Cultural Churn: Global Variation in the Instability of National Cultures

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Abstract

How stable are national cultures over time—and why do some societies experience more instability than others? Cultural instability—the extent to which a society's overall configuration of values changes from one period to the next—has profound implications for identity, social cohesion, and political conflict, yet it has not been directly measured at the cross-national level. We introduce a novel, broad-scale measure of cultural instability, which we term cultural churn. Rather than tracking directional change along a single value dimension, this index measures the degree to which a country's entire configuration of cultural values shifts over time. Applying the cultural fixation index—a multivariate cultural distance statistic—to six sequential waves of the World Values Survey (1989–2022) covering 71 countries, we find striking variation in cultural churn. In some countries, the cultural shifts observed over several years were as large as the cultural differences between separate nations, whereas in other countries, the national culture remained virtually identical. Multilevel regression models and specification curve analyses tested 31 country-level predictors of cross-national variation in cultural churn. Countries undergoing greater socioeconomic development and modernization tended to experience more cultural churn, as did countries with greater cultural tightness.

Introduction

Different countries are characterized by different cultural values, beliefs, and practices, but the specific nature of these cultural traits is always in flux. When summed across decades, some cultural changes (e.g., increases in individualism, decreases in religiosity, and semantic shifts in everyday language) may appear more linear than they actually are. Other changes—in popular political ideologies, for example—ebb and flow like the tides, but less predictably. Given the countless attributes that define national cultures, many of them will be in flux simultaneously, with consequences both psychological and societal [1–3].

Much remains unknown about this kind of cultural instability—which we refer to here as *cultural churn* (to distinguish it from other forms of cultural change). How stable versus unstable are different national cultures? And why might some countries experience more instability—more cultural churn—than others? These lacunae stem in part from the absence of a systematic means of measuring cultural churn. In this article, we report on the development and application of such a measure, designed to quantitively assess the extent to which a country's constellation of cultural values exhibits instability over time. We use this measure to address two research questions. One question is descriptive: How much cultural churn has been evident in different countries worldwide in recent decades? The second question is predictive: What factors might help to explain cross-national variation in cultural churn?

Cultural Dynamics

The study of cultural churn builds on research on cultural dynamics—how beliefs, values, and norms evolve over time. Some lines of research focus primarily on process, articulating the mechanisms

through which any cultural attribute might spread over time. These mechanisms include interpersonal communication and social learning processes that affect the transmission of cultural information from person to person and from generation to generation, as well as additional psychological processes that may affect the extent to which individuals comprising a cultural population are susceptible to social influence [4–13]. These mechanisms have implications for specific variables that may affect the cultural instability of a population. For example, computational models of interpersonal interaction and influence within cultures have suggested that cultural changes may occur more rapidly in populations that are tighter and more collectivistic [14,15].

Other lines of research have documented change over time in specific cultural norms and values [16–22]. Some of these studies have also documented cross-national differences in the magnitude of these changes, and have identified variables that predict those cross-national differences. For example, in a sample of 78 countries worldwide, a shift toward increased individualism was predicted by country-level changes in economic development and, to lesser extent, by changes in disease prevalence and the frequency of disasters [18]. While such studies have provided valuable insights into cultural change, they are unidimensional, assessing changes in one or a few specific cultural attributes. These studies do not reveal the extent to which local culture—defined by a broad array of popular values and attitudes and other norms—is characterized by cultural churn.

Cultural changes are rarely uniform across the many attributes that define cultures. Even when countries show similar shifts along one attribute, they may diverge on others, producing distinct, multidimensional patterns of change. For example, Medvedev and Jackson [23] found that while many countries follow a similar course of modernization typically associated with increased individualism, they differ substantially on other cultural dimensions (e.g., Canada and Hong Kong achieved comparable economic growth but showed opposite trends in the value of work ethic for children). It is for this reason that, when considering entire national cultures, it is difficult to characterize cultural change in terms of a specific direction or trajectory. Although one could compare countries based on the direction of change along a single dimension (e.g., gender equality), when one simultaneously considers the many conceptually distinct variables that define national cultures, it is no longer coherent to define, or measure, cultural change along a single trajectory. What remains measurable, however, is the extent to which an entire constellation of cultural attributes exhibits instability over time: cultural churn.

Cultural Churn

Although cultural churn has not been a direct focus of prior work, several studies have examined multiple cultural attributes to address related questions about whether countries' values have converged or diverged over time [23,24]. Medvedev and Jackson [23] tracked changes in countries' cultural distinctiveness and within-country cultural heterogeneity across repeated waves of the World Value Survey, finding regional convergence alongside global divergence in values. Such work offers insights into how national cultures evolve relative to one another but remains explicitly relational—it assesses how a country's profile shifts compared with others, rather than quantifying the magnitude of within-country instability.

New methods are therefore needed to measure cultural churn within countries, compare its magnitude across countries, and identify explanatory variables.

To do so, we used data from the World Values Survey (WVS; https://www.worldvaluessurvey.org/wvs.jsp), which provides nationally representative measures of people's values and beliefs across dozens of countries and seven waves spanning 1981 to 2022. Because these data encompass many diverse cultural values (pertaining to family life, work, leisure, religion, politics, morality, etc.), they offer an effective snapshot of each country's overall culture. Adapting existing methods for measuring cultural distance between groups [25], we calculated cultural distance between consecutive WVS waves within each country—yielding a measure of cultural churn for 71 countries across five time intervals.

We used this new measure of cultural churn to address two research questions. For ease of presentation, analyses and results bearing on the two questions are presented as separate studies. Study 1 addresses the descriptive question: How much cultural churn has been evident in each of these 71 different countries in recent decades? Study 2 then proceeds to address the second question: What factors predict these cross-national differences in cultural churn?

The methods and analysis plan for both studies were preregistered on the Open Science Framework (https://osf.io/r9ugk/overview?view_only=f7c599cc16a04f2cb88574fcbb9ce42e). All measures, inclusion/exclusion criteria, additional analyses, and deviations from the preregistration are disclosed below or in the Supporting Information.

Study 1: Cross-National Variation in Cultural Churn

Methods

Data Source

The data used to calculate cultural churn were obtained from the "Integrated Values Surveys" dataset (https://www.worldvaluessurvey.org/WVSEVStrend.jsp), which combines the WVS dataset with analogous data from the European Values Study (EVS) that, across five waves of data collection within the same timeframe, has used the same survey questions.

Not all items in the WVS/EVS assess culturally transmissible values, beliefs, or behavioral practices (e.g., some items assess demographic information, state of health, etc.). In order to select items that do—and thus contribute to an empirical "snapshot" of each country's culture during each wave of data-collection—we followed selection criteria used by Muthukrishna et al. [25] to identify a set of 145 WVS/EVS items that were deemed to be culturally transmissible. The full list of WVS/EVS variables is presented in section S1 of the Supporting Information.

Calculating Cultural Churn Scores

We calculated cultural churn scores by taking the cultural distance between each country's survey waves using the Cultural Fixation Index (CF_{ST}[25]). The CF_{ST} measures the overall magnitude of cultural differences between groups—in this case, the same country at different timepoints—by calculating the ratio of between-group to total variance for each cultural trait represented in the data. CF_{ST} values can theoretically range from 0 (culturally identical populations) to 1 (homogenous and maximally distinct populations, with all variance existing between populations). The CF_{ST} is a nonlinear statistic, such that a value of 0.4 is more than twice as large as a value of 0.2, similar to how a correlation coefficient of .4 is more than twice as large as .2.

Cultural churn was calculated using data from Waves 2 through 7 of the WVS, as well as Waves 2 and 5 of the EVS, which coincide with Waves 2 and 7 of the WVS (1989-1993 and 2017-2022, respectively). Wave 1 of the WVS/EVS was not included in our dataset, because far fewer countries were included in Wave 1 compared to later waves, therefore its inclusion would have greatly exacerbated the proportion of missing data while providing only a negligible improvement in statistical power.

Cultural distances were calculated between consecutive pairs of survey waves within each country. This produces a multilevel structure in our data, in which level-1 variables (the cultural distance between consecutive waves) are measured over five consecutive time intervals, corresponding with the time intervals between WVS/EVS waves. These time intervals are nested within each country, the level-2 unit. Each WVS/EVS wave is conducted over a multiyear period (e.g., WVS Wave 4 was conducted from 1994-1998). Practically, this means that the countries in these data vary in how many years elapse between each consecutive wave. To minimize the differences between countries in the length of time between successive waves, we excluded 9 observations for which the time between waves did not fall within 4-8 years. After applying exclusion criteria, there were a total of 149 observations on the cultural churn measure, across a sample of 71 countries, each with between one and five level-1 observations (1 score only = 34 countries; 2 scores = 16 countries; 3 scores = 9 countries; 4 scores = 4 countries; 5 scores = 8 countries).

Due to slight differences in the number of WVS/EVS items present across each country and wave, cultural churn scores are based on a set of cultural values that, while largely consistent, still contain a degree of heterogeneity. Fortunately, CF_{ST} values have been shown to be highly robust to missing data. As long as the variables included capture a reasonably broad array of cultural traits, CF_{ST} values show minimal deviations even when up to 50% of questions are removed [25]. We report additional robustness checks in section S2 of the Supporting Information.

Data Quality

Survey data quality can confound estimates of cultural churn, as greater measurement error can make samples drawn at different time points appear more dissimilar than they truly are—artificially inflating churn scores. Because data quality often covaries with economic development [26], failing to account for these differences might undermine the validity of our results. To address this, we constructed a data

quality index for each time interval within countries—applying longstring analysis [27,28] to two multi-item WVS questionnaires (Importance in Life and Schwartz Values) to detect non-differentiated response patterns indicative of poor data quality—and tested its strength of association with cultural churn, as well as GDP per capita. Full details on the computation and validation of the data quality index are provided in section S3 of the Supporting Information.

Results and Discussion

Based on the procedure described above, we calculated cultural churn scores for each eligible time interval within each country. These time interval-specific scores were then aggregated to yield a single mean cultural churn score for each country, representing its average degree of cultural churn across all recorded time intervals. Table 1 presents the cultural churn scores for all 71 countries. (Countries with the greatest mean cultural churn scores are listed first. An alternative version of this table, with countries listed alphabetically, can be found in section S4 of the Supporting Information.) Figure 1 provides a visual depiction of each country's mean cultural churn score, on a world map.

There was considerable variation in time interval-specific cultural churn scores, ranging from .004 (Canada, between waves 4 and 5) to .100 (India, between waves 5 and 6), and these values varied across time intervals (e.g., across 4 different time intervals, India's cultural churn scores ranged from .015 to .100). Across all 71 countries, there was also variation in mean cultural churn scores, ranging from mean scores less than .010 (Canada, New Zealand, Australia, Trinidad & Tobago) to mean scores that exceeded .080 (Rwanda, Latvia).

To contextualize these within-country cultural churn scores, it is helpful to compare them to analogous calculations of between-country "cultural distance" [25]. For example, Egypt's mean cultural churn score (.075) is roughly equivalent to the cultural distance between the United States and Spain, or between China and South Korea; and the mean cultural churn scores for Poland and Turkey (.026 and .024, respectively) are roughly equivalent to the cultural distance between the United States and Canada.

As expected, countries with higher GDP per capita tended to show higher data quality ($\gamma = 0.37$, $p < .001$), but data quality was unrelated to cultural churn ($\gamma = -0.06$, $p = .61$), indicating that although there may be between-country differences in the reliability of WVS data, these differences do not account for the observed variation in cultural churn. These results, showing evidence of cross-national differences, raise the question: Why are some countries characterized by higher levels of cultural churn, compared to others? Study 2 addresses that question.

Study 2: Cross-National Predictors of Cultural Churn

The purpose of Study 2 was to identify factors might explain the cross-national differences identified in Study 1. Analyses focused on a broad range of variables that might plausibly affect the magnitude of cultural churn.

Certain variables reflect economic development and modernization (i.e., rising GDP, industrialization, education, and urbanization). These processes have long been linked to cultural change—such as increased individualism and shifts in other values captured in the WVS [18,20,29–31]. Modernization is also associated with globalization, exposing societies to new beliefs, practices, and values that may destabilize the existing culture [23,32–36]. Together, rapid transformations in social organization, occupational structures, and information environments can unsettle multiple domains of cultural life—from family and gender norms to political and moral attitudes—thereby heightening cultural churn [29,36–39].

Other variables reflect different aspects of the natural and social ecologies within countries. Cultural norms often represent adaptive responses to local environments [40–46], and ecological factors explain substantial cross-national variation in cultural attributes [47]. Just as differences in ecology (e.g., disease prevalence [48]) predict cultural differences, ecological change can drive cultural change—for instance, rising population density predicts lower fertility, and declining disease prevalence predicts greater individualism and gender equality [18,22,49,50].

Cultural churn may also be predicted by enduring circumstances that either facilitate or inhibit cultural churn. For example, just as globalization exposes individuals to new and different kinds of information, within-country cultural diversity may have analogous effects, with corresponding implications for the instability of national cultures [12]. Additionally, some cultural values themselves may affect the extent to which a society is culturally stable or not. For example, cultures that are tighter and/or more collectivistic are characterized by increased susceptibility to social influence; as a consequence, these cultures may exhibit some initial resistance to change but also, when change occurs, these cultures may change more rapidly [14,15,51].

In the analyses reported below, we tested the extent to which cross-national variation in cultural churn was predicted by concurrent changes in country-level measures assessing socioeconomic development as well as by concurrent changes in local ecological circumstances (e.g., population density, pathogen prevalence). We also conducted a parallel set of analyses testing the extent to which cultural churn was predicted by the initial baseline values of those same variables. Additionally, we tested the extent to which cross-national differences in cultural churn were predicted by several other variables (e.g., tightness/looseness, collectivism/individualism) for which computation of concurrent change scores was impossible, but which also might plausibly affect the degree of cultural stability.

Method

Predictor Variables

Data were drawn from multiple online databases. Whenever possible, we obtained annual time-series data for predictors corresponding to the WVS/EVS intervals (level-1 units). These time-series predictors (22 of 31) included repeated measurements for each country and time interval, whereas the remaining

cross-sectional predictors (9 of 31) were available only once per country. The five intervals analyzed corresponded to the median years of WVS/EVS data collection: 1991–1996, 1996–2001, 2001–2007, 2007–2012, and 2012–2019. For each time-series predictor, we computed baseline values (the predictor's initial value for each interval; e.g., GDP per capita in 1991) and change values (percentage change from the first to last year; e.g., raw change in GDP from 1991 to 1996 divided by 1991 GDP). For non-ratio variables such as freedom rankings and globalization indices, we used raw unit change.

Time-Series Predictors. GDP per capita, urban population (% of total population), population density, and the percentage of the population employed in the agricultural, industrial, and service sectors were obtained from the World Bank database [52]. The population density data was log-transformed because Hong Kong and Singapore were extreme outliers.

The Human Development Index was accessed from the UN Development Programme database, a composite measure of living standards that assesses levels of education, income, and life expectancy [53], as well as two indices of gender equality: the Gender Development Index and the Gender Inequality Index. The Gender Development Index measures the degree of gender equality in the same three dimensions covered by the Human Development Index, with higher values indicating greater equality between men and women on these dimensions. The Gender Inequality Index measures gender inequalities in reproductive health, empowerment, and participation in the labour force, with higher values indicating greater inequality between men and women on these measures.

Measures of globalization were accessed from the KOF Globalization Index [54,55]. This index captures the multifaceted nature of globalization by separating the social, economic, and political dimensions of globalization into six subindices: Trade, Financial, Informational, Cultural, Interpersonal, and Political Globalization. Our analyses focus on these separate subindices as well as the composite index.

Indices of political rights and civil liberties were accessed from Freedom House (https://freedomhouse.org/sites/default/files/2024-02/Country_and_Territory_Ratings_and_Statuses_FIW_1973-2024.xlsx). Because the two indices were extremely highly correlated (r = .94), we standardized both indices and calculated their mean to form a composite freedom index, which was recoded such that higher values indicated higher levels of freedom.

Data on disease threat and extrinsic mortality (i.e., mortality due to uncontrollable external hazards, such as natural disasters, infectious disease outbreaks, or violence) were obtained from the Ecology and Culture Dataset [56], which originally sourced the data for these two variables from the Global Burden of Disease Collaborative Network [57] and the World Health Organization [58].

Cross-Sectional Predictors. We also examined country-level predictors available only as single measurements, for which change scores could not be computed. Tightness–looseness was assessed using two widely cited indices: the Eriksson et al. index [59], based on non-representative survey data from

57 countries assessing perceived norm strength and tolerance for violations, and the Uz index [60], based on representative samples from 68 countries measuring homogeneity in value endorsement (with tighter cultures showing greater homogeneity). Because the two indices capture different aspects of the construct, we analyzed them separately and coded both so that higher scores indicate greater tightness.

Collectivism–individualism was measured using the Minkov–Hofstede index [61], and the Global Collectivism Index [62], which is derived from six behavioral and psychological indicators of collectivism. Each was analyzed separately and coded such that higher values indicate greater collectivism.

Cultural diversity was indexed by Alesina et al.'s [63] measures of religious, ethnic, and linguistic fractionalization, and by a cultural heterozygosity index [64] estimating the probability that two randomly selected individuals from a country exhibit different cultural traits.

Finally, climatic instability was taken from Giuliano and Nunn [65], quantifying historical variability in global surface temperature since 500 CE (higher values = greater instability).

Results

Testing Time-Series Predictors.

What country-level predictor variables account for cross-national variability in cultural churn? To address this question, we ran multilevel regression analyses with random intercepts for both countries and time intervals. We began by examining the time-series predictors. For these, we decomposed effects into between-country components (country means) and within-country components (country-mean–centered scores). This decomposition was not possible for the cross-sectional predictors. Given that our primary interest in explaining between-country variation—as well as the fact that a substantial proportion of the variance in cultural churn occurred between countries (ICC = .43)—our results focus on the between-country effects, while controlling for within-country effects wherever possible.

Because country-level variables often contain outliers, we used robust multilevel models [66], estimating significance with Satterthwaite approximations of degrees of freedom. All models controlled for both years between survey waves and data quality, each entered as country-mean and mean-centered covariates.

Each time-series predictor was tested in a separate model under two specifications: one using change values (the percentage change in the predictor over each time interval) and another using baseline values (the predictor's level at the start of the time interval). This dual approach allowed us to test whether cultural churn was predicted by concurrent changes in these country-level characteristics, and/or by their baseline levels at each time interval.

The preregistration for this first set of analyses can be found at https://osf.io/r9ugk/overview?view_only=f7c599cc16a04f2cb88574fcbb9ce42e. The preregistration specified standard multilevel

models including random intercepts across countries and controls for years between waves. The analyses reported here deviate from that plan in three ways: (1) we used robust multilevel models rather than standard multilevel models to reduce the influence of outliers, (2) we added controls for both between- and within-country variation in data quality, and (3) we added random intercepts across time intervals to account for differences in average cultural churn scores across wave-to-wave time intervals (e.g., Wave 2–3 showed markedly higher across-country churn than other time intervals). Results from the preregistered analyses are reported in section S5 of the Supporting Information and are consistent with those reported here.

Table 2 lists the results of the first set of analyses, showing the results from 22 separate multilevel regression analyses that tested the relationship between the change values of each predictor variable and cultural churn. Out of the 22 predictors tested, 13 showed significant associations with cultural churn. These results show that, in general, greater increases in economic development and modernization, along with greater change in other variables associated with modernization (e.g., increased globalization, decreased disease threat) were associated with greater cultural churn.

Table 3 lists the results of the second set of analyses, showing the results from 22 separate multilevel regression analyses that tested the relationship between the baseline values of each predictor variable and cultural churn. Out of the 22 predictors tested, 16 showed significant associations with cultural churn. These results show that, in general, countries characterized by higher levels of economic development and modernization at the beginning of each time interval experienced less cultural churn over the subsequent 4 – 8 years.

Specification curve analyses.

Which of these significant predictors uniquely predicted cultural churn? To address this question, we conducted specification curve analyses (SCA; [67]). SCA systematically tests whether effects replicate across all reasonable combinations of analytic choices, providing a summary of which predictors remain significant under alternative model specifications. This approach is well suited to our data, which include a modest sample of countries (n = 71) and a large, intercorrelated predictor set.

We conducted two SCAs (see section S6 of the Supporting Information for full details). The first tested predictors based on their change values, and the second tested their baseline values. All models were robust multilevel regressions with random intercepts across countries and time intervals, estimated using the same procedures described in the previous section. In each, we first reduced the full set of time-series predictors to a non-redundant subset of significant predictors (9 for change values, 12 for baseline values) and then estimated the between-country effect of each predictor while statistically controlling for all possible combinations of the others. To summarize the results of each SCA, we calculated three statistics for each predictor: (a) the percentage of model specifications yielding standardized effect sizes (γ) greater than |.10|, (b) the median effect size γ, and (c) the range of effect sizes observed across all specifications.-

Table 4 reports the results from the first SCA focused on the change-value predictor variables. For 4 of those predictors—industrial sector employment (%), GDP per capita, the Gender Development Index, and the political globalization subindex—over 80% of the between-country effects were greater than |.10|. Additionally, the range of γ's for those four predictors indicates that all 512 model specifications produced a nonzero effect size γ with the same sign as the median γ, inspiring confidence that the actual effect is truly nonzero. These results suggest the following conclusion: the magnitude of a country's cultural churn was uniquely predicted by concurrent increases in industrial sector employment, GDP per capita, gender development, and political globalization. (Visualizations of the specification curves as well as additional results using different effect size thresholds and additional metrics are presented in section S7 of the Supporting Information.)

Table 5 reports the results from the second SCA focused on the baseline-value predictor variables. For 7 of those predictors—freedom rankings, urban population, the Gender Development Index, service sector employment, and the political, cultural, and financial globalization subindices—over 80% of the between-country effects were greater than |.10|. Of those seven predictors, only the freedom rankings produced a range of effects that were either nonzero or above zero, although urban population, the Gender Development Index, and political globalization produced a negligible proportion of effect sizes which were either zero or the opposite direction of the median effect size. These results suggest the following conclusion: cultural churn within any given 4 – 8 year time interval was greater in countries that, at the beginning of that time interval, had lower freedom scores (i.e., fewer political rights and civil liberties), less urbanization, lower levels of gender development, and less political globalization.

Testing Cross-Sectional Predictors. An additional set of analyses tested the extent to which cross-national differences in cultural churn were predicted by the cross-sectional variables: two indices of tightness/looseness, the two indices of individualism/collectivism, four measures of within-country cultural diversity, and a measure of historical climatic instability.

Table 6 reports results from nine random-intercept robust multilevel models testing each predictor's association with cultural churn. Significant effects emerged for the Uz tightness index and the Global Collectivism Index: countries higher in tightness and collectivism exhibited greater of cultural churn. None of the other predictors—including the Eriksson et al. tightness index and the Minkov–Hofstede individualism–collectivism measure—showed significant effects when tested individually.

Given that both the Uz tightness index and the Global Collectivism Index were significant in the separate models, we next tested their effects in a combined model (Model 1, Table 7). Both predictors remained significant, although the effect of the Uz index was stronger than that of the Global Collectivism Index.

We then tested whether this association persisted when controlling for the strongest time-series predictors identified in the SCA (Model 2, Table 7): industrial sector employment, Gender Development Index, GDP per capita, and political globalization. The Uz tightness index showed a significant positive association, whereas none of the time-series predictors showed significant independent associations.

Finally, Model 3 (Table 7) tested the Uz index alongside the seven robust baseline predictors (freedom rankings, urban population, service sector employment, Gender Development Index, and the cultural, political, and financial globalization subindices). The Uz index again showed a significant positive association, while only the cultural and financial globalization subindices reached significance.

Together, these results indicate that the positive relationship between cultural tightness (Uz index) and cultural churn is robust and independent of other country-level predictors. Figure 2 illustrates this association.

Discussion

How stable or unstable have different national cultures been in recent decades? To address this question, we deployed a novel method for measuring within-country cultural instability (or cultural churn) and applied it to WVS data from 71 countries since 1989. Results provide estimates of the magnitude of within-country cultural churn (showing, for example, more substantial churn in India and China than in Argentina and the United States). These scores were robust to concerns about data quality and also provide evidence that, within any given country, the degree of cultural churn varied across time intervals within those decades. It is useful to consider these estimates in historical context. For instance, Table 1 shows that 9 of the 10 countries with the highest churn scores from WVS Waves 2 and 3 (spanning 1989–1998) were Eastern European nations undergoing political upheavals following the dissolution of the U.S.S.R. These results indirectly attest to the validity of this measure and are consistent with the expectation that sudden geopolitical realignments may precipitate rapid shifts in cultural values.

What might explain cross-national differences in cultural churn? We examined the predictive effects of 31 variables in Study 2. Specification curve analyses identified several indicators of economic development (GDP, industrial sector employment) and modernization more broadly (e.g., Gender Development Index, political globalization) as the most robust predictors of cultural churn. These findings are consistent with modernization theories of cultural change [29,37,38]. Notably, cultural churn was predicted by concurrent increases in GDP, but not by baseline GDP—suggesting that economic growth better predicts cultural churn than absolute wealth.

We also found that cultural churn was greater in culturally “tighter” countries. At first glance, this result appears counterintuitive—one might expect tight cultures to be more culturally stable. However, it aligns with predictions from agent-based models simulating the spread of cultural traits under different social influence and network conditions [14]. In these models, susceptibility to social influence—the tendency for individuals to adopt the attitudes or behaviors of those around them—makes populations more prone to rapid, large-scale change. Higher susceptibility initially hinders the adoption of novel traits, but once a threshold is surpassed, it enables rapid, population-wide cascades.

These results were robust for the Uz tightness index [60] but not for the Eriksson et al. index [59], which is based on the perceived norm-enforcement scale developed by Gelfand and colleagues [68]. Although this discrepancy weakens the robustness of the tightness–churn association, it may also reflect differences

in what the two indices actually measure. The Uz index operationalizes tightness as within-country value consensus, derived from dispersion in responses to WVS items. This consensus facet of tightness aligns with the dynamics our cultural churn measure detects—when consensus is high, cultural shifts appear larger because more people move together. The Eriksson measure, in contrast, assesses perceived sanctioning of norm violations via self-report. Although this measure attempts to capture the central concept of tightness, this measure has been criticized on the basis that its reliance on self-report items makes it vulnerable to well-known response biases in which respondents rely on national stereotypes and are generally poor judges of actual norm strength [60,69], whereas the Uz index does not suffer from these same issues. That fact that our strongest effects emerge with the consensus-based Uz index aligns well with the ABM-inspired mechanism and adds weight to these methodological concerns raised by other researchers.

When drawing conclusions from these results, one must be mindful of several methodological limitations. The findings are correlational, constraining causal inference. The 71 countries in this dataset overrepresent affluent Western nations (especially in Europe and the Americas), with notable underrepresentation of countries in Africa, the Middle East, and Central and Southeast Asia. It remains unclear whether the predictors of cultural churn would generalize to countries that are less "WEIRD" [70]. The results are also temporally-bound: we assessed cultural churn across relatively short intervals during 1989–2022. The magnitudes documented in Table 1 would likely differ if measured in other historical eras, and the predictors of cultural churn may differ when predicting cultural churn across longer spans of time. For example, while ecological variables such as extrinsic mortality and historical climatic instability showed no associations here, they might predict change over decades, centuries, or millennia [65]. Emerging methods for extracting psychological data from historical texts may offer a way to extend these analyses over much longer timespans [71,72].

These results focused on shifts in cultural values, which are both causes and consequences of beliefs, rituals, and norms; hence, changes in values provide useful indicators of broader cultural dynamics [73]. Of course, culture also changes through language, art, technology, and other domains. The same methods can be applied to any dataset that tracks multiple cultural attributes across time—whether survey responses, linguistic analyses of media, or other large-scale indicators—offering a general framework for studying multidimensional cultural dynamics beyond values.

For this reason, the scholarly value of the research reported here lies not only in the results that we report, but also in the computational method that we employed to produce these results. This method—a novel means of measuring cultural instability across a wide range of cultural attributes—may be a handy tool to add to the toolkit that researchers draw upon to address important questions about cultural dynamics.

Declarations

Data availability

Data files and R code used in statistical analyses on those data can be found at https://osf.io/r9ugk/overview?view_only=f7c599cc16a04f2cb88574fcbb9ce42e.

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Tables

Table 1. *Cultural change scores for each of 71 countries, listed according to the magnitude of the mean cultural churn score.*

Country	Wave 2 – 3 (1989 – 1998)	Wave 3 – 4 (1994 – 2004)	Wave 4 – 5 (1999 – 2009)	Wave 5 – 6 (2005 – 2014)	Wave 6 – 7 (2010 – 2022)	Mean score
Rwanda	—	—	—	.084	—	.084
Latvia	.081	—	—	—	—	.081
Egypt	—	—	.061	.088	.076	.075
Lithuania	.073	—	—	—	—	.073
Slovakia	.068	—	—	—	—	.068
Czechia	.060	—	—	—	—	.060
Hungary	.060	—	—	—	—	.060
Albania	—	.057	—	—	—	.057
Iraq	—	—	—	.056	.058	.057
Belarus	.083	—	—	—	.025	.054
Estonia	.054	—	—	—	.049	.052
Tunisia	—	—	—	—	.052	.052
Vietnam	—	—	.052	—	—	.052
Iran	—	—	.049	—	—	.049
Thailand	—	—	—	.055	.042	.049
India	.034	.041	.015	.100	—	.048
Pakistan	—	.072	—	—	.024	.048
Bangladesh	—	.046	—	—	—	.046
Morocco	—	—	.064	.028	—	.046
Bulgaria	.045	—	—	—	—	.045
Azerbaijan	—	—	—	—	.040	.040
Malaysia	—	—	—	.028	.051	.040
Serbia	—	.025	.055	—	—	.040
Indonesia	—	—	.036	—	—	.036
Lebanon	—	—	—	—	.034	.034
Kazakhstan	—	—	—	—	.032	.032

Country	Wave 2 – 3 (1989 – 1998)	Wave 3 – 4 (1994 – 2004)	Wave 4 – 5 (1999 – 2009)	Wave 5 – 6 (2005 – 2014)	Wave 6 – 7 (2010 – 2022)	Mean score
China	.044	.043	.021	.030	.016	.031
South Korea	.061	.030	.016	.019	.028	.031
Ukraine	—	—	—	.031	—	.031
Venezuela	—	.030	—	—	—	.030
Russia	.030	—	—	.025	.032	.029
Moldova	—	.023	.034	—	—	.028
Finland	.027	—	—	—	—	.027
Romania	.057	—	—	.015	.009	.027
United Kingdom	.027	—	—	—	—	.027
Poland	.038	—	—	.010	.030	.026
Ecuador	—	—	—	—	.025	.025
Germany	.035	—	—	.010	.029	.025
Zimbabwe	—	—	—	—	.025	.025
Singapore	—	—	—	—	.024	.024
Turkey	.029	.046	.022	.010	.017	.024
Jordan	—	—	.018	.030	.017	.022
Sweden	.037	—	—	.011	.018	.022
Georgia	—	—	—	.013	.029	.021
Japan	.042	.025	.004	.011	—	.020
Libya	—	—	—	—	.020	.020
Puerto Rico	—	.020	—	—	—	.020
Switzerland	.020	—	—	—	—	.020
Colombia	—	—	—	.020	.017	.019
Mexico	.026	.034	.013	.007	.013	.019
Slovenia	—	—	—	.012	.027	.019

Country	Wave 2 – 3 (1989 – 1998)	Wave 3 – 4 (1994 – 2004)	Wave 4 – 5 (1999 – 2009)	Wave 5 – 6 (2005 – 2014)	Wave 6 – 7 (2010 – 2022)	Mean score
South Africa	.019	.010	.007	.039	—	.019
Spain	.012	.014	.014	.014	.044	.019
Chile	.022	.012	.014	.014	.029	.018
Hong Kong	—	—	—	—	.018	.018
Nigeria	.021	.015	—	—	.017	.018
Peru	—	.018	.018	.020	.011	.017
Netherlands	—	—	—	.016	—	.016
Brazil	.027	—	—	.008	.009	.015
Cyprus	—	—	—	.009	.020	.015
Ghana	—	—	—	.015	—	.015
United States	.016	.012	.018	.008	.015	.014
Taiwan	—	—	—	.013	.013	.013
Uruguay	—	—	—	.013	—	.013
Argentina	.013	.006	.012	.018	.010	.012
Philippines	—	.014	—	—	.011	.012
Norway	.011	—	—	—	—	.011
Trinidad & Tobago	—	—	—	.009	—	.009
Australia	—	—	—	.006	.010	.008
New Zealand	—	—	—	.007	—	.007
Canada	—	—	.004	—	—	.004
M	.039	.028	.026	.024	.027	.029

Note. "—" indicates that data were unavailable for the given time interval. Wave 1 of WVS data collection was excluded from analyses because there were an insufficient number of countries with available data.

Table 2. *Between-country effects of changes in the predictors on cultural churn.*

Predictor (change values)	γ (*SE*)	95% CI	*t* (*df*)	*p*
Human development index	0.50 (0.10)	[0.30, 0.69]	4.99 (66.23)	<.001
Gross national income per capita	0.32 (0.09)	[0.14, 0.50]	3.53 (48.08)	.001
Education	0.49 (0.11)	[0.27, 0.70]	4.45 (58.52)	<.001
Life expectancy	0.37 (0.11)	[0.15, 0.58]	3.33 (77.40)	.001
Gender development index	0.42 (0.10)	[0.22, 0.61]	4.24 (62.27)	<.001
Gender inequality index	0.17 (0.13)	[-0.09, 0.43]	1.28 (64.91)	.205
GDP per capita	0.52 (0.11)	[0.32, 0.73]	4.95 (104.36)	<.001
Service sector employment (%)	0.44 (0.09)	[0.26, 0.63]	4.75 (70.78)	<.001
Industrial sector employment (%)	0.51 (0.11)	[0.30, 0.72]	4.70 (86.24)	<.001
Agricultural sector employment (%)	-0.08 (0.12)	[-0.31, 0.15]	-0.65 (74.04)	.517
Urban population (%)	0.24 (0.13)	[-0.01, 0.50]	1.90 (70.18)	.062
Freedom rankings	0.01 (0.11)	[-0.21, 0.22]	0.06 (59.23)	.954
Globalization index	0.31 (0.11)	[0.10, 0.52]	2.85 (66.27)	.006
Financial globalization subindex	0.02 (0.14)	[-0.25, 0.29]	0.18 (55.72)	.861
Trade globalization subindex	0.11 (0.12)	[-0.13, 0.35]	0.94 (54.47)	.353
Cultural globalization subindex	0.39 (0.10)	[0.19, 0.59]	3.80 (52.06)	<.001
Interpersonal globalization subindex	0.32 (0.11)	[0.10, 0.55]	2.84 (59.33)	.006
Informational globalization subindex	0.24 (0.12)	[0.00, 0.47]	1.96 (57.68)	.055
Political globalization subindex	0.30 (0.10)	[0.09, 0.50]	2.89 (63.56)	.005
Disease threat	-0.26 (0.11)	[-0.47, -0.05]	-2.39 (50.90)	.021

Predictor (change values)	γ (*SE*)	95% CI	*t* (*df*)	*p*
Extrinsic mortality	-0.26 (0.17)	[-0.60, 0.07]	-1.56 (32.60)	.129
Population density	-0.06 (0.13)	[-0.31, 0.19]	-0.46 (58.49)	.647

Note. Each row provides between-country effects from separate random-intercept multilevel models. The gamma symbol (γ) denotes the standardized between-country effects. All models control for the within-country effect of each predictor (country-mean centered), as well as data quality and the years between WVS/EVS waves (both country-mean and country-mean-centered). Freedom rankings and the globalization indices were measured using raw change scores, rather than percent changes, as these were the only variables not measured on a ratio scale.

Table 3. *Between-country effects of baseline values of the predictors on cultural churn.*

Predictor (baseline values)	γ (*SE*)	95% CI	*t* (*df*)	*P*
Human development index	-0.51 (0.12)	[-0.74, -0.28]	-4.32 (56.60)	<.001
Gross national income per capita	-0.44 (0.11)	[-0.66, -0.23]	-4.00 (63.87)	<.001
Education	-0.42 (0.13)	[-0.67, -0.16]	-3.20 (54.39)	.002
Life expectancy	-0.32 (0.12)	[-0.56, -0.08]	-2.58 (64.31)	.012
Gender development index	-0.37 (0.11)	[-0.59, -0.15]	-3.34 (53.41)	.002
Gender inequality index	0.35 (0.14)	[0.08, 0.62]	2.57 (53.61)	.013
GDP per capita	-0.42 (0.10)	[-0.61, -0.22]	-4.23 (65.46)	<.001
Service sector employment (%)	-0.46 (0.09)	[-0.65, -0.28]	-4.89 (62.26)	<.001
Industrial sector employment (%)	0.14 (0.12)	[-0.10, 0.37]	1.13 (76.46)	.261
Agricultural sector employment (%)	0.36 (0.11)	[0.15, 0.57]	3.33 (64.95)	.001
Urban population (%)	-0.43 (0.10)	[-0.63, -0.23]	-4.29 (54.85)	<.001
Freedom rankings	-0.61 (0.09)	[-0.78, -0.44]	-7.01 (54.54)	<.001
Globalization index	-0.43 (0.12)	[-0.67, -0.19]	-3.54 (63.72)	.001
Financial globalization subindex	-0.30 (0.11)	[-0.50, -0.09]	-2.77 (57.11)	.008
Trade globalization subindex	0.14 (0.13)	[-0.11, 0.40]	1.12 (57.78)	.267
Cultural globalization subindex	-0.52 (0.13)	[-0.78, -0.27]	-3.99 (55.97)	<.001
Interpersonal globalization subindex	-0.22 (0.13)	[-0.48, 0.04]	-1.68 (54.18)	.099
Informational globalization subindex	-0.47 (0.13)	[-0.72, -0.22]	-3.68 (57.59)	.001
Political globalization subindex	-0.44 (0.09)	[-0.62, -0.25]	-4.62 (59.18)	<.001
Disease threat	0.01 (0.13)	[-0.25, 0.27]	0.05 (65.76)	.962

Predictor (baseline values)	γ (*SE*)	95% CI	*t* (*df*)	*P*
Extrinsic mortality	-0.07 (0.12)	[-0.31, 0.17]	-0.55 (33.14)	.584
Population density	0.17 (0.09)	[-0.02, 0.35]	1.79 (66.86)	.078

Note. Each row provides between-country effects from separate random-intercept multilevel models. The gamma symbol (γ) denotes the standardized between-country effects. All models control for the within-country effect of each predictor (country-mean centered), as well as data quality and the years between WVS/EVS waves (both country-mean and country-mean-centered).

Table 4. *Results of Specification Curve Analyses Predicting Magnitude of Cultural Churn from Concurrent Changes in Each Predictor Variable (Statistically Controlling For Concurrent Changes in the Other Predictor Variables).*

Predictor (change values)	Percent of effect size γ's > |.10|	Median effect size γ	Range of effect size γ's
Industrial sector employment (%)	100	0.31	0.10 – 0.51
GDP per capita	100	0.24	0.13 – 0.34
Gender Development Index	99.02	0.26	0.08 – 0.45
Political globalization subindex	96.48	0.18	0.07 – 0.35
Human Development Index	78.32	0.20	-0.13 – 0.56
Service sector employment (%)	62.50	0.14	-0.15 – 0.44
Cultural globalization subindex	49.61	0.10	-0.07 – 0.37
Interpersonal globalization subindex	48.63	0.10	-0.13 – 0.37
Disease threat	19.34	-0.04	-0.28 – 0.08

Note. The gamma symbol (γ) denotes the standardized between-country effects. Results are calculated from 512 separate model specifications for each predictor variable. All models included random intercepts across country and time interval, and controlled for between- and within-country differences in the years between WVS waves as well as data quality.

Table 5. *Results of Specification Curve Analyses Predicting Magnitude of Cultural Churn from Baseline Values of Each Predictor Variable (Statistically Controlling For Baseline Values of the Other Predictor Variables).*

Predictor (baseline values)	Percent of effect size γ's > |.10|	Median effect size γ	Range of effect size γ's
Freedom rankings	100	-0.41	-0.64 – -0.13
Urban population (%)	97.51	-0.40	-0.82 – 0.09
Gender Development Index	94.07	-0.25	-0.46 – 0.01
Political globalization subindex	89.33	-0.21	-0.44 – -0.01
Service sector employment (%)	83.25	-0.45	-1.67 – 0.22
Cultural globalization subindex	81.23	-0.38	-1.21 – 0.43
Financial globalization subindex	80.22	0.19	-0.31 – 0.48
Agricultural sector employment (%)	79.30	-0.57	-1.70 – 0.39
Informational globalization subindex	69.34	0.28	-0.61 – 1.06
GDP per capita	59.67	-0.16	-0.69 – 0.33
Human Development Index	47.31	-0.08	-1.13 – 0.74
Gender Inequality Index	42.77	0.06	-0.57 – 0.51

Note. The gamma symbol (γ) denotes the standardized between-country effects. Results are calculated from 4,096 separate model specifications for each predictor variable. All models included random intercepts across country and time interval, and controlled for between- and within-country differences in the years between WVS waves as well as data quality.

Table 6. *Associations Between Cross-Sectional Predictors and Cultural Churn.*

Predictor (baseline values)	γ (*SE*)	95% CI	*t* (*df*)	*p*
Tightness (Uz index [60])	0.53 (0.11)	[0.31, 0.74]	4.78 (32.16)	<.001
Tightness (Eriksson et al. index [59])	0.19 (0.14)	[-0.08, 0.47]	1.38 (20.36)	.183
Global collectivism index	0.43 (0.13)	[0.18, 0.69]	3.30 (59.77)	.002
Collectivism-individualism	0.20 (0.12)	[-0.03, 0.44]	1.74 (56.13)	.087
Cultural heterozygosity	0.09 (0.11)	[-0.13, 0.30]	0.81 (46.01)	.423
Ethnic fractionalization	-0.06 (0.12)	[-0.30, 0.18]	-0.50 (64.67)	.618
Linguistic fractionalization	-0.11 (0.11)	[-0.32, 0.10]	-1.05 (57.26)	.299
Religious fractionalization	0.05 (0.11)	[-0.16, 0.25]	0.46 (59.80)	.648
Climatic instability	-0.13 (0.13)	[-0.38, 0.12]	-1.04 (59.36)	.303

Note. Each row provides results from separate random-intercept multilevel models. All models control for data quality and the years between WVS/EVS waves (both country-mean and country-mean-centered). All coefficients are standardized.

Table 7. *Multilevel Models Testing the Robustness of the Association Between Tightness and Cultural Churn.*

	Model 1		Model 2		Model 3	
Predictor	γ (*SE*)	*p*	γ (*SE*)	*p*	γ (*SE*)	*p*
Cultural orientations						
Tightness (Uz index [60])	0.37 (0.08)	<.001	0.26 (0.09)	.010	0.22 (0.10)	.038
Global collectivism index	0.26 (0.10)	.019	—	—	—	—
Change values						
Industrial sector employment (%)	—	—	0.06 (0.18)	.736	—	—
Gender Development Index	—	—	0.25 (0.14)	.078	—	—
GDP per capita	—	—	0.49 (0.35)	.166	—	—
Political globalization subindex	—	—	-0.05 (0.12)	.655	—	—
Baseline values						
Freedom rankings	—	—	—	—	-0.12 (0.19)	.519
Urban population (%)	—	—	—	—	-0.24 (0.17)	.158
Service sector employment (%)	—	—	—	—	0.23 (0.23)	.329
Gender Development Index	—	—	—	—	-0.18 (0.14)	.194
Cultural globalization subindex	—	—	—	—	-0.69 (0.26)	.012
Political globalization subindex	—	—	—	—	-0.07 (0.11)	.538
Financial globalization subindex	—	—	—	—	0.31 (0.13)	.025

Note. Model 1 tests the effect of tightness on cultural churn controlling for collectivism. Model 2 tests the effect of tightness on cultural churn controlling for the top change value predictors identified by the SCA. Model 3 tests the effect of tightness on cultural churn controlling for the top baseline value predictors identified by the SCA. The gamma symbol (γ) denotes the standardized between-country effects. Models 2 and 3 control for the within-country effect of each predictor (country-mean centered), and all models control for data quality and the years between WVS/EVS waves (both country-mean and country-mean-centered).

Figures

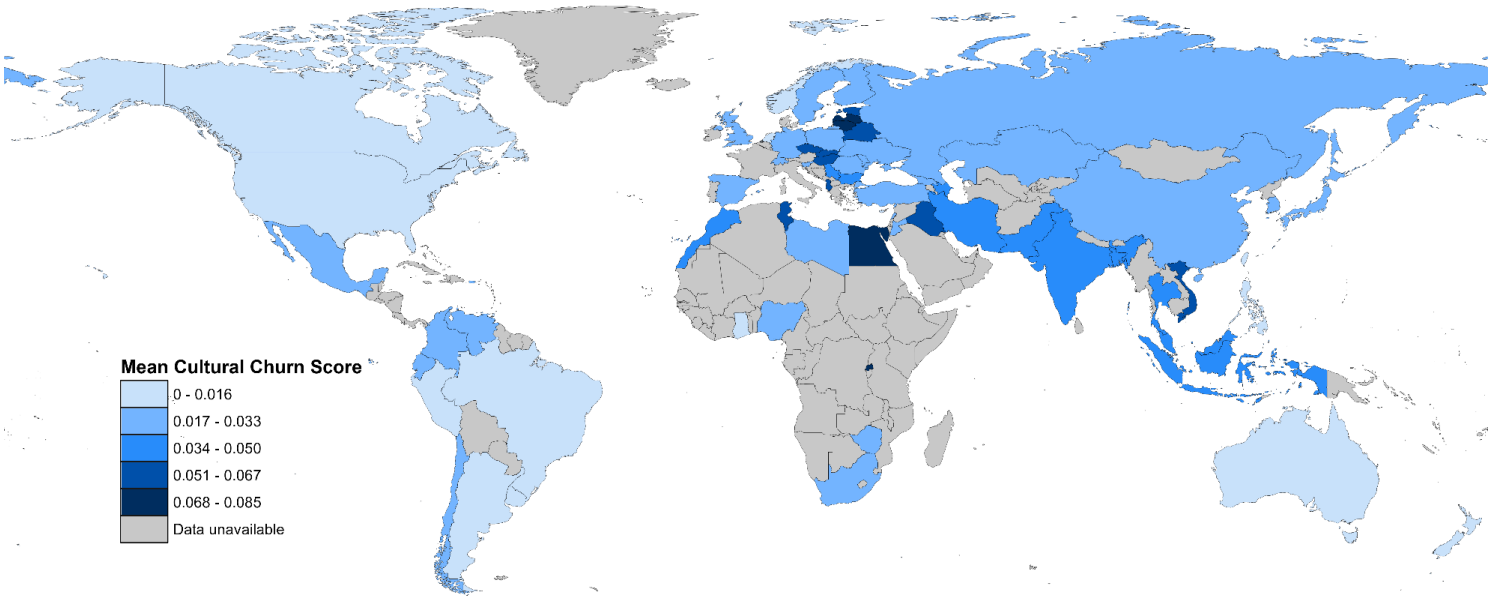

Figure 1

Mean cultural churn scores (from Table 1) for each of 71 countries, visualized on a world map.

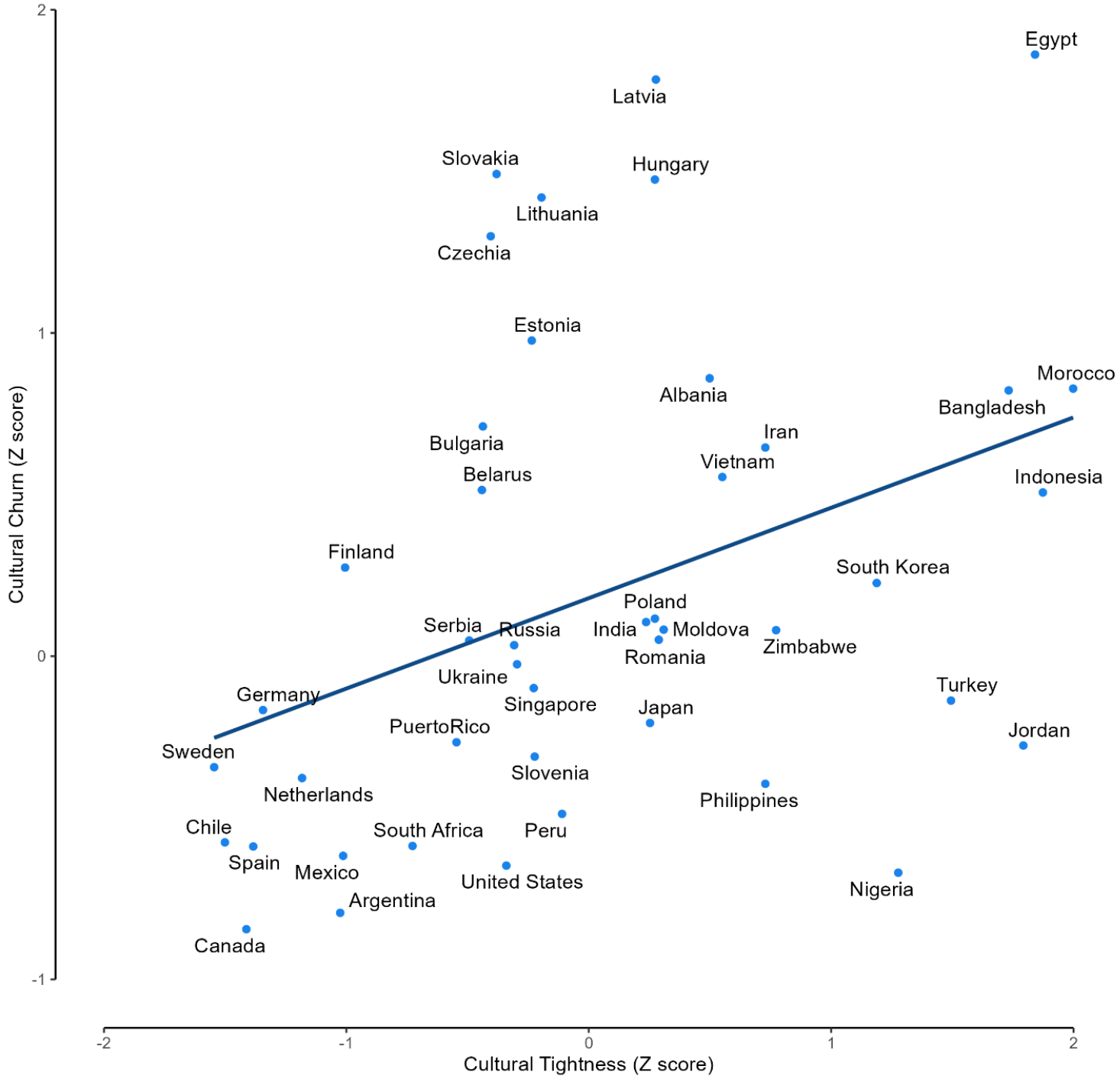

Figure 2

Country-level tightness scores (Uz index [60]) plotted against the predicted values of cultural churn, controlling for data quality and the length of time between waves.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- CulturalchurnSI.docx