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THE CULTURAL DIVIDE

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ABSTRACT

This paper conducts a systematic quantitative study of cultural convergence and divergence in the United States over time. Using the General Social Survey (1972-2016), we assess whether cultural values have grown more or less heterogeneous, both overall and between groups. Groups are defined according to 11 identity cleavages such as gender, religion, ethnic origin, family income quintiles, geographic region, education levels, etc. We find some evidence of greater overall heterogeneity after 1993 when averaging over all available values, yet on many issues heterogeneity changes little. The level of between-group heterogeneity is extremely small: the United States is very pluralistic in terms of cultural attitudes and values, but this diversity is not primarily the result of cultural divides between groups. On average across cleavages and values, we find evidence of falling between-group heterogeneity from 1972 to the late 1990s, and growing divides thereafter. We interpret these findings in light of a model of cultural change where intergenerational transmission and forces of social influence determine the distribution of cultural traits in society.

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A data appendix is available at http://www.nber.org/data-appendix/w24630

1 Introduction

Many scholars and commentators have argued that the United States faces a growing cultural divide along lines of race, geography, gender, age, income and other dimensions. These growing disagreements go hand in hand with a fraying social fabric, growing dysfunction in the political arena, and the disintegration of social capital. Others have argued that the greater availability of information and exchange facilitated by travel and exposure to different cultures have brought about cultural convergence, so that cultural heterogeneity between groups is becoming smaller as cultural traits diffuse throughout society.[1] Which view is correct?

In this paper we conduct a systematic quantitative study of cultural convergence and divergence in the United States over time. We assess whether cultural values - or *memes* - have grown more or less heterogeneous across groups defined according to 11 identity cleavages, among which are gender, religion, ethnic origin, family income quintiles, geographic region and education levels.[2] We use the General Social Survey (GSS), a survey of norms, values and attitudes, spanning 1972 to 2016. We consider a wide range of memes covering religious beliefs and practices, confidence in institutions, preferences over public policies, moral values and attitudes, measures of trust and life satisfaction, and tolerance for alternative viewpoints and lifestyles.

We use two classes of measures of cultural heterogeneity. The first captures *overall heterogeneity*, describing, for each meme, the likelihood that two randomly chosen individuals surveyed in the GSS will have a different cultural trait. The second is a measure of *heterogeneity between groups*, capturing the degree of fixation of memetic traits onto group identity. A high degree of fixation indicates that memes are highly group-specific, while a low degree of fixation indicates that the distribution of memes within each group closely resembles that in society overall. Rising fixation, in this context, would be associated with a growing cultural divide between groups.

We find that the overall degree of cultural heterogeneity in the United States is remarkably

[1] On the first view, prominent enunciations include Putnam (2000) and Murray (2013). Commentary along these lines among pundits and journalists are too numerous to list. The second view is more closely associated with modernization theory - see for instance Inglehart (1997) and Ritzer (2011), pointing, respectively, to rising incomes and globalization as powerful forces for cultural homogenization.

[2] The term "meme" was coined by Richard Dawkins (1989) to describe a cultural trait, much like a gene is a genetic trait. A meme can take on several variants, for instance the meme "belief in God" could take on variants "yes", "no" or "maybe". A person's culture, in our terminology, is simply that person's vector of memetic traits.

stable when averaging heterogeneity across all available memes. We find evidence that average cultural heterogeneity fell slightly between 1972 and 1993, and rose slightly thereafter. These average tendencies mask interesting variation across questions. For some questions, such as several questions on sexual behavior and public policies, there is growing social consensus. For others, such as questions on gun laws and confidence in some civic institutions, we find growing disagreements. Some of these dynamics can be understood as transitions from one end of the belief spectrum to the other. For instance, on the issue of marijuana legalization, attitudes have moved from generalized disagreement to majority agreement, so heterogeneity rose and is now falling. Overall, we find some evidence of a systematic tendency toward greater heterogeneity after 1993 when averaging over all available memes, yet on many issues heterogeneity changes little.

Across all identity cleavages, the level of between-group heterogeneity is extremely small: we confirm past findings that most heterogeneity in cultural traits occurs within, not between, groups (Desmet, Ortuño-Ortín and Wacziarg, 2017). The United States is an extremely pluralistic country in terms of cultural attitudes and values, but this diversity is not primarily the result of cultural divides between groups, however defined.

The time path of these cultural divides between groups displays interesting patterns. We find evidence of falling between-group heterogeneity from 1972 to the late 1990s, and growing divides thereafter, but only for some cleavages and only for some memes. Average heterogeneity has risen across religious identities since the mid-1990s, and across education levels, income quintiles, ethnic groups and racial groups since the early 2000s. The same trend is particularly pronounced across groups defined by political party self-identification. The cultural divide across party self-identification started to gradually increase at the end of the 1990s, and rose sharply in the first half of the 2000s. Of course, this may reflect the ability of individuals to more easily self-identify with a party that closely matches their cultural beliefs (sorting) rather than cultural change within groups predefined by party identification.[3] In many cases**,** the most recent levels of between-group heterogeneity do not surpass levels reached in the early 1970s. We also find stable or falling cultural heterogeneity across different regions of the United States, across urban categories, across age groups, and across genders. Some of these findings come as a surprise in light of the public pronouncements concerning growing divides across some of these identity cleavages.

[3]For instance, the gradual realignment of Southern Democrats with the Republican Party over time may imply greater fixation of political preferences on party identification.

How can we interpret these results in light of the popular commentary on the fraying social and cultural fabric of the United States? We hypothesize that several forces are at play, and may operate differently depending on specific memes and specific identity cleavages. To understand these forces, one needs to form a picture of how memes change over time. To do so, we propose a model of cultural change. In our model, three forces explain the distribution of memes across and within groups and its dynamics: intergenerational transmission, social conformism and the emergence of cultural innovations. First, an individual's vector of memes originates, with variation, from intergenerational transmission. Second, agents tend to conform to the majority memes of their own group. Third, innovations in values (particularly values initially held by a minority) can occur and spread through social influence. These three forces determine the dynamics of cultural change.

Our model provides simple comparative statics to understand the dynamics of cultural change in light of characteristics of memes and characteristics of identity cleavages. We use the model as a lense through which we interpret our empirical results. A crucial distinction is whether social influence occurs mostly within or across identity cleavages. This depends on the manner in which members of society interact across and within groups. For example, the emergence of technologies that create "echo chambers" reinforcing within-group conformism and weakening between-group interactions is important to understand the differential dynamics of the cultural divide across cleavages. This may help understand why, for instance, the cultural divide across Party ID seems to go up much more than across other cleavages. This trend is reinforced by the possible sorting of people with different memes into specific identities (such as party affiliations), a possibility that we explicitly allow for in our model. We also discuss how cultural divides may change differently across question categories. For instance, the emergence of cultural innovations such as greater social acceptance for gay marriage or marijuana legalization can lead to greater cultural divides if adopted at different rates across identity cleavages.

Our paper is related to a growing literature on the evolution of cultural traits. Our terminology and overall approach to culture borrow from the literature on cultural evolution (Cavalli-Sforza and Feldman, 1981, Boyd and Richerson, 1985, Richerson and Boyd, 2004, Henrich, 2015, Bell, Richerson and McElreath, 2009). Recent work by economists also tries to better understand the causes and mechanics of cultural change. Salient examples in this tradition include Bisin and Verdier (2000), Kuran and Sandholm (2008), Olivier, Thoenig and Verdier (2008) and Guiso, Herrera and Morelli (2016). Another literature, originating in political science and sociology, examines cultural

change arising from modernization and globalization (Inglehart, 1997, Inglehart and Baker, 2000, Norris and Inglehart, 2009, Ritzer, 2011). Our work is also linked to wide-ranging scholarship on cultural change and persistence (Alesina and Giuliano, 2015, Giuliano and Nunn, 2017). A related literature focuses on the features and behavior of immigrants to draw inferences on the persistence of cultural traits across generations (Giuliano, 2007, Fernandez and Fogli, 2006, Luttmer and Singhal, 2011, Giavazzi, Petrov and Schiantarelli, 2016).

Drawing on the aforementioned literature on the evolution of cultural traits, social scientists have also studied heterogeneity in cultural traits, which is our main focus here. An important recent contribution by Alesina, Tabellini and Trebbi (2017) study cultural heterogeneity in Europe using two waves of the World Values Survey.[4] Our work is also related to research on cultural and political polarization in the United States (DiMaggio, Evans and Bryson, 1996, McCarty, Poole and Rosenthal, 2006, Fiorina and Abrams, 2008, Gentzkow, Shapiro and Taddy, 2016, Boxell, Gentzkow and Shapiro, 2017). Finally, there is a recent literature on the measurement of cultural heterogeneity at the individual-level rather than at the group level, using either genetic or memetic data (Ashraf and Galor 2013, Desmet, Ortuño-Ortín and Wacziarg, 2017), with which the present study shares a measurement approach.

Our paper is organized as follows. Section 2 discusses our measurement framework and presents the data. Section 3 discusses the time path of our measures of heterogeneity between 1972 and 2014. Section 4 presents a model of cultural change leading to predictions on the dynamics of overall and between-group cultural heterogeneity. Section 5 concludes.

[4] Like us, Alesina, Tabellini and Trebbi (2017) are interested in characterizing cultural convergence or divergence. However, their focus is on the evolution of cultural differences between European countries, using heterogeneity between US states as a point of comparison. Instead, we focus on the US, consider a wide range of eleven identity cleavages, use a distinct measurement framework and interpret our findings through the lense of a model of cultural evolution.

2 Data and Measurement of Cultural Heterogeneity

2.1 Measurement Approach

To capture cultural heterogeneity and the cultural divide between identity cleavages, we start from the measurement framework in Desmet, Ortuño-Ortín and Wacziarg (2017).[5] That paper proposed a simple model of social antagonism to derive three classes of heterogeneity measures: heterogeneity in identity cleavages, overall heterogeneity in cultural values (memes), and heterogeneity in memes between identity cleavages. For the purposes of this paper we use the same functional forms to capture the latter two.

In particular, consider $c = 1, ..., C$ identity cleavages that each consist of groups $k_c = 1, ..., K_c$. Consider also $m = 1, ..., M$ memes that each can take on values $i_m = 1, ..., I_m$. For instance, c could be gender (k_c = male, female) and m could be belief in God (i_m = yes, no). We denote by s^{i_m} the share of the total population that holds variant i_m of meme m, and by s_{k_c} the share of group k_c in the total population. We denote by $s_{k_c}^{i_m}$ the share of group k_c (defined over cleavage c) that holds variant i_m of meme m. For instance, this could be the share of males that believe in God.

Overall heterogeneity is simply memetic fractionalization over the whole population. For meme m:

$$CF^m = 1 - \sum_{i_m=1}^{I_m} (s^{i_m})^2$$

Averaging over memes, we get average memetic fractionalization - the probability that two randomly chosen individuals from the entire sample hold a different variant of a randomly drawn memetic trait:

$$CF = \frac{1}{M} \sum_{m=1}^{M} CF^m = 1 - \frac{1}{M} \sum_{m=1}^{M} \sum_{i_m=1}^{I_m} (s^{i_m})^2$$

CF is a measure of memetic heterogeneity in the entire population, without regard to identity cleavages.

To derive a measure of the cultural divide between groups, we calculate F_{ST} measures of memetic fixation. Heuristically, F_{ST} captures the share of heterogeneity that occurs between groups defined by identity cleavages (Wright, 1949; Cavalli-Sforza et al, 1994; Desmet, Ortuño-Ortín and Wacziarg,

[5] That paper applied these measures to studying, in a cross-country context, heterogeneity across ethnic groups. Instead, here we use them to measure, for a single country across time, cultural heterogeneity between a much broader range of identity cleavages, not limited to ethnicity.

2017).[6] We start by defining heterogeneity in meme m within group k_c:

$$CF_{k_c}^m = 1 - \sum_{i_m=1}^{I_m} \left(s_{k_c}^{i_m}\right)^2$$

Taking the weighted average over groups for a given identity cleavage c, we obtain the average within-group heterogeneity for meme m, CF_c^m:

$$CF_c^m = \sum_{k_c=1}^{K_c} s_{k_c} CF_{k_c}^m$$

Finally F_{ST} for meme m defined over cleavage c is simply the share of the total heterogeneity that is not attributable to within-group heterogeneity:

$$(F_{ST})_c^m = 1 - \frac{CF_c^m}{CF^m}$$

$(F_{ST})_c^m$ takes on values between 0 and 1. When $(F_{ST})_c^m = 0$, group identity carries no information concerning an individual's cultural value. When $(F_{ST})_c^m = 1$, knowing a person's identity is equivalent to knowing their value, i.e. the meme is perfectly fixated on groups ($(F_{ST})_c^m = 1$ can only happen when the number of identity groups K_c is at least as large as the number of possible cultural values I_m, and there is no within-group heterogeneity in values). As was the case for CF^m, $(F_{ST})_c^m$ can be averaged over all memes m to obtain the expected cultural divide between groups defined over cleavage c.

2.2 Data

We use survey data from the General Social Survey (GSS) from 1972 to 2016, from the 31 waves that have occurred so far. The universe of all GSS questions across all waves includes 5,895 fields, but many questions were asked only episodically. We require as long a time series as possible over a common set of questions, to ensure the comparability of the measures of cultural diversity across time. There is a trade-off: the higher the frequency over which the measures are computed, the smaller the set of common questions across successive observations. To achieve balance between these considerations, we group waves into either two-wave sets or five-year sets and keep questions

[6] Desmet, Ortuño-Ortín and Wacziarg (2017) also defined a $\chi 2$ measure of between-group heterogeneity. This captures the information content of a person's identity in terms of that person's cultural values. Hence this index will take on high values when cultural traits are very group-specific. In practice F_{ST} and $\chi 2$ are very highly correlated, so it matters little which one we use. Due to easier computation we focus on F_{ST}.

that were asked at least once in each grouping (Online Appendix, Table A1 displays these groupings). This amounts to keeping questions asked at least once every two waves, or at least once in any five-year period. Next, to capture a respondent's vector of memes, we consider the universe of questions that refer to values and attitudes. This implies excluding questions that relate to either other people (spouse, parents, etc.) or to a respondent's education when he/she was younger; questions that do not relate to values; and identity or demographic questions. Some factual questions are retained, to the extent that they carry information on values (for instance, "do you have a gun in your home?" or "how often do you attend religious services?"), but these instances are rare. In the end, we are left with 76 memes when requiring questions to be asked every two wave, and 96 memes when requiring questions to be asked at least once in each five year interval. These questions are listed in the Online Appendix, Table A2. We use the 76 questions obtained from the two-wave groupings as our baseline set, since it provides higher frequency for the heterogeneity measures, and use the expanded set of questions obtained from the five-year groupings for robustness checks presented in the Online Appendix.

Questions come in different categories and types. We rely on the question categories provided by the GSS to classify questions. Broad categories include civil liberties, current affairs, gender and marriage, politics, religion and spirituality. These are further divided into finer subcategories. For instance, gender and marriage includes questions on children and working, on marriage, and on sex and sexual orientation. Questions are either binary or answered on a scale. In our baseline set of 76 questions, 26 are binary (yes/no, agree/disagree) and 50 admit answers that can be ordered on a scale. In 35 cases, the scale admits 3 answers, and in the remainder, 4 or more possible answers.

We consider 11 identity cleavages to compute the F_{ST} indices. These cleavages are characteristics of the respondents also observed in the GSS survey waves. They are labeled age, education, ethnicity, family income, gender, party ID, race, region, religion, urbanicity and work status. These cleavages admit anywhere from two values (gender) to nine values (region, ethnicity), with the modal number of categories equal to five. Table A3 in the Online Appendix displays the cleavages and corresponding categories.

3 The Evolution of Cultural Divides in the United States

3.1 The Dynamics of CF and F_{ST}

We begin by discussing the evolution of overall heterogeneity. Figure 1 displays the time path of CF, averaged over all 76 questions available, and the first columns of Table 1 shows the underlying numbers. We find that average CF varies between 0.482 (in 1993) and 0.500 (1976). There is a U-shaped pattern over the sample period: overall heterogeneity declined between the early 1970s and the mid-1990s and grew back to its initial level by the end of the period.[7] This average over all questions masks some underlying heterogeneity. Panel A of Table 2 breaks down the dynamics by question. We find that 14.5% of the questions display a significant U-shaped pattern (with the minimum reached some time between 1980 and 2005). Heterogeneity is declining for 29% of the questions and increasing for 25% of them. The rest is either hump-shaped or flat. This finding of a substantial degree of heterogeneity in the dynamics of cultural diversity across questions will be echoed when discussing fixation measures, highlighting the fact that generalizations about cultural diversity are hard to draw.

Table 3 characterizes the dynamics of CF by question category and subcategory. Overall there is a lot of variation in the dynamics of CF across question categories. We tend to find U-shaped or increasing paths for questions on crime, economic well-being and life satisfaction, and decreasing heterogeneity on questions regarding free speech.

Figure 2 turns to cultural fixation by identity cleavage. For each of the 11 cleavages, it displays the time path of F_{ST}, averaged over all questions (the underlying data is in Table 1). Figure 2 reveals an interesting ranking of cleavages by level of fixation, some of them surprising in light of public commentary on the cultural divide. The biggest cultural divides are between groups defined by educational attainment, family income quintiles and religion. The smallest divides are between genders, races and urbanicity. But across all cleavages, the absolute level of fixation is very low, on the order of $1-3\%$. The high level of cultural pluralism in the US, then, is not primarily due to

[7] The overall variation can reflect a substantial change in the underlying shares of respondents giving a specific answer to a question. For instance, consider a binary question. With a CF of 0.5, response shares would be equally divided between both possible answers. Then a change in CF to 0.482 represents a shift in answer shares of 9.5% (shares of 40.5% to 59.5% for each possible answer). More generally, given the specific distribution of the number of possible answers among our baseline set of 76 questions, the theoretical maximal average level of CF is 0.63. The United States appears to be be quite culturally diverse overall, but there is room for that diversity to grow.

diversity *between* identity cleavages, but mostly due to diversity *within* identity categories.

These levels of cultural fixation change substantially through time. On average, one can discern an overall U-shaped pattern, whereby cultural divides decreased between 1972 and the late 1990s, and rose thereafter.[8] Yet this masks very different patterns across cleavages. These are easiest to see in Figure 3, which plots the dynamics of average F_{ST} cleavage by cleavage. For instance average F_{ST} for Party ID is relatively flat through the mid-1990s, starts to gradually increase in the late 1990s, and then accelerates in the 2000s, reaching its maximum in 2016. Of course, it is possible that people with given Party IDs have grown culturally more distinct, or that people with distinct beliefs have sorted more effectively into different party IDs. A similar pattern is found for religion, and to a weaker extent for ethnicity. Other cleavages display flatter or mild U-shaped patterns: family income, education and race. Finally, some cleavages show declining levels of cultural fixation, though the decline typically flattens at the end of the sample: age, urbanicity, region, and work status. Average F_{ST} for gender is mildly hump-shaped around a very low level. The latter patterns are once again surprising in light of many commentators' priors on rising divides across urban categories, genders, regions of the US and employment status.

Table 2, Panel B classifies the types of dynamics of F_{ST} across questions for each cleavage. The first observation is that, across all 11 cleavages, about 50% of the questions display no clear direction over time: the dynamics are flat. For the remaining questions that do display significant patterns, we largely confirm the dynamics of average F_{ST} displayed in Figure 3. For instance, for 48.7% of the questions, F_{ST} based on Party ID displays a significant U-shaped pattern over the sample period, with an additional 6.6% of the questions displaying a strictly increasing trend. Similarly for religion, F_{ST} is U-shaped for 34.2% of the questions, and increasing for 5.3% of them. Positive trends are weaker for race and ethnicity, with a combined share of U-shaped and increasing patterns equal to 36.8% and 32.9%, respectively. For region, urbanicity and age, we see high shares of declining F_{ST} indices (respectively 34.2%, 27.6% and 31.6%). Finally for gender, we see a combined share of hump-shaped and declining F_{ST} dynamics equal to 29.0%.

Table 4 classifies the types of dynamics within question categories and sub-categories, for all 11 cleavages. We rely on the nomenclature of questions provided by the GSS. This gives five broad categories (civil liberties, current affairs, gender & marriage, politics, and religion & spirituality)

[8] A simple average of cultural fixation across the 11 identity cleavages reaches a minimum in 1997, and starts to increase in 2001.

that are further divided into sub-categories. For instance, for civil liberties there are 23 questions, and 11 cleavages: when we state that 19.76% of the dynamics are U-shaped we mean that 50 out of 11×23 series have U-shaped dynamics. We find again that a generally large share of the questions display flat dynamics of F_{ST}. But interesting patterns emerge nonetheless. For instance, for free speech, a large percentage of the question-cleavage categories (52.5%) display significantly decreasing levels of F_{ST}. These same questions, incidentally, tend to display a decreasing CF, indicating that between-group diversity is decreasing faster than overall diversity. Another notable category is the set of questions on crime, where we find on the contrary that fixation is either U-shaped or increasing in about 42.7% of the cases. A similar pattern is found for questions on sex and sexual orientation, with a combined share of U-shaped and increasing F_{ST} indices equal to 49.1%.

Table 5 carries out a regression analysis of variation in the level of F_{ST}. We pooled all of the F_{ST} measures across cleavages, questions and periods (with 76 questions, 16 periods and 11 cleavages, this gives us $13,376$ observations). Each panel reports results on each of three sets of regressors: cleavage type, question category or subcategory, and time period (these are all entered simultaneously). We largely confirm previous observations. Looking at Panel A, we replicate the ordering of F_{ST} magnitudes across cleavages. The average level of F_{ST} is elevated for age, education, family income and religion, and is low for race, urbanicity and gender (the latter is the smallest, and hence is the excluded category). In sum, the ranking of F_{ST} magnitudes across cleavages is consistent with that displayed in Figure 2. Panel B analyzes the level of fixation by question category (column 1) and subcategory (column 2), finding that across all cleavages, F_{ST} tends to be high for free speech questions, sex and sexual orientation, and religious affiliation and behaviors. F_{ST} tends to be low for national spending, children and working, and confidence and power (the cultural divide on questions on marriage is the smallest of all, which is why it is our excluded category). Finally Panel C looks at time effects by including a dummy for each of the 16 periods (excluding the one that starts in 1972, which is the excluded category). We find a U-shaped pattern reminiscent of the general pattern displayed in Figure 2: cultural fixation across all questions and cleavages tends to fall until the late 1990s, and to rise in the 2000s (the minimum is reached for the 1996-1998 wave grouping). Of course these average level differences mask a lot heterogeneity in time and across cleavages, already discussed previously.

3.2 Alternative Approach Based on Regressions

As an alternative approach to assessing the dynamics of the cultural divide, we use a regression approach. For each meme m at time t, we run a regression of the following form:

$$y = \alpha + \sum_{c=1}^{11} \sum_{k_c=1}^{K_c-1} \beta_{k_c} D_{k_c} + \varepsilon$$

where y is the response of an individual to meme m at time t, α is a constant, D_{k_c} is a dummy variable taking on a value of 1 if the individual is in cleavage category k_c, and ε is an error term. With 16 time periods and 76 memes, this means we are running $1,216$ regressions. We record the total R^2 from each of these regressions, a measure of the informativeness of all identity cleavages together, in terms of cultural memes. We then calculate the partial R^2 due to each set of cleavage dummies. To do so, we rerun the above regressions excluding the set of dummies for the cleavage of interest (this is an additional $1,216$ regressions for each of 11 cleavages). We refer to the R^2 from these regressions as the restricted R^2. For each meme i at time t, we then take the difference between the total R^2 and the restricted R^2, giving us the partial R^2 for the corresponding cleavage. For each time t, we then average the total and the partial R^2 over all memes.

This approach is related to measuring fixation using F_{ST}. The greater the explanatory power of an identity cleavage for cultural values, the higher the corresponding partial R^2 in the above regression. Similarly, the F_{ST} for that cleavage will tend to be relatively high.[9] One advantage of the R^2 approach is that all identity cleavages are entered jointly, so we are controlling for the effect of other cleavages when assessing the explanatory power of a particular cleavage.

The results are presented in Table 6 and displayed graphically in Figures 4 and 5. The overall R^2, i.e. the joint explanatory power of all cleavages, displays a U-shaped pattern and is minimized for the 1996-1998 wave grouping (Figure 4). The level of the R^2 itself is modest, going from 15.5% in 1972-1973 to 11.4% in 1996-1998 and back to 15.1% in 2016. The ability of cleavages overall to explain answers to these 76 GSS questions therefore has increased starting in the early 2000s, indicating growing cultural divides in the last decade and a half.

[9] Desmet, Ortuño-Ortín and Wacziarg (2017) explicitly relate F_{ST} to measures of informativeness such as χ^2, showing that they are very highly correlated. χ^2 explicitly captures the informational content of a cleavage in terms of memes (Cover and Thomas, 2006). Similarly, in our context the partial R^2 also captures the degree of informativeness of specific identity cleavages for responses on cultural values.

However, this average pattern masks interesting differences cleavage by cleavage. These differences largely replicate those found for F_{ST}, confirming that the average partial R^2 reflects a similar concept of informativeness of cleavages for memes as does F_{ST}. In terms of the average levels of partial R^2 and F_{ST}, there is a clear correspondence, with high values of both indicators for age, education, family income, party ID, region and religion (compare the last rows of Tables 1 and Table 6). These similarities in terms of average levels extend to the time path of the indicators cleavage by cleavage. This is most easily seen by comparing Figure 5 and Figure 3: the dynamics of partial R^2 are broadly similar to those of F_{ST}, cleavage by cleavage. Overall, partial R^2 values for Party ID are relatively flat until the early 2000s, after which they increase rapidly, almost doubling in the span of 15 years. We uncover a similar pattern for religion, with an acceleration starting slightly earlier, in the second half of the 1990s. We find a hump-shaped partial R^2 for gender, and falling partial R^2 for urbanicity and region, as we did when capturing fixation with F_{ST}.

4 A Model of Cultural Change

In this section, we propose a model of cultural change. The model builds upon ideas from the cultural evolution literature in both anthropology and, more recently, economics. Among the earliest contributions to model culture in an explicitly evolutionary context are Boyd and Richerson (1985) and Richerson and Boyd (2004, 2005). These authors proposed a range of evolutionary mechanisms explaining the dynamic paths of cultural traits where cultural traits evolve through mutation and selection, much like genes but at very different rates, partly because, unlike genes, cultural traits can be transmitted horizontally.[10] Bisin and Verdier (2000) study the intergenerational transmission of norms in an explicitly economic model where parents rationally choose which traits to pass on to their children, to derive the degree of cultural heterogeneity of a stationary population.[11] Bernheim (1994) models conformism, assuming that it arises from social influence: social status enters the utility function, so there is a penalty for not conforming. Such conformism can lead to persistent customs as well as temporary fads. Bikhchandani, Hirshleifer and Welch (1992) contains a theory of fads and culture whereby certain values can originate from small shocks to preferences

[10] Genes and cultural traits can also coevolve. Henrich (2015) contains further explorations in a similar vein.

[11] Doepke and Zilibotti (2008) also explicitly model parents' choices of values to impart to their children as a function of economic incentives. Lazear (1999) models an individual's choice to learn languages, gain familiarity with other cultures, and assimilate culturally, again as a function of economic incentives to trade.

and spread through local conformism, leading to informational cascades and cultural change. Kuran and Sandholm (2008) compare the dynamics of cultural evolution in isolated and integrated societies, by analyzing the role of intergroup versus intragroup socialization and coordination. The goal is to understand the conditions under which cultural integration occurs, and circumstances under which societies can retain their original cultures. We build on all these contributions, but emphasize the role of cultural diversity between and within identity groups, since our purpose is to study how and why the resulting cultural divide changes over time.

The aim of our conceptual framework is two-fold. First, we seek to understand the drivers of different dynamic patterns of CF and F_{ST}. The specific sources of cultural change that we model include intergenerational transmission, conformism, and cultural innovations. Some of these sources of cultural change may lead to cultural convergence between groups, whereas others may lead to cultural divergence, or more complex non-monotonic dynamics. Second, our model provides us with a lens through which to interpret our empirical findings. Depending on characteristics of memes, of identity cleavages, and of the extent of cross-group versus within-group cultural diffusion, our model predicts different dynamic patterns for CF and F_{ST}. We then discuss these predictions and their origins in light of the specific empirical patterns identified in Section 3.

4.1 Setup

Consider a society with one identity cleavage (e.g., gender) and one cultural meme (e.g., belief in God). The identity cleavage has two identity traits k and $-k$ (e.g., male or female) and the cultural meme can take two values i and $-i$. Time is discrete, $t = 1, 2, ...$. Identity groups are of equal size, and for now we assume that an individual cannot choose her trait. Each agent has one child, so that each generation is as large as the previous one. Cultural values are imperfectly transmitted from parent to child. As an agent socializes, she may change her cultural value in two situations. First, if she was born with the minority value and is sensitive to conforming to his group's majority value, she may switch to the majority value. Second, we allow for the emergence of cultural innovations, meaning that one of the values becomes more socially acceptable. If an agent has a taste for adopting cultural innovations, she may switch to the value that has become more acceptable. Before stating an agent's decision problem, we describe in more detail the different determinants of his culture: vertical transmission, pressure to conform and the adoption of cultural innovations.

Vertical transmission and innate values. There is imperfect vertical transmission between a parent and a child. In particular, a share α of children inherits the value of their parent, and a share $(1-\alpha)$ is born with the other value. The parameter α therefore measures the intensity of vertical transmission.[12] We refer to the value an agent is born with as his innate value. In the absence of conformism and innovation, the utility an agent derives from his innate value is normalized to one.

Pressure to conform. As an agent socializes, he may perceive a benefit from conforming to the majority value of his group. One benefit from conformism may be that agents who frequently interact gain from coordinating on the same value; another reason may be that some agents do not like to stand out by being different from their group's mainstream view. The benefit from conforming increases in the share of the own group that holds the majority value, but is heterogeneous across individuals. In what follows, we denote by s_k^i the share of group k that holds the majority view (and by s_k^{-i} the share that holds the minority value, where obviously $s_k^{-i} = 1 - s_k^i$). When born, an individual draws a random variable p from a uniform distribution with support $[0, 1/\bar{p}]$. The utility he gets from conforming to the majority value is then $\frac{1}{p} s_k^i$ if he was born with the minority value and as $\frac{1+\gamma}{p} s_k^i$ if he was born with the majority value, where $\gamma \geq 0$ is a utility premium from having been born with the majority value. A higher $\bar{p}$ indicates a higher expected level of intra-group conformism in society overall.

Our setup does not allow for inter-group conformism *per se*. However, when discussing comparative statics on $\bar{p}$, we will argue that a weakening of within-group conformism (a lower $\bar{p}$) can be interpreted as a stengthening of between-group conformism.

The diffusion of cultural innovations. We define a cultural innovation as an existing value that becomes socially more acceptable or fashionable. A cultural innovation is simply a label attached to a given value that makes that value more attractive to hold. Some agents may find it attractive to adopt this value, and switch from the non-innovating to the innovating value. Suppose that j is the innovating value. For an agent of group k, the benefit of holding the innovating value is increasing in the share of agents of group k that hold this value, but is heterogeneous across agents. When a cultural innovation occurs, each agent draws a random variable r from a uniform distribution with support $[0, 1/\bar{r}_k]$. This determines an agent's utility from imitating the innovating value, $\frac{1}{r} s_k^j$. A

[12] We do not endogenize α, in contrast to the approach in the classic paper by Bisin and Verdier (2000), where the intergenerational transmission of culture results from purposeful decisions by parents.

higher $\bar{r}_k$ indicates a higher expected level of sensitivity to imitating cultural innovations, i.e. a higher sensitivity to fads, fashions or social trends.

Cultural innovations diffuse within groups, but may evolve differently in the two groups if $\bar{r}_k$ and $\bar{r}_{-k}$ are very different from each other. We discuss below situations under which $\bar{r}_k$ and $\bar{r}_{-k}$ may be more or less similar to each other.

4.2 Decision problem

We now analyze an agent's value choice at a given time t. Denote by i the value held by the majority of the agent's group and by j the value experiencing an innovation, where j could be equal or different from i. An agent born with value x in group k, after drawing variables p and r, decides which value x' to adopt by maximizing the following discrete choice problem:

$$u(x,k) = \max_{x' \in \{j,i,x\}} \left\{ I(x), I(i)\frac{1+I(x)\gamma}{p} s_k^i, I(j)\frac{1}{r} s_k^j \right\} \tag{1}$$

where

$$I(x) = \begin{cases} 1 & \text{if } x' = x \\ 0 & \text{otherwise} \end{cases}$$

$$I(i) = \begin{cases} 1 & \text{if } x' = i \\ 0 & \text{otherwise} \end{cases}$$

$$I(j) = \begin{cases} 1 & \text{if } x' = j \\ 0 & \text{otherwise} \end{cases}$$

To give an example, consider someone born with the majority value in a society where there is a cultural innovation to the minority value. If she holds on to her majority value, she will get a utility equal to $\max\left\{\frac{1+\gamma}{p} s_k^i, 1\right\}$, whereas if she switches to the innovating value she will get utility $\frac{1}{r} s_k^j$.

Laws of motion. Since individuals do not always keep the value they are born with, we denote by $z_k^i(t)$ the share of people of group k born in period t with innate value i and by $s_k^i(t)$ the share of people of group k with value i after solving the discrete choice problem. Our assumption on the imperfect vertical transmission of values between a parent and a child implies that

$$z_k^i(t+1) = \alpha s_k^i(t) + (1-\alpha)(1 - s_k^i(t)) = (2\alpha - 1) s_k^i(t) + (1-\alpha) \tag{2}$$

Of course if $\alpha = 1$, vertical transmission is perfect so that $z_k^i(t+1) = s_k^i(t)$.

To derive the laws of motion that determine cultural evolution, we solve the discrete choice problem (1), assuming that the random draws of p and r are independent. We start by analyzing the case where the innovation occurs to the minority value $-i$. Depending on their draws of p and r, agents of group k born with value $-i$ may want to switch to value i. Similarly, agents of group k born with value i may prefer value $-i$. In Theoretical Appendix A, we show that the *ex ante* probability that an individual of group k born in period $t+1$ with value $-i$ prefers value i is $\bar{p}s_k^i(t+1) - \frac{1}{2}\bar{p}\bar{r}_k s_k^i(t+1)(1 - s_k^i(t+1))$. Because of the law of large numbers, this is the same as the share of agents of group k born with value $-i$ that switch to value i. As for individuals of group k born in period $t+1$ with value i, the share that prefers to switch to value $-i$ is $\bar{r}_k(1 - s_k^i(t+1)) - \frac{1}{2}\bar{p}\bar{r}_k(1+\gamma)s_k^i(t+1)(1 - s_k^i(t+1))$. These results yield the following law of motion for the share of the population holding value i when the innovation occurs to value $-i$:

$$\begin{aligned} s_k^i(t+1) &= z_k^i(t+1) + \bar{p}s_k^i(t+1)(1 - z_k^i(t+1)) - \bar{r}_k(1 - s_k^i(t+1))z_k^i(t+1) \\ &\quad + \frac{1}{2}\bar{r}_k\bar{p}s_k^i(t+1)(1 - s_k^i(t+1))((1+\gamma)z_k^i(t+1) - (1 - z_k^i(t+1))) \text{ if } j = -i \end{aligned} \quad (3)$$

Next we turn to the case where the innovation occurs to the majority value i. The share of individuals of group k born in period $t+1$ with value $-i$ who prefer to switch to value i can be shown to be $\bar{p}s_i^k(t+1) + \bar{r}_k s_i^k(t+1) - \bar{r}_k\bar{p}(s_i^k(t+1))^2$. The law of motion for the share of people holding value i when the innovation occurs to value i then becomes:

$$\begin{aligned} s_k^i(t+1) &= z_k^i(t+1) + \bar{p}s_k^i(t+1)(1 - z_k^i(t+1)) + \bar{r}_k s_k^i(t+1)(1 - z_k^i(t+1)) \\ &\quad - \bar{r}_k\bar{p}(s_k^i(t+1))^2(1 - z_k^i(t+1)) \text{ if } j = i \end{aligned} \quad (4)$$

The above two laws of motion are difference equations that describe the evolution of the majority value. Of course, the two laws of motion of the minority value are the complements of the laws of motion of the majority value. The laws of motion of the other group $-k$ can be written down by analogy. Theoretical Appendix A gives further details. Note that if no one is sensitive to cultural innovations (i.e. $\bar{r}_k = 0$), or if there is no conformism ($\bar{p} = 0$), then these difference equations simplify considerably and become linear.

Choice of identity trait. Until now we have assumed that agents cannot choose their identity trait. Of course, for some identity cleavages (e.g., party ID) an individual can freely choose identity trait k or $-k$. In that case, at a given time t, the discrete choice problem of an agent born with

value x becomes

$$u(x) = \max\{u(x,k), u(x,-k)\} \tag{5}$$

where $u(x,k)$ and $u(x,-k)$ are the outcomes of maximization problem (1) for an agent who, respectively, chooses identity trait k and $-k$. We postpone the discussion of the laws of motion under this scenario until Proposition 3.

4.3 Patterns of Cultural Evolution

In this section, we analyze different patterns of cultural evolution generated by our model. In doing so, we focus on the cases that are most relevant to our empirical analysis.

Conformism. We start by exploring a society with no diffusion of cultural innovation and with no choice of identity traits. We are interested in understanding how the steady-state value shares, and hence CF and F_{ST}, depend on the intensity of vertical transmission and the intensity of conformism. As we will now see, the results depend crucially on whether the majority value is the same across groups or not.

Proposition 1: Conformism. *Consider a society with no diffusion of cultural innovations (i.e.* $\bar{r}_k = 0$*). Then, in steady state:*

1. *The majority share in each group is weakly increasing in the strength of vertical transmission* (α) *and conformism* ($\bar{p}$)*;*

2. *If the majority value is the same in both groups,* F_{ST} *is zero and* CF *is weakly decreasing in the strength of vertical transmission and conformism;*

3. *If the majority value is different in both groups,* F_{ST} *is weakly increasing in the strength of vertical transmission and conformism, and* CF *is maximized (and equal to* 0.5*).*

Proof. See Theoretical Appendix B.

This proposition is intuitive. The steady-state share of the majority value is increasing in the pressure to conform ($\bar{p}$) and in the strength of the intergenerational vertical transmission of values (α). With stronger pressure to conform, individuals have a greater incentive to switch to the majority value. As a result, the steady-state majority share becomes larger. With stronger intergenerational transmission of values, the constraint on how high the majority share can become

is weakened. Taken together, there is less intra-group heterogeneity when $\bar{p}$ is larger and/or α is larger.

By increasing the steady-state share of the majority value, larger values for $\bar{p}$ and α reduce within-group cultural fractionalization. If both groups conform to the same majority value, this also reduces overall cultural fractionalization. Since, in that case, there are no differences between groups, F_{ST} is zero in steady state. If the two groups conform to different majority values, then a higher α and/or a higher $\bar{p}$ leave the society's overall cultural fractionalization unchanged, because the two groups are assumed to be of equal size. In this case, the cleavage between groups deepens, thus increasing F_{ST}.

How can we extend this discussion to a consideration of between-group conformism? Individuals from one group may be sensitive to the majority value of the other group. Of course, the importance of this force would depend on the importance of interactions between groups. For example, if the intensity of interactions between groups declines, individuals become less sensitive to the majority view of the other group. If the majority values differ across groups, then in our interpretation becoming less sensitive to the other group is akin to becoming more sensitive to one's own group. This translates into an increase in $\bar{p}$, and hence a higher F_{ST}. If, on the other hand, the majority value is the same across groups, then allowing for inter-group conformism does not affect the steady-state cultural divide, since F_{ST} remains zero.

Proposition 1 has a simple corollary which states that if an exogenous shock switches the majority value of one of the groups, the cultural divide between groups will increase.

Corollary 1: Switching of Majority Values. *Consider a society with no diffusion of cultural innovations. Starting off in a steady state where both groups conform to the same majority value, assume the value of the majority switches in one of the two groups. In that case, society converges to a new steady state with higher F_{ST} and higher CF.*

This result is immediate. If initially both groups have the same majority value, their steady-state value shares are identical, so that F_{ST} is zero. Consider a shock that turns the majority value of one of the groups into the minority value. Irrespective of the magnitude of this initial shock, the steady-state value shares of that group will switch. For instance, if the two values had shares of $0.2 - 0.8$ in both groups, these now switch to $0.8 - 0.2$ in one of the two groups. As a result, the steady-state *aggregate* value shares are $1/2$, so CF is maximized. Given that both groups now conform to different majority values, there is a growing divide between groups, so F_{ST} increases.

This result can be applied to a situation where shifting circumstances disrupt the existing consensus enough to make the majority view change in one of the groups.

Cultural innovations. We now turn to analyzing the diffusion of cultural innovations, while still assuming that individuals cannot choose their identity trait. We focus on a situation in which both groups start off holding the same majority value and where the innovation affects the minority value.[13]

Proposition 2: Diffusion of Cultural Innovations. *Starting from a situation in which both groups have the same majority value and the same majority share, suppose an innovation occurs to the minority value.*

1. *If conformism is sufficiently weak and diffusion is sufficiently strong, the majority value switches in both groups. During the transition, CF exhibits a hump-shaped path.*

2. *If conformism is sufficiently strong and diffusion is sufficiently weak, the majority value stays the same in both groups. During the transition, CF increases.*

Proof. See Theoretical Appendix B.

Once again, this proposition is intuitive. If diffusion is strong, and hence $\bar{r}_k$ and $\bar{r}_{-k}$ are high, individuals have a strong propensity to adopt innovations. Fads diffuse easily, and eventually take over, becoming the new majority norm. As the original consensus breaks down, there is initially growing disagreement between individuals. However, as the old majority norm is replaced by a new majority norm, agreement between individuals once again increases. This translates into a hump-shaped transition path for cultural fractionalization. If cultural diffusion is weak in both groups, the cultural innovation increases CF. In both cases, if the strength of diffusion of a particular cultural innovation differs across groups, this will lead to a growing divide across groups since the steady state shares of each value will be different across groups, and F_{ST} will rise.

How can this proposition inform our understanding of inter-group cultural diffusion? In our model, the innovation affects the same value in both groups. However, the adoption pattern may

[13] In practice, for many memes, the majority value is the same across groups, so focusing on the case where both groups have the same majority value is reasonable. Theoretical Appendix B analyzes what happens if initially both groups hold different majority values. As for the cultural innovation, the more interesting case is when it occurs to the minority value. If, instead, it occurs to the majority value, then it simply reinforces the share of people holding the majority view.

be different in the two groups, to the extent that $\bar{r}_k$ and $\bar{r}_{-k}$ are different. For instance, if $\bar{r}_k$ is low and $\bar{r}_{-k}$ is high, then group k will be much less sensitive to the innovation than group $-k$. If interactions between groups are frequent and intense, the sensitivity to cultural innovations in the two groups is likely to be more similar.[14] Hence we can interpret differences between $\bar{r}_k$ and $\bar{r}_{-k}$ as having effects on cultural diversity akin to those of interactions between groups. If $\bar{r}_k$ and $\bar{r}_{-k}$ are the same, cultural innovations are adopted to the same degree in both groups, leaving F_{ST} unchanged. Correspondingly, if the intensity of intra-group diffusion is different across groups, a cultural innovation will lead to a growing divide between groups. These insights are summarized in the following corollary.

Corollary 2: Differences in Intra-group Diffusion. *Starting off in a steady state where $\bar{r}_k$ and $\bar{r}_{-k}$ are different, if this difference becomes smaller, then F_{ST} falls.*

Choice of identity trait. We now let individuals choose their identity trait. Consider an individual born with the minority value in her identity group. In addition to holding on to the minority value in her group or adopting the majority value of her group, she now has one more option: she can also switch identity groups. This may be an attractive option if she is a conformist *and* her value is held by the majority in the other identity group. The following proposition summarizes this insight.

Proposition 3: Choice of Identity Trait. *In a society with no diffusion of cultural innovations where the majority value of one group is the minority value of the other, then as long as the majority shares are smaller than one,*

1. *F_{ST} is larger if individuals can choose their identity trait than if individuals cannot choose their identity trait;*

2. *The greater the degree of conformism, the larger the difference in F_{ST} between a situation where individuals can choose their identity trait and one where they cannot.*

Proof. See Theoretical Appendix B.

This proposition says that the cultural divide between groups increases if individuals can freely choose their identity trait. Moreover, the increase in the cultural divide is larger if within-group

[14] By interactions we mean communication, contact and cooperative exchange between groups, not unlike the meaning of "contact" in Intergroup Contact Theory in social psychology (Allport, 1954).

conformism is stronger. The intuition for these two results is straightforward. Take an individual who holds the minority value in the group she is born into. If it is costless to switch groups, then she would rather change to the group where her innate value is held by the majority, as opposed to changing her value. That is, if changing identity trait is free, then it is better to change identity trait than to change value. This leads to sorting of values along identity traits, and hence to a rising cultural divide between groups. The average payoff from sorting into the identity trait where one's innate value is held by the majority is especially high if within-group conformism is strong. Hence, the incentive to sort on the majority value is greater in societies where people care a lot about conforming to the group.

4.4 Interpretation of Empirical Findings

We now use our conceptual framework to interpret our empirical findings. In doing so, we are not providing a test of our conceptual framework. Rather, we are using the model as a lens through which to interpret the patterns observed in the data. We start by looking at how the dynamics of F_{ST} depend on the type of identity cleavage, and we then turn to analyzing the dynamics of both CF and F_{ST} for different question categories.

4.4.1 Cultural Evolution across Cleavages

Our empirical analysis documents that on average F_{ST} displayed a U-shaped pattern between 1972 and 2016, declining from the early 1970s until the late 1990s, and increasing since the early 2000s. Underlying this average pattern there is substantial heterogeneity across identity cleavages. Starting in the late 1990s and accelerating in the mid-2000s, we see important increases in F_{ST} for Party ID and for religion, and to a weaker extent for ethnicity. Other cleavages display a flatter or mildly increasing pattern for F_{ST} since the late 1990s. These include family income, education and race. Some cleavages exhibit no significant change in F_{ST} in the later period: age, gender, urbanicity, region and work status.

Here, we seek to explain these differences in the dynamics of F_{ST} across cleavages. How do model parameters relate to the evolution of the cultural divide? In the context of our conceptual framework, the main parameters of interest are the level of $\bar{p}$ and the difference between $\bar{r}_k$ and $\bar{r}_{-k}$. An increase in $\bar{p}$ can be interpreted as either a strengthening of intra-group conformism or a weakening of inter-group conformism. According to Proposition 1, this would lead to an increase in F_{ST}. The intuition is as follows: in a society where the majority values differ across groups, an

increase in $\bar{p}$ implies a stronger tendency to conforming towards the own-group norm, and hence a weaker sensitivity towards the views of the other group. In the case where the majority value is the same in both group, an increase in $\bar{p}$ has no effect on F_{ST}. Therefore, on average a higher $\bar{p}$ implies a deepening divide, and greater fixation of values on identity traits. An increase in the difference between $\bar{r}_k$ and $\bar{r}_{-k}$ can be interpreted as a weakening of the inter-group diffusion of cultural innovations. According to Corollary 2, this would also lead to an increase in F_{ST}. The intuition is, once again, easy to understand. If there is less inter-group diffusion of innovations, then the adoption of innovations is more likely to occur with different intensities across groups, leading to a deepening divide.

Within-group and between-group interactions. The environment in which individuals interact with each other affects the level of $\bar{p}$ and the difference between $\bar{r}_k$ and $\bar{r}_{-k}$, i.e. whether social influence occurs mostly within groups or also between groups. In this context, the rise of new forms of communication in the late 1990s and early 2000s may have led to differential changes in our model's main parameters depending upon the specific cleavage under consideration.

We start by discussing under which conditions these new technologies might have facilitated the creation of echo chambers that favor within-group interactions relative to between-group interactions. For modern technologies to have such echo chamber effects, one of two conditions must hold. They must allow individuals with a certain identity trait who previously lacked contact with others with the same identity to deepen their interaction, or they must allow individuals with different identity traits who previously had frequent contact to isolate themselves with people of their own identity. These conditions do not apply to all identity cleavages. For example, in the case of the urban-rural identity cleavage, individuals in urban areas already mainly interacted with other individuals in urban areas before the advent of the modern technologies such as the internet. The same is true for group identity based on the region where individuals reside. For both the rural-urban identity cleavage and the regional identity cleavage, modern communication technologies would therefore not have much scope to enhance group-specific echo chambers, simply because groups defined by these cleavages were already living in echo chambers to start with.

Another example of an identity cleavage where we would not expect new technologies to have an important impact is the gender cleavage. Individuals of a particular gender do not live isolated from others of the same gender. For example, women do not need the internet to have frequent interaction with other women. In that sense, the gender cleavage is similar to the urban-rural

cleavage in that it does not satisfy the first condition for modern media to have a group-specific echo chamber effect. Of course, one could argue that social media allows people of a certain gender to isolate themselves more from those of a different gender. However, given how much people of different genders interact with each other on a day to day basis, it is unlikely that the internet can make women and men more isolated from each other. In that sense, the gender cleavage does not satisfy the second condition for modern communication technology to have a group-specific echo chamber effect. The same is true for the age cleavage, but perhaps to a lesser extent because people of different ages do not necessarily live together and interact to the same degree that men and women do.

For other cleavages, such as party ID, religion, family income, work status, education and race, arguably the conditions above hold, at least to some extent. In these cases, people with different identity traits are neither totally isolated from each other, nor interacting intensively. Hence, for these identity cleavages, modern communication technologies have the potential to create group-specific echo chambers, by facilitating interactions within groups. In our model, this corresponds to a higher $\bar{p}$ or a bigger difference between $\bar{r}_k$ and $\bar{r}_{-k}$, and thus a rising F_{ST}.

Summarizing, we can classify the 11 identity cleavages into two categories along the echo chamber effect dimension. Four identity cleavages have little scope for group-specific echo chamber effects (urbanicity, region, gender and age), whereas all the other identity cleavages have more scope for group-specific echo chamber effects. An increase in F_{ST} would only be prominent for the latter identity cleavages for which modern communication technologies either allows individuals with the same traits to connect or permits individuals with different traits to disconnect. Consistent with our discussion, we should therefore *not* see a rise in F_{ST} for cleavages such as urbanicity, region, gender, and possibly age. In contrast, there is potential for an increasing level of F_{ST} for all other identity cleavages: party ID, religion, family income, work status, education, ethnicity and race.

Choice of identity traits. For identity cleavages with scope for an echo chamber effect (party ID, religion, family income, work status, education, ethnicity and race), Proposition 3 suggests that we should expect the effect to be particularly important for cleavages along which individuals can freely choose their trait. For example, individuals can choose their party ID. The payoff from changing party ID in order to align individual values with those of the majority is greater if within-group conformism is stronger (i.e. when $\bar{p}$ is higher). By introducing a complementarity between within-group echo chambers and sorting, this increases the fixation of party ID on values. In

contrast, individuals can typically not choose their race. Although internet and social media make it easier for isolated individuals of a certain race to interact with others of the same race, it does not increase the sorting of races on particular values. Hence, fixation on race does not further increase.

An additional observation stems from the ability to directly sort into groups on the basis of cultural values: the increasing alignment between values and traits such as party ID implies that the distinction between identity traits and values could become more blurred. In that sense, some group-specific echo chambers are not unlike value-specific echo chambers. For example, Republican-leaning media increasingly coincide with media promoting conservative values, and vice versa.

If the emergence of new forms of media facilitate sorting on values rather than on identity traits, then the cultural divide on some identity cleavages may actually fall. For instance, conservative members of different racial groups may have an easier time finding each other on social media. If so, this might lead to a narrowing cultural divide between races. This observation suggests that the dynamics of the cultural divide across different cleavages may need to be considered jointly. In the example above, if individuals of different races are increasingly sorting on values, this may to some extent be equivalent to increasingly sorting on party ID. In that case, the drop in the cultural divide across races would coincide with a rise in the cultural divide across party ID.

Dynamics of F_{ST} across identity cleavages. In terms of how the internet, social media and cable TV news are expected to affect the cultural divide across different identity cleavages, the above discussion suggests that two dimensions matter: the scope of the echo chambers effect, and the ease of sorting into identity trait. Figure 6 shows this graphically in a two-dimensional matrix. We can distinguish between three categories of identity cleavages.

A first category consists of identity cleavages for which there is little scope for an echo chamber effect: age, gender, region and urbanicity. In the absence of an echo chamber effect, being able to choose one's identity trait is irrelevant in the sense that modern media does not further reinforce sorting. That is, the complementarity between echo chambers and sorting is inoperative when there is no echo chamber effect. For the identity traits in the left half of Figure 6 we would therefore expect no increase in F_{ST}. A second category consists of identity cleavages with scope for an echo chamber effect, but identity traits cannot be freely chosen: ethnicity, race, and to a lesser extent, family income, work status and education. For the identity cleavages in the bottom-right quadrant of Figure 6 we would therefore expect the introduction of modern media to have a moderately positive effect on F_{ST}. A third class consists of identity cleavages with echo chamber effects for

which the complementarity between echo chambers and sorting is at work: party ID, and to a lesser extent, religion. For the identity cleavages in the top-right quadrant of Figure 6 our conceptual framework therefore predicts an increase in F_{ST} following the introduction of modern media.

These theoretical predictions are largely consistent with the empirical patterns seen after the introduction of modern media and communication technologies. Since the **late 1990s**, fixation is **mostly flat** for age, gender, region and urbanicity; it is mildly increasing for ethnicity, race, income, work status and education; and it strongly increasing for religion and party ID.

4.4.2 Cultural Evolution across Question Categories

There is substantial heterogeneity in cultural evolution, not just across identity cleavages, but also across question categories and within question categories. In what follows we start by focusing on two question categories that exhibit a fairly homogeneous pattern across questions.

Crime. The first of these categories are questions related to crime. In 69% of questions pertaining to crime CF exhibits either a U-shaped or an increasing pattern over time. For the subset of crime questions for which F_{ST} is not flat, 67% display a U-shaped or an increasing F_{ST} path. What might account for the U-shaped pattern in CF and F_{ST} for many of the crime questions? One obvious candidate is the evolution of the violent crime rate and the property crime rate, both of which peaked in 1991. There are many explanations for the decline in crime rates since then. They include more and better policing, mass incarceration, the end of the crack epidemic, the introduction of legalized abortion, and the decline in lead exposure, among others.

To see how the rapid decline in crime rates might have changed people's attitudes towards crime issues, it is useful to focus on a particular example. Take, for instance, the question in the GSS that asks respondents whether courts deal too harshly or not harshly enough with criminals. In 1991, of those surveyed by the GSS, 16 answered courts were dealing too harshly with criminals, compared to $1,202$ who said courts were not harsh enough. By 2016, those numbers had changed to 513 and $1,578$, respectively. There are two ways of interpreting these numbers in light of the precipitous drop in crime rates. If the driving force in the decline in crime is a harsher judicial system, this change in policy may push more people to believe the courts are too harsh. Under this interpretation, people are not changing their preferences about how harsh the courts should be, but given that the courts have become harsher, fewer people now believe the courts are not harsh enough. As a result, we would see CF increase. If, instead, the driving force in the decline

in crime is unrelated to the judicial system, then people may change their preferences about how harsh the courts should be given that crime rates are lower. In our model we would view this as a cultural innovation that increases the minority view that courts are too harsh. In other words, there is an innovation to the minority value. Through the parameter $\bar{r}_k$, this leads to a changing cultural consensus in the direction of a growing minority believing that courts are too harsh. In that case, cultural heterogeneity increases, since the overall consensus that courts are not harsh enough is waning. Hence, according to Proposition 2, we should expect CF to increase, because of a cultural innovation to the minority value.

At the same time, the view on crime has become more divisive across identity groups. Going back to the question on the harshness of courts, consider the changing racial divide. In 1991, there was a broad consensus across racial groups: only 3% of whites and 12% of blacks answered that courts were not treating criminals harshly enough. By 2016, these shares had increased to 16% and 38%, respectively. One way of interpreting these facts is that whites have a lower $\bar{r}_k$ for this particular value than blacks. The sensitivity of each group to the cultural innovation differs, because different groups may be affected differently by, say, the increase in mass incarceration. Consistent with Proposition 2, if $\bar{r}_k$ differs from $\bar{r}_{-k}$, the divide between groups increases when an innovation occurs, and F_{ST} increases.

Another interesting question in the crime category relates to the legality of marijuana use. Between 1972 and the early 1990s there was a growing consensus that it should be illegal, reaching a maximum of 83% in favor of keeping it illegal in 1990. Since then, the consensus has completely shifted, and by 2016 only 39% were still in favor of keeping marijuana illegal. As with the question on the harshness of courts, this would lead to an increase in CF since the early 1990s. In terms of F_{ST}, here as well the susceptibility to the innovation differs across groups. For example, blacks were less in favor of legalization than whites in 1990; this had switched by 2016.

These examples illustrate that when circumstances change, in a way that affects different groups differently, the pre-existing consensus may weaken (showing up as increasing cultural heterogeneity) and there may be growing divides across identity groups (showing up as growing fixation). Looking ahead, whether in the long run the pre-existing consensus is replaced by a new consensus or whether the new steady state is a lack of consensus will depend on the specific question. For example, in the case of marijuana the growing majority in favor of legalization is such that in recent years CF has started to decline, suggesting that a new consensus might be emerging. Indeed, when the old

consensus is replaced by a new consensus, Proposition 2 predicts a hump-shaped path for CF.

Free speech. The second category of questions where we see homogeneous patterns is the one related to freedom of speech. For 78% of those questions CF exhibits a decreasing pattern over time. And for the subset of free speech questions for which F_{ST} is not flat, 65% display a decreasing F_{ST} path. As an example, consider the question whether an atheist should be allowed to make a speech against religion in your community. In 1972, 62% of those surveyed answered positively; by 2016, this percentage had increased to 80%. This points to a long-term growing consensus in favor of free speech, thus leading to a falling CF over time. In general, this increasing agreement happened across all groups. As an illustration, consider how the question on free speech for an atheist changed across the rural-urban divide. In 1972, 80% of those living in locations of more than 1 million favored free speech for atheists, compared to 58% of those living in locations of fewer than $10,000$. In 2016, those numbers were 80% and 78%, respectively. Hence, for this particular question on free speech, the rural-urban divide all but disappeared. As a result, in this case F_{ST} converged to a number very close to zero.

In the context of our model, this can be viewed as the diffusion of a cultural value across groups. The end of McCarthyism, the civil rights movement, and the increasing level of education might have led to a renewed commitment to the First Amendment. Not all groups took this change on board simultaneously, but eventually it diffused to all groups. This led to a decrease in the difference between $\bar{r}_k$ and $\bar{r}_{-k}$. According to Corollary 2, this should lead to a decrease in F_{ST}. This is an example of cultural convergence. Why do some changing values diffuse across groups and others do not? One reason is that the issue at stake may affect different groups very differently. For example, the harshness of courts may affect African Americans differently from Whites, whereas the issue of free speech does not have a strong racial element.

Same-sex relations. Within question categories, some specific questions exhibit strong dynamics that are worth highlighting in the context of our model. For example, the percentage of people answering that homosexual relations were always wrong peaked at the end of the eighties, with 78% in 1987; by 2016, that figure had gone down to 39%. The decline was especially rapid in the early 1990s. Between two consecutive GSS waves, 1991 and 1993, the percentage dropped by nearly 10 percentage points. This increasing tolerance towards same-sex relations translated into an increasing CF. This is consistent with Proposition 2: as the original consensus disintegrates, we

initially see rising disagreement in society, and hence an increase in CF. This has happened across groups, but not at the same rate. Compare locations below $10,000$ inhabitants to those above 1 million. In 1990, the share answering homosexual relations were always wrong was 83% and 78%, respectively. These figures stood at 45% and 35% respectively in 2016. Hence, both saw a drop, but the drop was faster in urban areas. In the context of our model, this is a cultural change going from one consensus to a different consensus, but at differing rates across groups. Thus, F_{ST} increases in the transition.

5 Conclusion

In this paper, we have conducted a systematic analysis of the evolution of cultural heterogeneity in the United States. We sought to assess growing concerns about deepening cultural divides between groups defined along a wide range of identity cleavages. We considered eleven such cleavages, such as race, gender, income quintiles, educational attainment, etc. Using answers to questions on values, attitudes and norms - cultural traits that we refer to as memes, in reference to Dawkins' (1989) terminology - we characterized the time paths of cultural divides. The picture that emerges from this analysis is not one of a generalized deepening of cultural divisions. First, the degree of between-group cultural specificity is very small, as between-goup variation represents between 0.6% (for gender) and 2.4% (education) of total variation: most variation in memes is within groups. Second, we find, on average, a U-shaped pattern for our F_{ST} measure of cultural fixation: on average cultural divisions tended to fall from the early 1970s to the late 1990s, and to rise in the 2000s. In most cases, F_{ST} remains below its earlier peaks. Third, the data does not justify a sweeping conclusion that there are deepening cultural divides. The increase in the 2000s is driven largely by cleavages such as Party ID. Many commentators have focused on the cultural divide across political lines, ignoring trends across other divides and ignoring heterogeneity across memes. Our paper in contrast took a more systematic approach of looking at a wide range of cleavages and memes. This broader approach does not warrant a pessimistic conclusion that the United States is experiencing cultural disintegration. The data suggests a more qualified conclusion that cultural divisions have grown only since the late 1990s, only for some cleavages and only for some memes.

We also provided a theoretical interpretation for the heterogeneity in the dynamics of cultural divides across cleavages and memes. In our model, agents are born with cultural traits inherited with variation from their parents. Social influence then triggers potential changes in these inherited

traits, because agents conform to the majority of their own group and because they respond to cultural fads and innovations: social influence is a major force explaining cultural change. The degree to which cultural change is group specific determines the evolution of cultural divides between goups.

The model suggests that the manner in which agents access information and interact with each other has important effects on the evolution of cultural divisions. If the predominant mode of interaction is between-groups, cultural change will occur in a similar manner across group identities, keeping F_{ST} low. If instead most interactions are within-groups and information is group specific, it becomes more likely that cultural fixation increases as a result of a cultural innovation. For instance, new information technologies such as tailored cable TV channels and online social media can increase the relative importance of within versus between-group social interactions, by creating echo chambers. The dynamics of cultural divides also depend on characteristics of the cultural traits under consideration. For instance, since the mid-1990s, there is an increasing view that the justice system is too harsh on crime, but this change has occurred differentially across races. African-Americans are more likely to find the judicial system too harsh than Whites. In terms of our model, this happens because the susceptibility of each group to this specific cultural innovation is different, creating a growing divide.

Our work can be extended in several directions. First, we have provided a comprehensive analysis of the dynamics of cultural divides across several identity cleavages, but differences in these dynamics warrant a closer analysis of the factors affecting each cleavage. Second, for each cleavage, we have considered all groups jointly, but this may mask interesting patterns for specific group pairs. For instance, the average divide between all races may follow a certain time path, but the specific divide between Hispanics and Whites may follow a different pattern. Third, we have also treated identity cleavages separately but interactions may be relevant: while men and women may not have drifted apart culturally, it is conceivable that African American women could have drifted apart from White men. Our methodology can easily accommodate such extensions, as F_{ST} can be calculated for specific pairs of identity groups, or for groups defined by the intersection of several traits.

Ultimately, we are interested in the evolution of cultural heterogeneity because of its potential effects on social cohesion, social capital and the ability of different groups to reach agreements on public policy. In this paper, we have described the evolution of cultural divides, but the question

of their impact on political economy outcomes such as public goods provision, voting, inequality and economic interactions between groups remains an important topic for future research.

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Theoretical Appendix

A. Derivation of Laws of Motion

We focus on group k and start by solving the case where the innovation occurs to the minority value $-i$. There are two relevant types of agents, those born with value $-i$ and those born with value i. For an individual born with value $-i$ to prefer value i, it must be that the utility of conforming, $\frac{1}{p}s_k^i(t+1)$, is greater than both his default innate utility, 1, and the utility of imitating the innovation, $\frac{1}{r}(1-s_k^i(t+1))$. We can rewrite these two conditions as $p < s_k^i(t+1)$ and $r > p\frac{1-s_k^i(t+1)}{s_k^i(t+1)}$. The area of the parameter space that satisfies these two conditions is $\int_0^{s_k^i(t+1)}(\frac{1}{\bar{r}_k} - p\frac{1-s_k^i(t+1)}{s_k^i(t+1)})dp$. To get the probability that an individual of group k born with value $-i$ prefers to switch to i, we divide this by the total area of the parameter space, $\frac{1}{\bar{p}\bar{r}_k}$. Doing so yields a probability $\bar{p}s_k^i(t+1) - \frac{1}{2}\bar{p}\bar{r}_k s_k^i(t+1)(1-s_k^i(t+1))$. Because of the law of large numbers, this is the same as the share of agents of group k born with value $-i$ that switch to value i. For an individual of group k born with value i to prefer value $-i$, it must be that $\frac{1}{r}(1-s_k^i(t+1)) > 1$ and

$\frac{1}{r}(1-s_k^i(t+1)) > \frac{1+\gamma}{p}s_k^i(t+1)$. The area of the parameter space that satisfies these two conditions is $\int_0^{1-s_k^i(t+1)}(\frac{1}{\bar{p}}-r\frac{(1+\gamma)s_k^i(t+1)}{1-s_k^i(t+1)})dr$. This implies a share $\bar{r}_k(1-s_k^i(t+1))-\frac{1}{2}\bar{p}\bar{r}_k(1+\gamma)s_k^i(t+1)(1-s_k^i(t+1))$ of individuals born with value i who want to switch to value $-i$. These results give us the following law of motion for value i when the innovation occurs to value $-i$:

$$\begin{aligned} s_k^i(t+1) &= z_k^i(t+1)+\bar{p}s_k^i(t+1)(1-z_k^i(t+1))-\bar{r}_k(1-s_k^i(t+1))z_k^i(t+1) \\ &\quad +\frac{1}{2}\bar{r}_k\bar{p}s_k^i(t+1)(1-s_k^i(t+1))((1+\gamma)z_k^i(t+1)-(1-z_k^i(t+1))) \text{ if } j=-i \end{aligned}$$

Next we turn to the case where the innovation occurs to the majority value i. An individual born with value $-i$ prefers to switch to i if either $\frac{1}{p}s_k^i(t+1) > 1$ or $\frac{1}{r}s_k^i(t+1) > 1$. The probability of this occurring is the complement of $p > s_k^i(t+1)$ and $r > s_k^i(t+1)$, which is equal to $1-(1-\bar{p}s_k^i(t+1))(1-\bar{r}_k s_k^i(t+1))$. Simplifying, the share of people with value $-i$ that find it beneficial to switch to value i is equal to $\bar{p}s_k^i(t+1)+\bar{r}_k s_k^i(t+1)-\bar{r}_k\bar{p}(s_k^i(t+1))^2$. The law of motion for value i when the innovation occurs to value i then becomes:

$$\begin{aligned} s_k^i(t+1) &= z_k^i(t+1)+\bar{p}s_k^i(t+1)(1-z_k^i(t+1))+\bar{r}_k s_k^i(t+1)(1-z_k^i(t+1)) \\ &\quad -\bar{r}_k\bar{p}(s_k^i(t+1))^2(1-z_k^i(t+1)) \text{ if } j=i \end{aligned}$$

We can complete the analysis by writing down the two laws of motion of the minority value:

$$\begin{aligned} s_k^{-i}(t+1) &= z_k^{-i}(t+1)-\bar{p}(1-s_k^{-i}(t+1))z_k^{-i}(t+1)+\bar{r}_k s_k^{-i}(t+1)(1-z_k^{-i}(t+1)) \\ &\quad -\frac{1}{2}\bar{r}_k\bar{p}(1-s_k^{-i}(t+1))s_k^{-i}(t+1)((1+\gamma)(1-z_k^{-i}(t+1))-z_k^{-i}(t+1)) \text{ if } j=-i \end{aligned}$$

$$\begin{aligned} s_k^{-i}(t+1) &= z_k^{-i}(t+1)-\bar{p}(1-s_k^{-i}(t+1))z_k^{-i}(t+1)-\bar{r}_k(1-s_k^{-i}(t+1))z_k^{-i}(t+1) \\ &\quad -\bar{r}_k\bar{p}(1-s_k^{-i}(t+1))^2 z_k^{-i}(t+1) \text{ if } j=i \end{aligned}$$

B. Proofs of Propositions

B.1. Proof of Proposition 1

Suppose that in group k the majority value is i. Because $s_k^i(t+1) = z_k^i(t+1)+\bar{p}s_k^i(t+1)(1-z_k^i(t+1))$, we can write $s_k^i(t+1) = z_k^i(t+1)/(1-\bar{p}(1-z_k^i(t+1)))$. Since $s_k^i(t+1)$ is weakly increasing in $\bar{p}$ and is increasing in $z_k^i(t+1)$, and since $z_k^i(t+1)$ is increasing in $s_k^i(t)$ and weakly increasing in α, it follows that for a given level of $s_k^i(t)$, $s_k^i(t+1)$ is weakly increasing in $\bar{p}$ and α. If $\bar{p}=1$ or $\alpha=1$, it is straightforward to see that s_k^i converges to 1. This, together with the previous

statement, implies that the steady state s_k^i is weakly increasing in $\bar{p}$ and α. If the majority value is the same in both groups, then the value shares in both groups converge to the same shares. As a result, in steady state, F_{ST} is zero. CF is equal to $1-(\frac{1}{2}(s_k^i+s_{-k}^i))^2-(1-\frac{1}{2}(s_k^i+s_{-k}^i))^2$. In steady state, if both groups have the same majority shares, CF can be written as $2s^i(1-s^i)$ which is maximized when $s^i=\frac{1}{2}$. Since s_k^i is weakly increasing in α and $\bar{p}$ for $s^i \geq \frac{1}{2}$, it follows that CF is weakly decreasing in α and $\bar{p}$. If the majority value is different in both groups, then in steady state $s_k^i = s_{-k}^{-i}$, so that the aggregate value shares will be equal to $\frac{1}{2}$. As a result, CF will be $\frac{1}{2}$, and group-specific CF is weakly decreasing in α and $\bar{p}$. Hence, F_{ST} will be weakly increasing in α and $\bar{p}$. $\square$

B.2. Proof of Proposition 2

Case 1: Since group k experienced an innovation to value $-i$, with the majority value still being i, we start off with $1 > s_k^i(t) > \frac{1}{2}$. From $z_k^i(t+1) - s_k^i(t) = (1-\alpha)(1-2s_k^i(t))$ it follows that $z_k^i(t+1) < s_k^i(t)$, so $z_k^i(t+1) < 1$. If $\bar{p}_k = 0$ and $\bar{r}_k > 0$, then $s_k^i(t+1)/z_k^i(t+1) = 1-\bar{r}_k(1-s_k^i(t+1)) \leq 1$. In the previous expression, for $s_k^i(t+1)/z_k^i(t+1)$ to be equal to 1, it must be that $s_k^i(t+1) = z_k^i(t+1) = 1$. Since this would contradict $z_k^i(t+1) < 1$, we can conclude that $s_k^i(t+1)/z_k^i(t+1) < 1$, so that $s_k^i(t+1) < z_k^i(t+1)$. By continuity of $s_k^i(t+1)/z_k^i(t+1)$ when $s_k^i(t+1) > \frac{1}{2}$, it follows that if $\bar{p}$ is sufficiently small, $s_k^i(t+1) < z_k^i(t+1)$. Together with $z_k^i(t+1) < s_k^i(t)$, this implies that s_k^i is decreasing over time as long as the original majority value continues to have a share greater than $\frac{1}{2}$. Now consider what happens when the share of the original majority value drops below $\frac{1}{2}$. Following the notation above, we now refer to the original majority value as $-i$. If $\bar{p}=0$ and $\bar{r}_k > 0$, then $s_k^{-i}(t+1)/z_k^{-i}(t+1) = 1-\bar{r}_k(1-s_k^{-i}(t+1)) < 1$, so that $s_k^{-i}(t+1) < z_k^{-i}(t+1)$. Since $z_k^{-i}(t+1) = (2\alpha-1)s_k^{-i}(t) + (1-\alpha)$ and $s_k^{-i}(t) < \frac{1}{2}$, it follows that $z_k^{-i}(t+1) < \frac{1}{2}$, so that $s_k^{-i}(t+1) < \frac{1}{2}$. Hence, if the original majority value has a share below $\frac{1}{2}$, that share remains below $\frac{1}{2}$. Because of continuity of $s_k^{-i}(t+1)/z_k^{-i}(t+1)$ when $s_k^{-i} < \frac{1}{2}$, this conclusion does not change if $\bar{p}$ is sufficiently small. The dynamics for s_k^i when $s_k^i > \frac{1}{2}$ and the dynamics for s_k^{-i} when $s_k^{-i} < \frac{1}{2}$ imply that eventually the share of the original majority value drops below $\frac{1}{2}$. There is no need to describe the dynamics for when $s_k^{-i} = \frac{1}{2}$ as this would never be a stable equilibrium. The value shares in group $-k$ follow similar dynamics. We can therefore conclude that if $\bar{p}$ is sufficiently small and if $\bar{r}_k > 0$ and $\bar{r}_{-k} > 0$, then the majority value switches in both groups. As a result, in both groups CF first goes up (because value shares become more equal as the original majority share gets closer to $\frac{1}{2}$) and then goes down (because value shares become more unequal as the new majority value increases its share above $\frac{1}{2}$). If $\bar{r}_k = \bar{r}_{-k}$, then

the within-group dynamics of CF will be the same in both groups, so that overall CF also first goes up and then down, with F_{ST} remaining equal to zero. If $\bar{r}_k \neq \bar{r}_{-k}$, the two groups converge to different shares, so that F_{ST} goes up.

Case 2: If $\bar{p} > 0$ and $\bar{r}_k = 0$ in group k, then the original steady-state value share of group k remain unchanged. Hence, if the original majority value corresponded to the value that also was the steady-state majority value, this will not change. Since the law of motion is continuous, this result does not change if $\bar{p} > 0$ and $\bar{r}_k$ is sufficiently small. If $\bar{r}_k > 0$ and $\bar{r}_{-k} > 0$, the majority shares become closer to $\frac{1}{2}$ so that CF increases. If $\bar{r}_k$ and $\bar{r}_{-k}$ differ, the two groups will converge to different shares, so that F_{ST} increases, assuming they started off with the same shares. □

B.3. Proof of Proposition 3

Consider an agent holding the minority value $-i$ in group k. After drawing p, he has three options: keep the minority value and remain in group k (payoff 1); switch to the majority value and remain in group k (payoff $\frac{1}{p}s_k^i$); and switch to group $-k$ where his value $-i$ is the majority value (payoff $\max[1, \frac{1+\gamma}{p}s_{-k}^{-i}]$. Because of symmetry, $\frac{1+\gamma}{p}s_{-k}^{-i} = \frac{1+\gamma}{p}s_k^i$. Since $\frac{1+\gamma}{p}s_k^i > \frac{1}{p}s_k^i$, the agent will always prefer the option of keeping his value and switching traits to adopting the majority value without switching traits. Assuming that the default option is to keep his minority value without changing trait, the agent only switches traits when $\frac{1+\gamma}{p}s_k^i > 1$, i.e., when $p < (1+\gamma)s_k^i$. Applying the law of large numbers, a share $\max[(1+\gamma)\bar{p}s_k^i, 1]$ of the population holding value $-i$, $(1 - z_k^i)$, switches to the other group. Because of symmetry, an identical share of the other group switches to group k. As a result, the law of motion of value i in group k is

$$s_k^i(t+1) \quad = \quad \begin{cases} \frac{z_k^i(t+1)}{1-(1+\gamma)\bar{p}(1-z_k^i(t+1))} & \text{if } \bar{p} < \frac{1}{1+\gamma} \\ 1 & \text{otherwise} \end{cases}$$

The proposition is for the case where the majority share does not reach one. For the rest of the proof we therefore focus on the case where $\bar{p} < \frac{1}{1+\gamma}$. Using a similar argument as in Proposition 1, in steady state $s_k^i = s_{-k}^{-i}$, so that the aggregate value shares will be equal to $\frac{1}{2}$. As a result, CF will be $\frac{1}{2}$, and group-specific CF is weakly decreasing in $\bar{p}$ and γ. Hence, F_{ST} will be weakly increasing in $\bar{p}$ and γ. To show that the increase in F_{ST} with $\bar{p}$ is greater in a situation where agents can choose their identity trait compared to a situation where they cannot choose their identity trait, we write down the law of motion of value i in group k when identity traits are given:

$$s_k^{i\prime}(t+1) = \frac{z_k^i(t+1)}{1-(1+\gamma)\bar{p}(1-z_k^i(t+1))}$$

where we have introduced a prime to distinguish with the share when individuals can choose their identity trait. For a given $z_k^i(t+1)$ we can now show that the ratio $s_k^i(t+1)$ to $s_k^{i\prime}(t+1)$ is increasing in $\bar{p}$. The ratio can be written as:

$$\frac{s_k^i(t+1)}{s_k^{i\prime}(t+1)} = \frac{1-\bar{p}(1-z_k^i(t+1))}{1-(1+\gamma)\bar{p}(1-z_k^i(t+1))}$$

The derivative of this ratio with respect to $\bar{p}$ is strictly positive if $\gamma > 0$. Hence, the majority shares diverge more from $\frac{1}{2}$ if $\bar{p}$ is greater. As a result, the increase in F_{ST} is greater when $\bar{p}$ is larger. $\square$

Table 1 – CF by Time Period and F_{ST} by Time Period and Cleavage (2-wave grouping)

Time Period	CF	F_{ST} Age	F_{ST} Educ.	F_{ST} Ethnic	F_{ST} Family income	F_{ST} Gender	F_{ST} Party ID	F_{ST} Race	F_{ST} Region	F_{ST} Religion	F_{ST} Urban	F_{ST} Work Status
1972	0.495	0.025	0.030	0.015	0.020	0.006	0.016	0.012	0.019	0.024	0.015	0.019
1974	0.494	0.025	0.026	0.014	0.017	0.006	0.013	0.009	0.020	0.022	0.016	0.018
1976	0.500	0.024	0.026	0.013	0.017	0.006	0.011	0.009	0.017	0.019	0.012	0.017
1979	0.499	0.023	0.028	0.014	0.018	0.006	0.011	0.010	0.018	0.022	0.013	0.017
1982	0.497	0.020	0.027	0.017	0.020	0.006	0.014	0.015	0.018	0.019	0.013	0.018
1984	0.496	0.022	0.028	0.016	0.018	0.007	0.013	0.010	0.016	0.020	0.011	0.018
1986	0.494	0.020	0.025	0.019	0.020	0.007	0.012	0.015	0.020	0.018	0.011	0.017
1988	0.486	0.021	0.027	0.013	0.018	0.007	0.010	0.008	0.015	0.019	0.010	0.018
1990	0.484	0.017	0.023	0.013	0.016	0.009	0.010	0.009	0.018	0.019	0.011	0.018
1993	0.482	0.017	0.019	0.013	0.015	0.006	0.011	0.009	0.014	0.018	0.009	0.015
1997	0.489	0.015	0.019	0.012	0.014	0.006	0.013	0.009	0.011	0.020	0.009	0.013
2001	0.491	0.015	0.018	0.013	0.017	0.007	0.013	0.011	0.012	0.021	0.008	0.013
2005	0.495	0.012	0.021	0.016	0.018	0.006	0.019	0.015	0.011	0.023	0.009	0.011
2009	0.499	0.014	0.025	0.018	0.019	0.006	0.018	0.012	0.012	0.024	0.009	0.012
2013	0.496	0.013	0.024	0.016	0.019	0.005	0.021	0.012	0.012	0.025	0.008	0.013
2016	0.491	0.013	0.022	0.017	0.017	0.005	0.023	0.013	0.012	0.027	0.010	0.014
Average	**0.493**	**0.018**	**0.024**	**0.015**	**0.018**	**0.006**	**0.014**	**0.011**	**0.015**	**0.021**	**0.011**	**0.016**

Time period refers to 2-wave groupings. So for instance 1972 refers to pooled data over the 1972 and 1973 waves of the GSS.

Table 2- Dynamics of CF and F_{ST}, by Cleavage
(2-wave grouping, 1972-2016, 76 Questions)

	U-shaped	Hump-Shaped	Increasing	Decreasing	Flat
Panel A: CF					
CF	14.47%	13.16%	25.00%	28.95%	18.42%
Panel B: F_{ST}					
Age	11.84%	9.21%	10.53%	31.58%	36.84%
Education	15.79%	3.95%	13.16%	21.05%	46.05%
Ethnicity	14.47%	3.95%	18.42%	10.53%	52.63%
Family Income	5.26%	1.32%	14.47%	22.37%	56.58%
Gender	6.58%	17.11%	11.84%	11.84%	52.63%
Party ID	48.68%	3.95%	6.58%	6.58%	34.21%
Race	14.47%	3.95%	22.37%	14.47%	44.74%
Region	11.84%	1.32%	2.63%	34.21%	50.00%
Religion	34.21%	0.00%	9.21%	14.47%	42.11%
Urbanicity	15.79%	2.63%	5.26%	27.63%	48.68%
Work status	7.89%	11.84%	7.89%	18.42%	53.95%
Panel B Average	**16.99%**	**5.38%**	**11.12%**	**19.38%**	**47.13%**

Note: This Table displays the fraction of questions, among the 76 in our baseline sample, for which CF or FST follows the types of dynamics listed in the first row, i.e. U-shaped, hump shaped, increasing, decreasing or flat. To assess these dynamics, we regress for each question its CF / F_{ST} on a time trend and its square. If both the linear and quadratic terms are statistically significant at the 5% level, and the vertex of the fitted quadratic curve is between 1980 and 2005, we characterize the dynamics as either U-shaped or hump-shaped. In all other cases, we run a linear regression of CF / F_{ST} on a time trend, and classify the dynamics as increasing, decreasing or flat depending on whether the coefficient on the time trend is significantly positive, significantly negative, or insignificant, respectively.

Table 3 - Dynamics of CF, by Question Category and Sub-category
(2-wave grouping, 1972-2016, 76 Questions)

Question Category	Question Sub-category	# of questions	U-shaped	Hump-Shaped	Increasing	Decreasing	Flat
Civil Liberties		**23**	**21.74%**	**17.39%**	**17.39%**	**43.48%**	**0.00%**
	Crime	13	38.46%	7.69%	30.77%	23.08%	0.00%
	Differences & Discrimination	1	0.00%	100.00%	0.00%	0.00%	0.00%
	Free Speech	9	0.00%	22.22%	0.00%	77.78%	0.00%
Current Affairs		**23**	**0.00%**	**4.35%**	**43.48%**	**21.74%**	**30.43%**
	Economic Well-Being	4	0.00%	25.00%	75.00%	0.00%	0.00%
	National Spending	11	0.00%	0.00%	36.36%	18.18%	45.45%
	Social Issues	8	0.00%	0.00%	37.50%	37.50%	25.00%
Gender & Marriage		**14**	**28.57%**	**21.43%**	**21.43%**	**21.43%**	**7.14%**
	Children & Working	2	50.00%	50.00%	0.00%	0.00%	0.00%
	Life Satisfaction	6	33.33%	0.00%	33.33%	16.67%	16.67%
	Marriage	1	0.00%	100.00%	0.00%	0.00%	0.00%
	Sex & Sexual Orientation	5	20.00%	20.00%	20.00%	40.00%	0.00%
Politics		**13**	**15.38%**	**0.00%**	**15.38%**	**23.08%**	**46.15%**
	Confidence & Power	12	16.67%	0.00%	8.33%	25.00%	50.00%
	Political Beliefs	1	0.00%	0.00%	100.00%	0.00%	0.00%
Religion & Spirituality		**3**	**0.00%**	**66.67%**	**0.00%**	**33.33%**	**0.00%**
	Beliefs	1	0.00%	0.00%	0.00%	100.00%	0.00%
	Religious Affiliation & Behaviors	2	0.00%	100.00%	0.00%	0.00%	0.00%

Note: This Table displays the types of dynamics of CF for different categories and subcategories of questions, as defined by the GSS. The types of dynamics are listed in the first row, i.e. U-shaped, hump shaped, increasing, decreasing or flat. To assess these dynamics, we regress for each question its CF on a time trend and its square. If both the linear and quadratic terms are statistically significant at the 5% level, and the vertex of the fitted quadratic curve is between 1980 and 2005, we characterize the dynamics as either U-shaped or hump-shaped. In all other cases, we run a linear regression of CF on a time trend, and classify the dynamics as increasing, decreasing or flat depending on whether the coefficient on the time trend is significantly positive, significantly negative, or insignificant, respectively. We then summarize these dynamics by averaging within question categories / subcategories.

Table 4 - Dynamics of F_{ST}, by Question Category and Sub-category, averaged across 11 cleavages (2-wave grouping, 1972-2016, 76 Questions)

Question Category	Question Sub-category	# of questions	U-shaped	Hump-Shaped	Increasing	Decreasing	Flat
Civil Liberties		**23**	**19.76%**	**5.53%**	**13.83%**	**29.64%**	**31.23%**
	Crime	13	23.78%	6.29%	18.88%	14.69%	36.36%
	Differences & Discrimination	1	9.09%	0.00%	0.00%	18.18%	72.73%
	Free Speech	9	15.15%	5.05%	8.08%	52.53%	19.19%
Current Affairs		**23**	**14.23%**	**5.14%**	**11.46%**	**13.04%**	**56.13%**
	Economic Well-Being	4	2.27%	0.00%	22.73%	13.64%	61.36%
	National Spending	11	12.40%	9.92%	11.57%	14.05%	52.07%
	Social Issues	8	22.73%	1.14%	5.68%	11.36%	59.09%
Gender & Marriage		**14**	**16.23%**	**5.19%**	**11.04%**	**20.13%**	**47.40%**
	Children & Working	2	13.64%	9.09%	0.00%	13.64%	63.64%
	Life Satisfaction	6	4.55%	1.52%	13.64%	28.79%	51.52%
	Marriage	1	0.00%	0.00%	0.00%	0.00%	100.00%
	Sex & Sexual Orientation	5	34.55%	9.09%	14.55%	16.36%	25.45%
Politics		**13**	**17.48%**	**5.59%**	**5.59%**	**9.09%**	**62.24%**
	Confidence & Power	12	15.15%	5.30%	6.06%	8.33%	65.15%
	Political Beliefs	1	45.45%	9.09%	0.00%	18.18%	27.27%
Religion & Spirituality		**3**	**18.18%**	**6.06%**	**12.12%**	**30.30%**	**33.33%**
	Beliefs	1	27.27%	0.00%	9.09%	18.18%	45.45%
	Religious Affiliation & Behaviors	2	13.64%	9.09%	13.64%	36.36%	27.27%

Note: This Table displays the types of dynamics of F_{ST} for different categories and subcategories of questions, as defined by the GSS. The types of dynamics are listed in the first row, i.e. U-shaped, hump shaped, increasing, decreasing or flat. To assess these dynamics, we regress for each question its F_{ST} on a time trend and its square. If both the linear and quadratic terms are statistically significant at the 5% level, and the vertex of the fitted quadratic curve is between 1980 and 2005, we characterize the dynamics as either U-shaped or hump-shaped. In all other cases, we run a linear regression of F_{ST} on a time trend, and classify the dynamics as increasing, decreasing or flat depending on whether the coefficient on the time trend is significantly positive, significantly negative, or insignificant, respectively. We then summarize these dynamics by averaging within question categories / subcategories and across all 11 cleavages.

Table 5 – Regression analysis of the Level of F_{ST}, by cleavage type, by question category and by subcategory, and by time period.

	Categories		Sub-categories	
Panel A - Cleavages				
Age	1.194	(13.56)***	1.194	(13.27)***
Education	1.770	(20.10)***	1.770	(19.66)***
Ethnicity	0.851	(9.67)***	0.851	(9.45)***
Family income	1.127	(12.80)***	1.127	(12.52)***
Gender	(excluded)		(excluded)	
Party ID	0.775	(8.80)***	0.775	(8.61)***
Race	0.475	(5.39)***	0.475	(5.28)***
Region	0.884	(10.04)***	0.884	(9.82)***
Religion	1.477	(16.77)***	1.477	(16.40)***
Urbanicity	0.435	(4.94)***	0.435	(4.84)***
Work status	0.908	(10.31)***	0.908	(10.08)***
Panel B - Categories and sub-categories				
Civil liberties			0.801	(14.11)***
- Crime	1.163	(6.85)***		
- Differences and discrimination	1.424	(6.15)***		
- Free speech	2.488	(14.42)***		
Current affairs			-0.206	(3.63)***
- Economic well being	0.986	(5.39)***		
- National spending	0.552	(3.23)***		
- Social issues	0.721	(4.15)***		
Gender and marriage			(excluded)	
- Marriage	(excluded)			
- Children and working	0.214	(1.07)		
- Life satisfaction	0.815	(4.61)***		
- Sex and sexual orientation	1.434	(8.00)***		
Politics			-0.756	(11.74)***
- Confidence and power	0.084	(0.49)		
- Political beliefs	0.761	(3.29)***		
Religion and spirituality			1.288	(12.10)***
- Beliefs	0.826	(3.57)***		
- Religious affiliation and behaviors	2.858	(14.26)***		

(Continued)

	Categories		Sub-categories	
Panel C - Time Dummies				
1972	(excluded)		(excluded)	
1974	-0.139	(1.31)	-0.139	(1.28)
1976	-0.283	(2.67)***	-0.283	(2.61)***
1979	-0.192	(1.81)*	-0.192	(1.77)*
1982	-0.133	(1.25)	-0.133	(1.23)
1984	-0.200	(1.88)*	-0.200	(1.84)*
1986	-0.155	(1.46)	-0.155	(1.43)
1988	-0.323	(3.04)***	-0.323	(2.97)***
1990	-0.347	(3.26)***	-0.347	(3.19)***
1993	-0.507	(4.77)***	-0.507	(4.67)***
1997	-0.544	(5.12)***	-0.544	(5.01)***
2001	-0.479	(4.51)***	-0.479	(4.41)***
2005	-0.361	(3.40)***	-0.361	(3.32)***
2009	-0.289	(2.72)***	-0.289	(2.66)***
2013	-0.290	(2.73)***	-0.290	(2.67)***
2016	-0.252	(2.37)**	-0.252	(2.32)**
Intercept	-0.064	(0.34)	0.829	(7.83)***
R^2	0.15		0.11	
Number of observations	13,376		13,376	

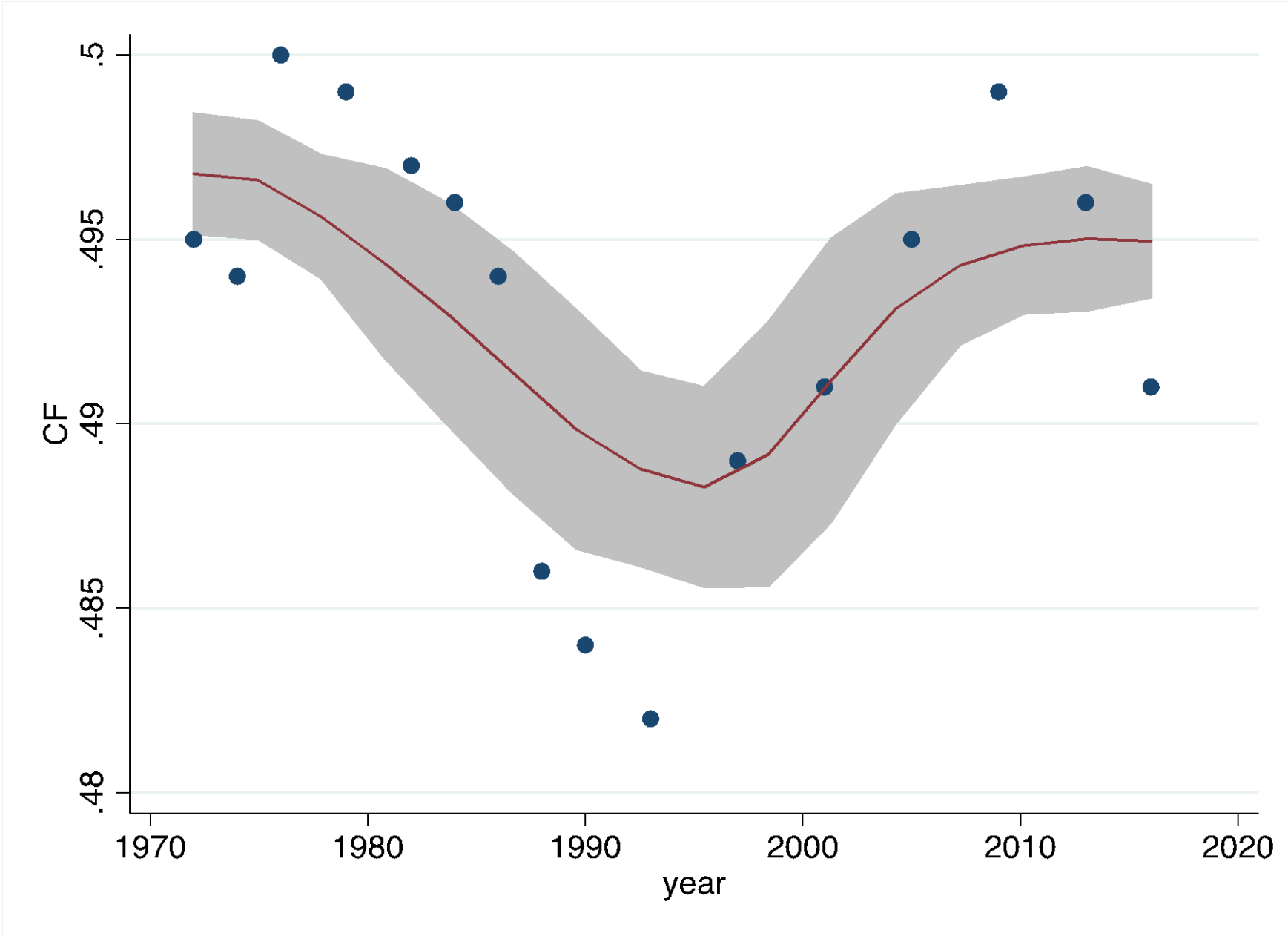
* $p<0.1$; ** $p<0.05$; *** $p<0.01$; t-statistics in parentheses; F_{ST} multiplied by 100 to improve readability. Time dummies refers to 2-wave groupings. So for instance 1972 refers to pooled data over the 1972 and 1973 waves of the GSS, and the dummy takes on a value of 1 if the F_{ST} measure is computed using these underlying waves, and zero otherwise.

Table 6 – Overall or Partial R^2, Over Time

Time Period	R^2 Overall	Age	Educ.	Ethnic	Family Income	Gender	Party ID	Race	Region	Religion	Urban	Work Status
1972	0.155	0.013	0.013	0.006	0.011	0.003	0.010	0.003	0.014	0.014	0.007	0.007
1974	0.141	0.012	0.010	0.007	0.009	0.003	0.008	0.002	0.012	0.013	0.007	0.006
1976	0.132	0.012	0.011	0.005	0.009	0.004	0.007	0.003	0.011	0.011	0.007	0.006
1979	0.136	0.012	0.011	0.004	0.010	0.004	0.008	0.002	0.011	0.013	0.007	0.005
1982	0.135	0.011	0.011	0.006	0.009	0.004	0.008	0.003	0.011	0.011	0.006	0.006
1984	0.140	0.011	0.014	0.008	0.010	0.005	0.011	0.002	0.013	0.012	0.005	0.007
1986	0.136	0.010	0.011	0.008	0.010	0.005	0.010	0.002	0.011	0.011	0.005	0.006
1988	0.134	0.010	0.013	0.006	0.011	0.005	0.011	0.002	0.011	0.010	0.005	0.007
1990	0.134	0.010	0.012	0.006	0.010	0.006	0.010	0.002	0.013	0.010	0.006	0.006
1993	0.118	0.009	0.010	0.005	0.010	0.005	0.010	0.002	0.008	0.011	0.005	0.005
1997	0.114	0.008	0.011	0.004	0.008	0.004	0.010	0.002	0.006	0.013	0.004	0.004
2001	0.122	0.007	0.010	0.005	0.010	0.005	0.010	0.002	0.008	0.014	0.005	0.005
2005	0.133	0.007	0.009	0.004	0.010	0.004	0.017	0.002	0.008	0.014	0.005	0.004
2009	0.135	0.007	0.011	0.006	0.009	0.005	0.014	0.002	0.008	0.016	0.005	0.006
2013	0.136	0.007	0.011	0.005	0.009	0.004	0.016	0.002	0.007	0.015	0.005	0.005
2016	0.151	0.008	0.012	0.008	0.010	0.004	0.020	0.003	0.008	0.019	0.005	0.007
Average	**0.135**	**0.010**	**0.011**	**0.006**	**0.010**	**0.004**	**0.011**	**0.002**	**0.010**	**0.013**	**0.006**	**0.006**

Time period refers to 2-wave groupings. So for instance 1972 refers to pooled data over the 1972 and 1973 waves of the GSS.

Figure 1 – CF over Time (76 questions, 2-wave grouping)



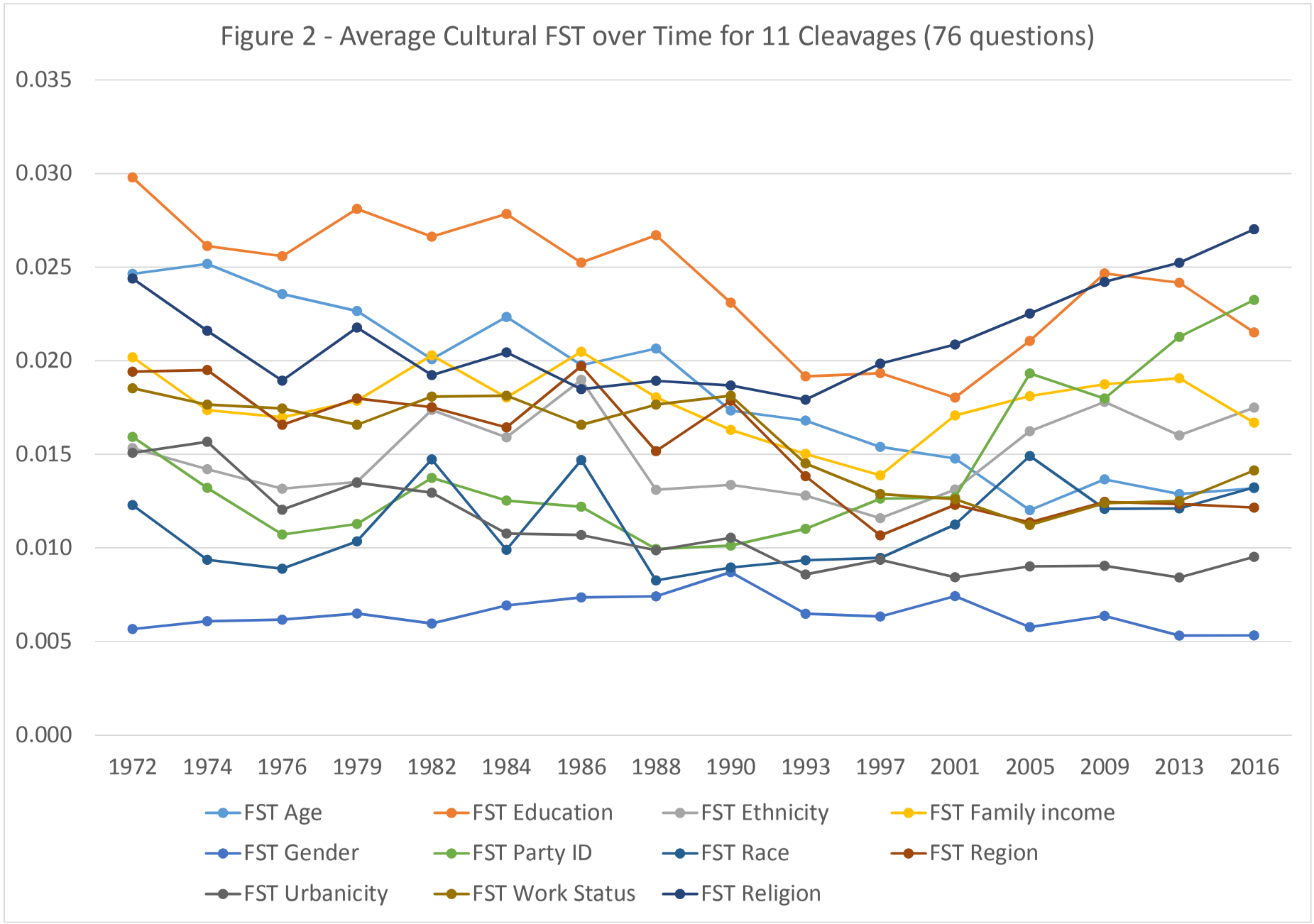
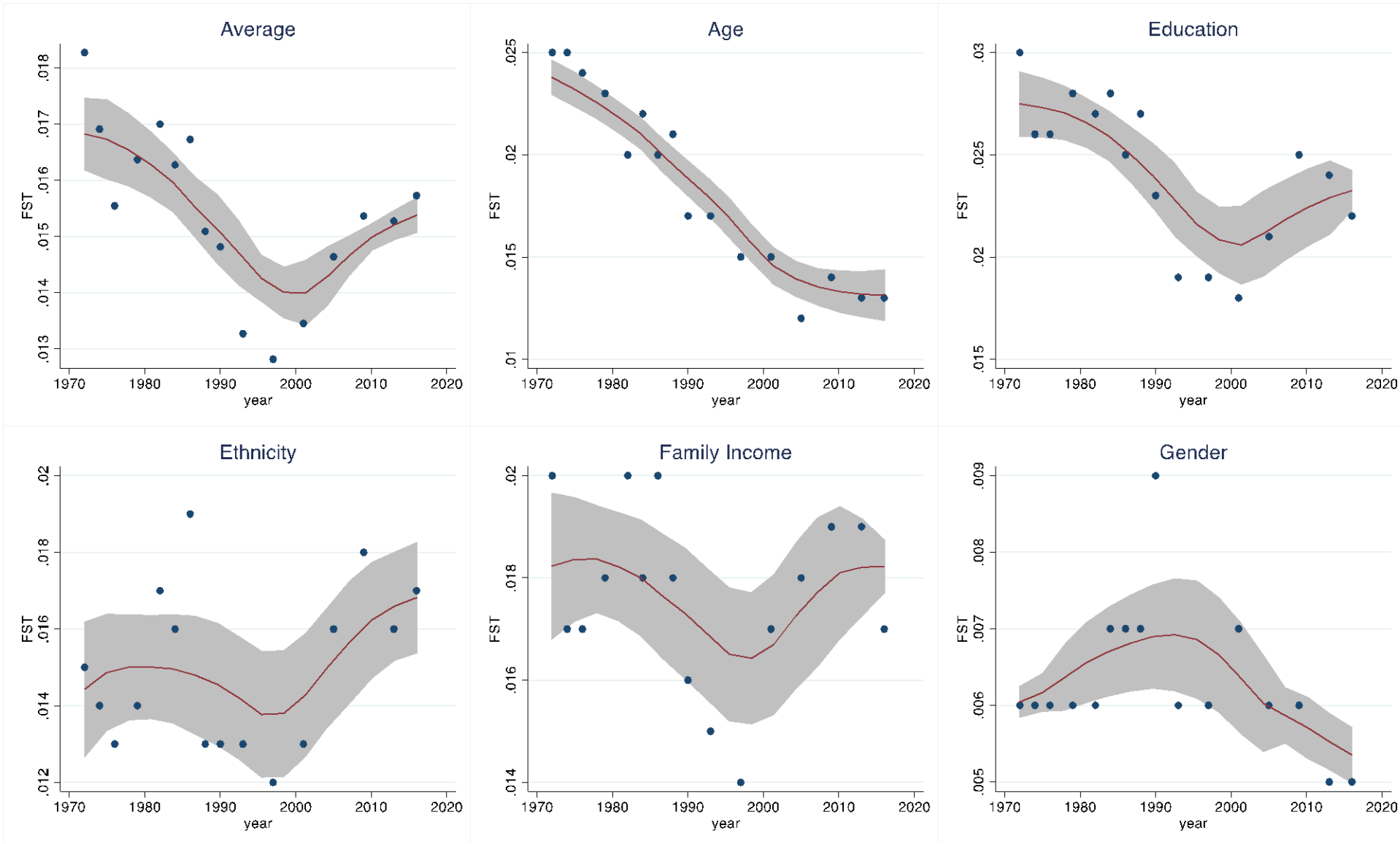


Figure 2 - Average Cultural FST over Time for 11 Cleavages (76 questions)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1972
1974
1976
1979
1982
1984
1986
1988
1990
1993
1997
2001
2005
2009
2013
2016
FST Age
FST Education
FST Ethnicity
FST Family income
FST Gender
FST Party ID
FST Race
FST Region
FST Urbanicity
FST Work Status
FST Religion

Figure 3 – Evolution of FST for Each of 11 Cleavages, over Time



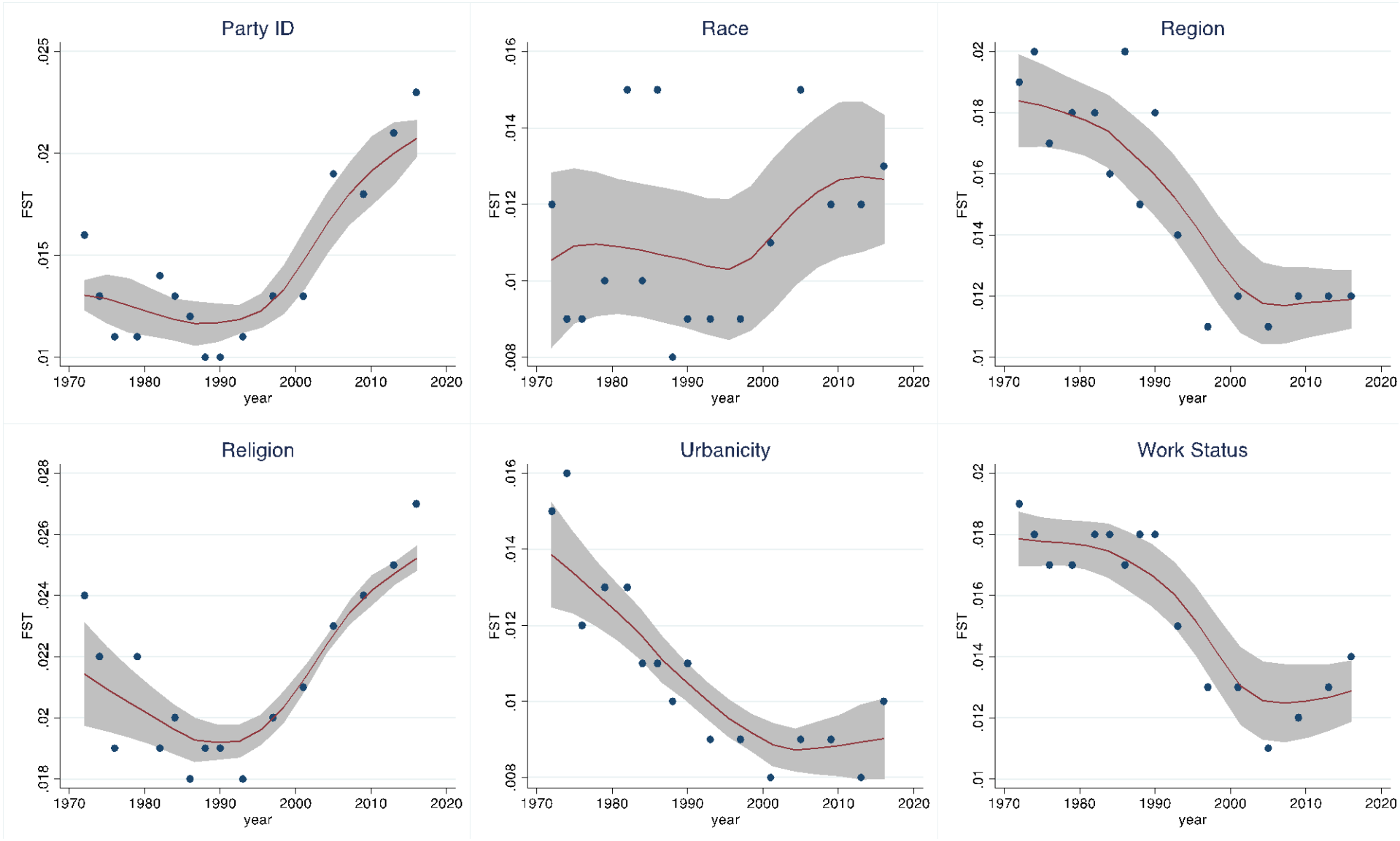

Party ID
Race
Region
Religion
Urbanicity
Work Status
FST
year
1970
1980
1990
2000
2010
2020

Figure 4 – Total R^2 across All 11 Cleavages, Over Time (76 questions, 2-wave grouping)

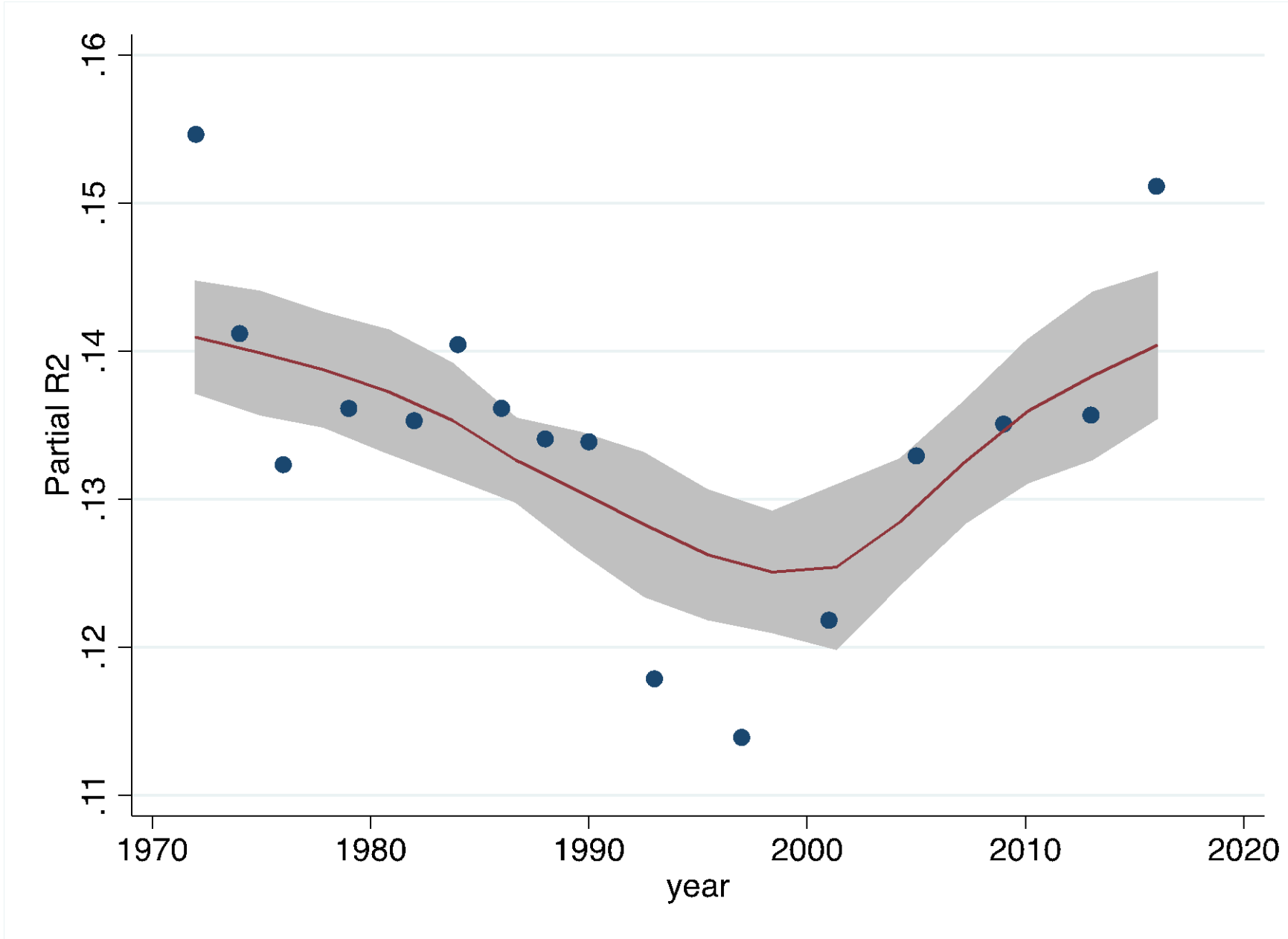
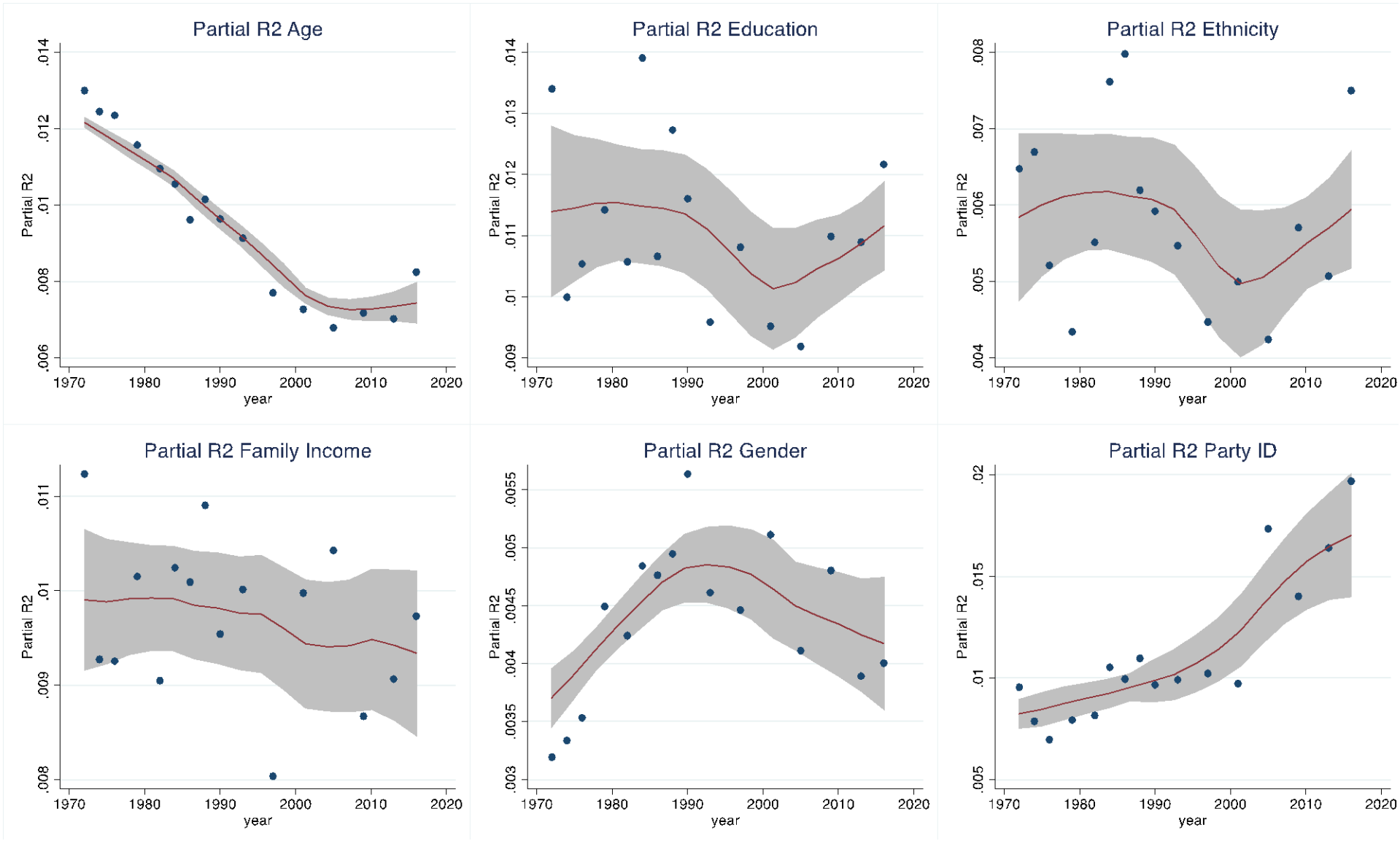
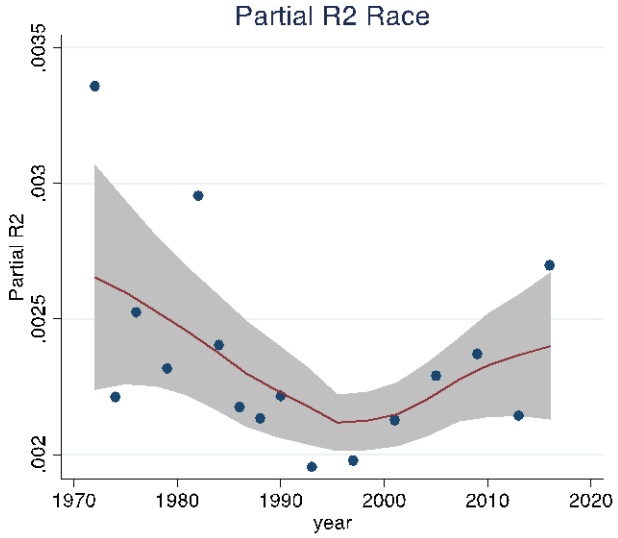
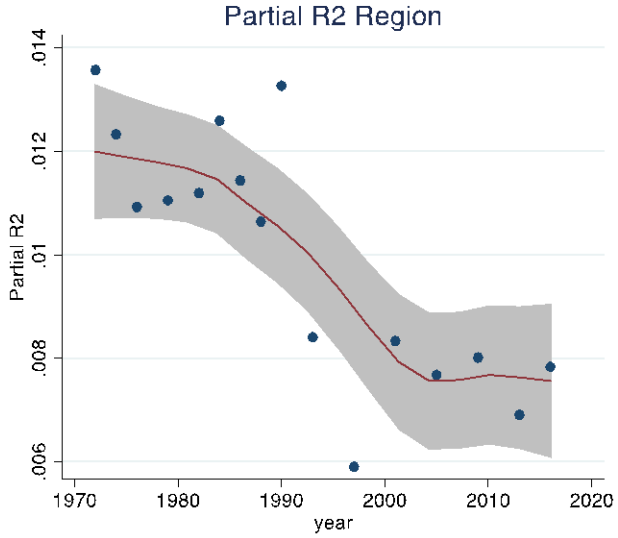
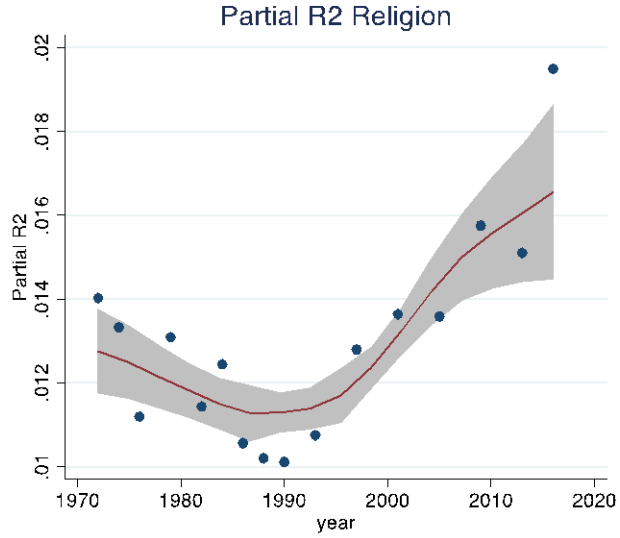


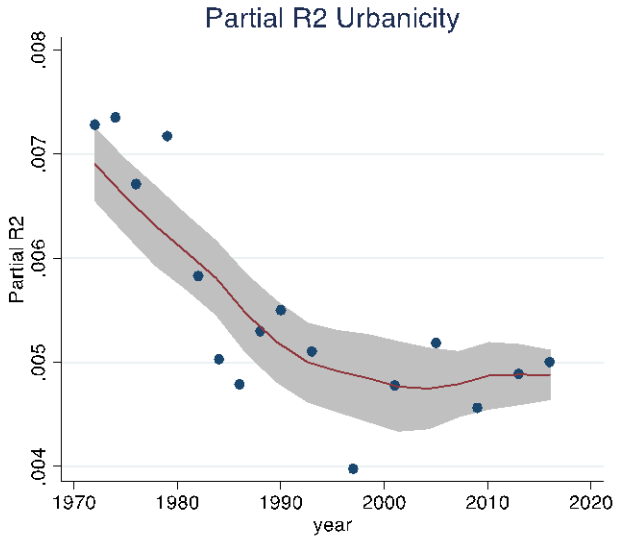
Figure 5 – Partial R^2 across Each of 11 Cleavages, Over Time




Partial R2 Race
Partial R2
.002
.0025
.003
.0035
1970
1980
1990
2000
2010
2020
year


Partial R2 Region
Partial R2
.006
.008
.01
.012
.014
1970
1980
1990
2000
2010
2020
year


Partial R2 Religion
Partial R2
.01
.012
.014
.016
.018
.02
1970
1980
1990
2000
2010
2020
year


Partial R2 Urbanicity
Partial R2
.004
.005
.006
.007
.008
1970
1980
1990
2000
2010
2020
year

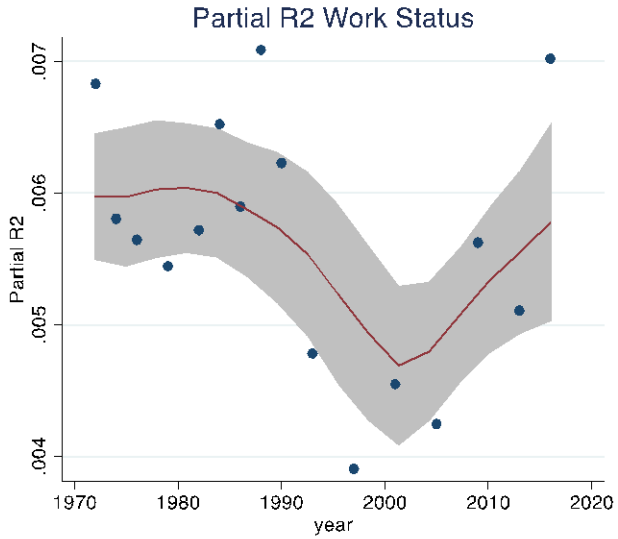

Partial R2 Work Status
Partial R2
.004
.005
.006
.007
1970
1980
1990
2000
2010
2020
year

Figure 6 – Classification of Identity Cleavages