.9 discusses the details. Even restricting attention to such fine-grained geographic variation, I find that the importance of markets is strongly linked to all moral outcome variables.

**Placebo analyses regarding education.** A potential concern with the analysis of markets is that it captures a broader feature of modernization rather than market interactions as such. An arguably important aspect of modernization that may affect the development of morality is education. In the folklore database, I construct an index for the strength of education through a rich set of 24 target words, including 'school,' 'education' and 'teacher'. See Supplementary Information section 3.6 for details. I always control for this variable in regression analyses. In addition, in placebo analyses, I analyse whether modernization, as proxied by education, is actually associated with the type of morality discussed so far. Supplementary Table 8 shows that education is significantly positively correlated with prosociality, but not with trust, moral emotions or universalism. In fact, education is significantly negatively correlated with moral universalism values. This is in stark contrast to the markets index, which is associated with higher universalism. This suggests that the results indeed reflect the role of markets as such, rather than a potentially confounding role of education.

**Robustness checks.** Supplementary Information section 3 reports four further sets of robustness checks. First, a potential concern with the analysis is that the bag-of-words from which the folklore variables are constructed are hand-selected. To address this, I construct 'simple'



**Fig. 3 | Coefficient plots for regression coefficient estimates of the markets index.** Panel names indicate the dependent variables in each regression specification. Red labels indicate  $t$ -statistics and  $P$  values of the coefficient estimates, with estimates displayed as black dots. Error bars show 95% confidence intervals. In the regressions, robust standard errors are clustered at the language family level. IV estimates were obtained by instrumenting for markets with proximity to historical trade routes and ecological polarization.  $N = 943$  for OLS

estimates and  $N = 940$  for IV estimates. The baseline specifications control for number of motifs and its square as well as continent fixed effects (FE). Additional controls include agriculture, pastoralism, hunting and gathering, education, distance to the equator and continent fixed effects. The third specification controls for country fixed effects instead of continent fixed effects. The regressions underlying this figure are reported in Supplementary Tables 3 and 9. Note that axis ranges vary across panels.

alternative measures of the variables that consist of only two words each, which is arguably more transparent. For example, for markets, the analysis only leverages the concepts ‘trade’ and ‘money’ from the Michalopoulos-Xue database. Supplementary Information 3.4 presents the words used for the other concepts and shows that the results using these simpler measures are very similar.

As a second robustness check, Supplementary Table 5 shows that controlling for the size of a community, as coded in the Ethnographic Atlas, does not meaningfully affect the results. Third, Supplementary Table 4 shows that the results also hold up when I remove each world region one-by-one, showing that the results are not driven by a single region.

A fourth potential concern pertains to the treatment of standard errors. While the analysis always takes into account potential non-independence of observations from the same language subfamily, an alternative approach is to account for spatial correlation of errors. Supplementary Table 7 shows that the results are very similar when I compute standard errors on the basis of Conley’s adjustment for spatial autocorrelation.

### Instrumental variable analysis

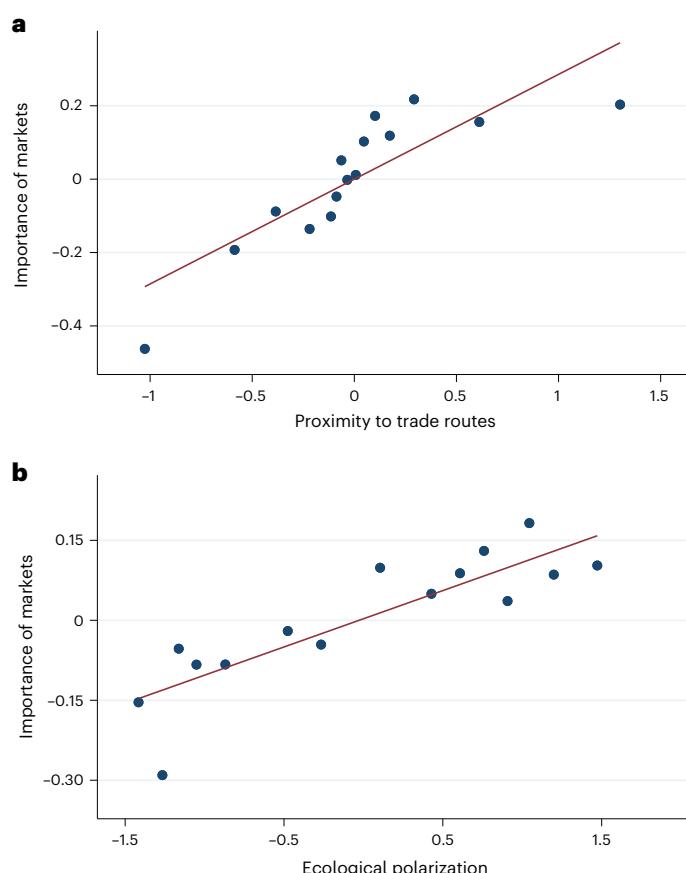
**Instrumental variables strategy.** A potential concern for a causal interpretation of the results is reverse causality: even if omitted variables are not an issue, it is conceivable that a certain type of morality causes a society to become more market-based. This paper does not argue that such a causal effect of morality on markets does not exist. Rather, I seek to provide evidence that part of the link between markets and morality is driven by a causal effect of the former on the latter. To this effect, I deploy instrumental variables (IV) analyses that make use of the well-known idea that certain ecological and historical conditions were favourable for the development of markets in a way that is plausibly not driven by a society’s moral values<sup>29–31</sup>. The

instrumental variables I use are historical trade routes and ecological polarization.

First, if a society was located in proximity to historical trade routes, it is more likely to have been exposed to markets, trade and money. Such market exposure could then translate into a certain moral system. The idea behind using proximity to trade routes as an instrumental variable for markets is justified if the moral values of a society did not determine their locational choice. This is plausible if societies settle on a location long before the first long-distance trade routes emerged. I measure the presence of historical trade routes by following Michalopoulos et al.<sup>31</sup>, who compute, for a large set of historical societies, its geographical distance to the nearest pre-600AD and pre-1700AD trade routes.

Second, a literature in economics has documented that, historically, trade was more likely to arise in locations with high ecological diversity as computed from vegetation shares. This is because the gains from trade were higher when products from different ecological zones were exchanged than when both trading parties lived in the same ecology and therefore produced similar goods<sup>29</sup>. On the basis of this idea, Fenske<sup>30</sup> constructs an index of ecological polarization for the homelands of a large set of historical societies. This index is helpful in the present context because ecological polarization is likely to generate variation in the importance of markets that is independent of a society’s morality. In particular, it is difficult to imagine that a society would settle in an ecologically more or less diverse environment just because it maintains certain moral values. Instead, it is more plausible that societies first settled in locations which differed in whether or not their geographic environment induced trade. Then, trade affected the structures of morality in these societies.

Figure 4 shows the effects of proximity to historical trade routes and ecological polarization on markets as measured using folklore. We see that the importance of markets indeed strongly increases in both proximity to trade routes and ecological polarization. The coefficient



**Fig. 4 | Binscatter partial correlation plots for the relationships between markets and distance to trade routes and ecological polarization.**

**a**, Relationship between markets and log distance to trade routes. **b**, Relationship between markets and ecological polarization. In each plot, a unit of observation is a society in the folklore database,  $N = 943$ . Each dot shows the average of the importance of the markets index for a given range of values of the  $x$  axis. All variables are standardized into z-scores for ease of interpretation. Each binscatter is constructed by controlling for the total number of motifs in a society, its square and continent fixed effects. Results from regressing response variables on the importance of markets after partialling out control variables are presented as fitted lines. In addition, the partial correlations are given by  $\rho = 0.30$  for proximity to trade routes and  $\rho = 0.21$  for ecological polarization.  $P < 0.001$  for all partial correlations. Note that axis ranges vary across panels.

estimates of regressing the markets index on the two instruments with control variables partialled out are 0.29 for historical trade routes (95% confidence interval 0.23, 0.34) and 0.11 for ecological polarization (0.07, 0.14). Results are significant with  $P < 0.001$  for both estimates.

The strong correlations enable instrument variables analyses in which I use trade proximity and ecological polarization as instruments for markets to predict morality. These instrumental variables regressions only leverage the part of the variation in the importance of markets that is predicted by proximity to trade routes or ecological polarization. Therefore, making the plausible assumption that, for example, morality does not determine whether a society settles in a more or less ecologically diverse area, these IV estimates identify the true causal effect of markets on morality. See Supplementary Information section 3.7 for details.

**IV results.** Figure 3 summarizes the results of the second-stage regressions by comparing the IV regression coefficients with those obtained from OLS regressions. The IV regression results underlying this coefficient plot are reported in Supplementary Table 9. Supplementary

Table 10 shows the results of the first stage of the IV. The  $F$ -statistic is large, ranging from 10.4 to 13.4 across specifications.

Figure 3 shows that, across all dependent variables, the IV estimates are in line with the OLS results: markets are also strongly predictive of prosociality, trust, moral universalism and moral emotions in the IV analyses. The IV results are very similar when I include country fixed effects in the regressions. This further increases confidence that the main feature that varies across the societies that are compared with each other is indeed only the importance of markets rather than additionally a host of other characteristics. Overall, these results suggest that the documented relationship between markets and morality indeed partly reflects a causal effect of the nature of economic interactions on the structure of morality.

**Additional analyses.** Because the analysis makes use of two different instruments, an overidentification test is possible. The average of Hansen's statistics for different regression specifications is given by 1.25, with average  $P$  value 0.38, which means that the analysis cannot reject the null hypothesis that the second instrument is valid, under the assumption that the first one is valid. Individual values of the statistic are shown in Supplementary Table 9.

A relevant question is whether these results depend on which particular instrumental variable is used. While the results reported in Fig. 3 use both trade proximity and ecological polarization simultaneously as instruments, Supplementary Tables 11 and 12 show that very similar patterns hold when I use either variable individually. Thus, potential concerns about causal identification would have to apply to both instrumental variables.

## Discussion

This paper has provided large-scale evidence that markets and a universalist morality are tightly linked. The folklore of societies that rely more on intercommunity trade and money emphasizes concepts related to prosociality, trust, universalist moral values and moral emotions. It is plausible that this correlation reflects a long-term coevolutionary process in which markets and culturally transmitted norms and values interact. Yet, the analysis also tentatively suggests that a part of the correlation is driven by markets shaping the structure of human morality. This inference is based on instrumental variable analyses in which historical markets are instrumented for with geographic conditions and historical trade routes. A causal interpretation of these results is valid if ecological polarization and historical trade routes did not affect communities' moral values through factors other than markets.

The present research has a number of limitations. First, the measurement of a society's market exposure and moral system through folklore is relatively indirect. As is the case with most historical data sources, the data are incomplete and coarse, which adds measurement error and resulting noise to the analysis. Second, the text analysis does not consider the context in which the target words of interest appear in the folklore. This may be problematic because, for example, folktales can reference prosociality in both positive and negative contexts. Third, the instrumental variable analyses rely on the validity of the assumption that proximity to trade routes and ecological polarization only affect morality through market exposure. This would not be the case if, for instance, societies with certain moral systems decided to locate closer to pre-existing trade routes.

A relevant question is which specific mechanisms might mediate the link between markets and morality. One candidate is that the experience of benefitting from economic interactions itself induces humans to learn (or teach their children) a sense of prosociality, universalism and emotions that enforce such moral priorities. A second candidate is that the legal or political institutions that are often associated with markets shape morality. Naturally, the main advantage of a large-scale study such as the present one cannot be to tease apart precise mechanisms. At the same time, Supplementary Table 13 studies the link between

morality and the salience of legal and political institutions in a society's folklore. The results show that (1) markets are always a highly significant predictor of the moral outcome variables even controlling for institutions and (2) while salient institutions are significantly related to some outcome variables, they are actually negatively correlated with moral universalism, which is the opposite of the result found for markets. This is in line with the results for education, which is also negatively correlated with universalism. This again suggests that a universalist morality is at least partly generated by market experience per se, rather than a broader modernization process.

The results in this paper have both theoretical and practical implications. In terms of theory, the results directly tie into the rich and influential literatures on the evolutionary origins of morality in moral and evolutionary psychology, cultural and evolutionary anthropology, and evolutionary biology. A prominent idea in these literatures is that morality is economically functional and evolved in part because it supported cooperative behaviour which conferred cultural or biological advantages on the members of the group. While the present study was not designed to triangulate between different theories for why markets may shape morality (and therefore cannot provide specific evidence for functionalist accounts), I note that the results are broadly consistent with this body of theories.

In terms of practical implications, the results suggest that contemporary discussions about the potential adverse effects of markets on morality should also consider the long-run implications of markets on morality. For instance, it is often argued that distrust of strangers, xenophobia and racism tend to be more pronounced in relatively remote areas and populations<sup>32–34</sup>. To the extent that markets and globalization tie these remote areas into broader networks of mutual advantage through economic exchange, it could be that an ever-increasing portion of humanity will come to adhere to an impersonal universalist values system.

## Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

## Data availability

All data used for this paper are available for download at <https://doi.org/10.7910/DVN/EEGV7A>. Source data are available at <https://academic.oup.com/qje/article/136/4/1993/6124640>.

## Code availability

All code used for this paper are available for download at <https://doi.org/10.7910/DVN/EEGV7A>.

## References

- Bowles, S. & Gintis, H. in *Genetic and Cultural Evolution of Cooperation* (ed. Hammerstein, P.) 429–444 (MIT Press, 2003).
- Henrich, J. et al. In search of homo economicus: behavioral experiments in 15 small-scale societies. *Am. Econ. Rev.* **91**, 73–78 (2001).
- Henrich, J. et al. ‘Economic man’ in cross-cultural perspective: behavioral experiments in 15 small-scale societies. *Behav. Brain Sci.* **28**, 795–855 (2005).
- Henrich, J. et al. Markets, religion, community size, and the evolution of fairness and punishment. *Science* **327**, 1480–1484 (2010).
- Ensminger, J. in *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-scale Societies* (eds Henrich, J. et al.) 356–381 (Oxford Univ. Press, 2004).
- Gintis, H., Bowles, S., Boyd, R. T. & Fehr, E. *Moral Sentiments and Material Interests. The Foundations of Cooperation in Economic Life* Vol. 6 (MIT Press, 2005).
- Boyd, R. & Richerson, P. J. Culture and the evolution of human cooperation. *Phil. Trans. R. Soc. B* **364**, 3281–3288 (2009).
- Haidt, J. *The Righteous Mind. Why Good People are Divided by Politics and Religion* (Vintage, 2012).
- Tomasello, M. *A Natural History of Human Morality* (Harvard Univ. Press, 2016).
- Henrich, J. & Muthukrishna, M. The origins and psychology of human cooperation. *Annu. Rev. Psychol.* **72**, 207–240 (2021).
- Tabellini, G. The scope of cooperation: values and incentives. *Q. J. Econ.* **123**, 905–950 (2008).
- de Montesquieu, C. *Montesquieu. The Spirit of the Laws* (Cambridge Univ. Press, 1989).
- Baldassarri, D. Market integration accounts for local variation in generalized altruism in a nationwide lost-letter experiment. *Proc. Natl Acad. Sci. USA* **117**, 2858–2863 (2020).
- Fiske, A. P. The four elementary forms of sociality: framework for a unified theory of social relations. *Psychol. Rev.* **99**, 689–723 (1992).
- Greene, J. & Haidt, J. How (and where) does moral judgment work? *Trends Cogn. Sci.* **6**, 517–523 (2002).
- Rai, T. S. & Fiske, A. P. Moral psychology is relationship regulation: moral motives for unity, hierarchy, equality, and proportionality. *Psychol. Rev.* **118**, 57–75 (2011).
- Graham, J. et al. Mapping the moral domain. *J. Pers. Soc. Psychol.* **101**, 366–385 (2011).
- Greene, J. *Moral Tribes: Emotion, Reason and the Gap Between Us and Them* (Atlantic Books, 2014).
- Michalopoulos, S. & Xue, M. M. Folklore. *Q. J. Econ.* **136**, 1993–2046 (2021).
- Shiller, R. J. Narrative economics. *Am. Econ. Rev.* **107**, 967–1004 (2017).
- Smith, D. et al. Cooperation and the evolution of hunter-gatherer storytelling. *Nat. Commun.* **8**, 1–9 (2017).
- Berezkin, Y. E. *Folklore and Mythology Catalogue: Its Lay-out and Potential for Research* 58–70 (The Retrospective Methods Network, 2015).
- Becker, R. A., Wilks, A. R., Brownrigg, R., Minka, T. P. & Deckmyn, A. maps: Draw Geographical Maps. R Package version 3.4.0 <https://CRAN.R-project.org/package=maps> (2021).
- Shweder, R. A., Much, N. C., Mahapatra, M. & Park, L. in *Morality and Health* (eds Brandt, A. M. & Rozin, P.) 119–169 (Taylor & Francis/Routledge, 1997).
- Haidt, J. in *Handbook of Affective Sciences* (eds Davidson, R. J. et al.) 852–870 (Oxford Univ. Press, 2003).
- Norenzayan, A. *Big Gods: How Religion Transformed Cooperation and Conflict* (Princeton Univ. Press, 2013).
- Norenzayan, A. et al. The cultural evolution of prosocial religions. *Behav. Brain Sci.* **39**, e1 (2016).
- Michalopoulos, S. & Papaioannou, E. Pre-colonial ethnic institutions and contemporary African development. *Econometrica* **81**, 113–152 (2013).
- Bates, R. H. *Essays on the Political Economy of Rural Africa* Vol. 38 (Univ. of California Press, 1987).
- Fenske, J. Ecology, trade, and states in pre-colonial Africa. *J. Eur. Econ. Assoc.* **12**, 612–640 (2014).
- Michalopoulos, S., Naghavi, A. & Prarolo, G. Trade and geography in the spread of Islam. *Econ. J.* **128**, 3210–3241 (2018).
- Voigtländer, N. & Voth, H.-J. Persecution perpetuated: the medieval origins of anti-semitic violence in Nazi Germany. *Q. J. Econ.* **127**, 1339–1392 (2012).
- Enke, B. Moral values and voting. *J. Polit. Econ.* **128**, 3679–3729 (2020).
- Enke, B., Rodríguez-Padilla, R. & Zimmermann, F. *Moral Universalism and the Structure of Ideology* (National Bureau of Economic Research, 2020).

## Acknowledgements

I thank J. Henrich and N. Nunn for useful discussions and feedback. I received no specific funding for this work.

## Author contributions

B.E. designed the research, analysed data and wrote the paper.

## Competing interests

The author declares no competing interests.

## Additional information

**Supplementary information** The online version contains supplementary material available at  
<https://doi.org/10.1038/s41562-022-01480-x>.

**Correspondence and requests for materials** should be addressed to Benjamin Enke.

**Peer review information** *Nature Human Behaviour* thanks the anonymous reviewers for their contribution to the peer review of this work.

**Reprints and permissions information** is available at [www.nature.com/reprints](http://www.nature.com/reprints).

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

© The Author(s), under exclusive licence to Springer Nature Limited 2022

## Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

### Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- The exact sample size ( $n$ ) for each experimental group/condition, given as a discrete number and unit of measurement
- A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- The statistical test(s) used AND whether they are one- or two-sided  
*Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
- A description of all covariates tested
- A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- For null hypothesis testing, the test statistic (e.g.  $F$ ,  $t$ ,  $r$ ) with confidence intervals, effect sizes, degrees of freedom and  $P$  value noted  
*Give P values as exact values whenever suitable.*
- For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- Estimates of effect sizes (e.g. Cohen's  $d$ , Pearson's  $r$ ), indicating how they were calculated

*Our web collection on [statistics for biologists](#) contains articles on many of the points above.*

### Software and code

Policy information about [availability of computer code](#)

Data collection No primary data collection involved, and no software was used for data collection.

Data analysis All data and code used in analysis are available for download at <https://doi.org/10.7910/DVN/EEGV7A>; the software used is Stata, version MP16.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

### Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

All data and code used in analysis are available for download at <https://doi.org/10.7910/DVN/EEGV7A>, no restriction applies. Source data used is constructed by Stelios Michalopoulos and Melanie Meng Xue, available at <https://academic.oup.com/qje/article/136/4/1993/6124640>.

## Human research participants

Policy information about [studies involving human research participants and Sex and Gender in Research](#).

Reporting on sex and gender

n/a

Population characteristics

n/a

Recruitment

n/a

Ethics oversight

n/a

Note that full information on the approval of the study protocol must also be provided in the manuscript.

## Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

Life sciences

Behavioural & social sciences

Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://nature.com/documents/nr-reporting-summary-flat.pdf)

## Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description

Quantitative study that uses regression techniques to understand the potential effect of market exposure on human morality, by comparing different historical societies

Research sample

943 ethnolinguistic groups from Stelios Michalopoulos and Melanie Meng Xue's folklore database, which in turn is based on Yuri Berezkin's work. The sample is not representative, however, due to the fact that it is the largest available catalog of folklore, it is chosen for this study.

Sampling strategy

n/a

Data collection

No original data collection involved

Timing

n/a

Data exclusions

Exclude societies from the database for which less than five cultural motifs were available, since for societies with such sparse information, moral values and market exposure cannot be measured with reasonable precision.

Non-participation

n/a

Randomization

Randomization is not applicable since this study uses observational data on historical ethnolinguistic groups.

## Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

### Materials & experimental systems

- |                                     |  |
|-------------------------------------|--|
| n/a                                 | Involved in the study                                  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Antibodies                    |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Eukaryotic cell lines         |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Palaeontology and archaeology |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Animals and other organisms   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Clinical data                 |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Dual use research of concern  |

### Methods

- |                                     |   |
|-------------------------------------|---|
| n/a                                 | Involved in the study                           |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> ChIP-seq               |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Flow cytometry         |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> MRI-based neuroimaging |