Individualistic culture increases economic mobility in the United States

Bryan Leonard[a,1] and Steven M. Smith[b,1,2]

[a]School of Sustainability, Arizona State University, Tempe, AZ 85287; and [b]Department of Economics and Business, Colorado School of Mines, Golden, CO 80401

Edited by Robert A. Moffitt, Johns Hopkins University, Baltimore, MD, and approved July 24, 2021 (received for review April 16, 2021)

Where an individual grows up has large implications for their long-term economic outcomes, including earnings and intergenerational mobility. Even within the United States, the "causal effect of place" varies greatly and cannot be fully explained by socioeconomic conditions. Across different nations, variation in growth and mobility have been linked to more individualistic cultures. We assess how variation of historically driven individualism within the United States affects mobility. Areas in the United States that were isolated on the frontier for longer periods of time during the 19th century have a stronger culture of "rugged individualism" [S. Bazzi, M. Fiszbein, M. Gebresilasse, *Econometrica* 88, 2329–2368 (2020)]. We combine county-level measures of frontier experience with modern measures of the causal effect of place on mobility—the predicted percentage change in an individual's earnings at age 26 y associated with "growing up" in a particular county [R. Chetty, N. Hendren, *Q. J. Econ.* 133, 1163–1228 (2018)]. Using commuting zone fixed effects and a suite of county-level controls to absorb regional variation in frontier experience and modern economic conditions, we find an additional decade of frontier experience results in 25% greater modern-day income mobility for children of parents in the 25th percentile of income and 14% for those born to parents in the 75th percentile. We use mediation analysis to present suggestive evidence that informal manifestations of "rugged individualism"—those embodied by the individuals themselves—are more strongly associated with upward mobility than formal policy or selective migration.

intergenerational mobility | individualism | persistence

Social scientists have long been interested in intergenerational mobility—the ability of children to move up in the income distribution relative to their parents. Recent methodological advances have allowed researchers to estimate the "causal effects of place" (CEP) on income, leading to the insight that where children grow up can have a profound impact on upward mobility later in life (2, 3). Places with greater positive effects tend to be associated with less income segregation and inequality, better educational outcomes, greater social capital, and certain demographic characteristics (2). While some regions have seen major increases in mobility over time, there is a persistent component of place-based intergenerational mobility with "deep roots" in history that cannot be explained by subsequent changes to policies or industry structure (4). Thus, important questions remain about the underlying mechanisms though which a place affects the incomes of those that grow up there.

There is also a long-running debate about the effects of individualist vs. collectivist cultures on upward mobility. On the one hand, individualistic cultures foster "vertical" commercial relationships that are conducive to upward mobility (5) while also incentivizing innovation that can lead to greater economic growth (6). On the other hand, individualistic cultures may struggle to overcome important collective action problems (7). So far, empirical evidence in this debate has mostly relied on comparisons of growth between countries.

Previous research focused on socioeconomic correlates of mobility in the United States has thus far not examined the role of culture. This omission is surprising, given recent insights about the role of culture in shaping social, political, and economic organization over time and at a variety of scales (8–10) and a growing body of work exploring the extent of both vertical (i.e., parents to children) and oblique (i.e., peer-based) cultural transmission across generations (11, 12). Cultural transmission helps explain the prevalence of a variety of traits commonly associated with individualism including risk preferences and trust (13), work ethic (preferences for leisure) and individual discount rates (14), and beliefs about the role of luck vs. hard work in determining upward mobility (15).

This paper studies the effect of individualism by leveraging recent advances that establish the relationship between exposure to the historic US frontier (1790 to 1890) and a persistent culture of rugged individualism (1, 16). Frontier conditions—little social infrastructure but abundant land—not only attracted individualists but also intensified their individualistic culture the longer the area remained on the frontier. Abundant land provided a clear path through which effort gave rise to upward mobility, and individualism had greater returns on the frontier historically (1). This relationship between effort and mobility not only promotes cultural transmission of particular views of work ethic but also transmits a set of views on government, given that tax-based redistribution is seen as unfair when economic opportunity is linked to effort (17). Accordingly, individualistic culture can

Significance

While previous cross-national comparisons have shown that individualistic societies are associated with more innovation, growth, and income mobility than collectivist societies, our analysis, operating at a finer spatial resolution, demonstrates the relationship also holds within a country and provides new insights into the mechanisms. Our finding—that children who grow up in US counties with a stronger historically determined culture of individualism have greater upward mobility—identifies a significant component of the persistent "causal effect of place" that is not explained by other political and economic variables. With suggestive evidence that informal channels explain more of the result, this study also highlights the need for ongoing work to measure culture and its transmission.

Author contributions: B.L. and S.M.S. designed research, performed research, analyzed data, and wrote the paper.

The authors declare no competing interest.

This article is a PNAS Direct Submission.

See online for related content such as Commentaries.

[1]B.L. and S.M.S. contributed equally to this work.

[2]To whom correspondence may be addressed. Email: ssmith1@mines.edu.

This article contains supporting information online at https://www.pnas.org/lookup/suppl/doi:10.1073/pnas.2107273118/-/DCSupplemental.

Published September 7, 2021.

manifest itself both through informal channels that shape individuals' private beliefs and through formal policy choices that reflect those beliefs.

Although the social and economic landscape have evolved considerably since the frontier time period, Bazzi et al. (1) show that the length of a county's historical exposure to frontier conditions ("total frontier experience," or TFE) is associated with more individualistic culture today. Consistent with the broader debate on individualism vs. collectivism, counties with greater TFE also have lower property taxes, greater opposition to redistribution, and less compliance with COVID-19 mandates surrounding social distancing and mask wearing (1, 16). Barrios et al. (18) subsequently show that TFE is associated with more entrepreneurship and small business activity today, yielding evidence that the "self-reliance" component of individualism has also persisted. Hence, a place's historical exposure to the frontier continues to foster a culture of individualism today, inclusive of individualism institutionalized in the form of less "collectivist" policies.

We combine Bazzi et al.'s (1) measure of TFE with Chetty and Hendren's (2) estimates to study the long-run impact of culture on income mobility in the United States. We estimate the reduced-form effect of TFE on the CEP by adapting and extending the identification strategy developed by Bazzi et al. (1, 16) to focus on variation within commuting zones (CZs). Chetty and Hendren (3) demonstrate that CEPs vary within CZs, and additional analysis shows even finer variation across census tracts (19). There is also significant variation in TFE within CZs. Although CZs are viewed as cohesive economic units today, transportation costs were significantly higher on the frontier, amplifying the effect of distance on access to markets and exposure to economic shocks across neighboring counties (20).

We find that increases in TFE lead to significant increases in CEP within states and CZs: An additional decade of TFE is associated with a 25% increase in the effect of place on adulthood earnings for children born to parents in the 25th income percentile, with a more modest 14% increase for children of parents in the 75th percentile. This finding is robust to a suite of different samples, fixed effects, and other robustness checks adapted from Bazzi et al. (1, 16), including an instrumental variables (IV) approach based on exogenous weather shocks that drove migration to the United States in the 19th century and accelerated the advance of the frontier. Controlling for the share of the population that is White weakens our core result in some specifications, as does including nonlinear controls for population density, particularly for estimates of the 75th percentile.

Finally, we explore the role of potential mechanisms from the literature including formal policy, informal culture, and selective migration. Mediation analysis provides suggestive evidence that tax rates, public expenditures, and migration rates play a somewhat modest role that is dwarfed by measures of informal individualism and entrepreneurship, such as unique names and small businesses per capita. Our results add to the growing literature on culture in economics by showing that local variation in culture affects economic outcomes. Moreover, by focusing on the CEP, we show that culture operates not just in the aggregate but also affects individual people who are exposed to places characterized by certain cultures during childhood but subsequently leave.

Data and Methods

Data. Our outcome measures come from Chetty and Hendren (2), who estimate the "casual effects of place" for each CZ and county in the United States by combining variation induced by individuals who move in and out of different counties over time with outcomes for permanent residents. We use the county-level earnings forecasts they produce. Specifically, we focus on the predicted percentage change in an individual's earnings at age 26 y associated with "growing up" in a particular county (defined as 20 y of childhood exposure). We use predictions for children whose parents were in the 25th and 75th earnings percentiles. We also utilize data on various county-level variables that Chetty and Hendren (2) explore as potential correlates of mobility, described in *Possible Mechanisms*.

To test the hypothesis that growing up in a more individualistic culture increases household income in adulthood, we draw on Bazzi et al. (1), who identify the "frontier" of settlement in the United States in every decade from 1790 to 1950. A county is beyond the frontier at a given time if it has fewer than two persons per square mile. From this, Bazzi et al. (1) calculate TFE, defined as the total time that a county spent on the frontier from 1790 to 1890, the year in which Frederick Jackson Turner (21) declared the frontier to be "closed." Bazzi et al. (1) demonstrate that TFE is strongly associated with various measures of individualism including uniqueness of children's names, preferences for smaller government, and frontier migrants' intergenerational mobility. Bazzi et al. (16) show that TFE is also associated with weaker government responses to the COVID-19 pandemic and less compliance with stay-at-home orders.

We utilize a variety of covariates from Bazzi et al. (1)—described in *Empirical Strategy* and *Results*—that could jointly determine TFE and upward mobility potential. We also draw on Bazzi et al.'s (1) measure of individualism based on the share of children in the 1940 census with infrequent names, defined as those outside the top 10 within a census division. As a supplemental measure of individualism, we proxy for entrepreneurship using data on the number of small businesses per capita from the US Census. *SI Appendix*, Table S1 provides summary statistics.

Fig. 1*A* provides an illustration of the extent of the 1890 frontier and spatial variation in TFE, and Fig. 1*B* depicts the causal effect of place on income for children with parents in the 25th percentile of earnings. While national comparisons are illustrative, much of the discussion in Chetty and Hendren (2) focuses on variation in mobility within CZs. We provide examples of this variation in Fig. 1 *C*–*H* for CZs in the South, West, and Midwest, which all experienced the frontier at different points in history.

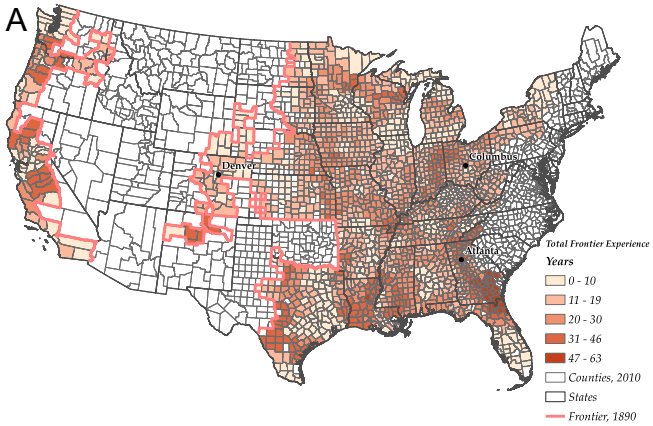
We emphasize several features of the variation depicted in Fig. 1. First, all three CZs suggest a positive correlation between TFE and CEP (with the noted exception of urban hub counties). Second, as detailed by Chetty and Hendren (2), the CEP on income varies substantially, both between and within CZs. Third, TFE varies substantially across different CZs. Counties in Atlanta's CZ all remained on the frontier for at least 19 y (many of them much longer), whereas the Denver CZ was settled more quickly, with most of its counties accumulating less than 10 y of TFE. Finally, there is also substantial variation in TFE within CZs: The range of TFE varies from 15 y in Denver to 23 y in Atlanta. For reference, the average TFE in our sample is 18 y and the overall SD is 11 y.

Within-CZ variation in TFE is likely driven by the fact that historical transportation costs increased the impact of physical distance on market access (20). Consider the Columbus, OH CZ in Fig. 1 *G* and *H*, for instance. The seat of Union County, OH is just 35 miles northwest of Columbus, OH—well within commuting distance today. However, those same 35 miles would have been separated by more than a full day's journey via wagon, rendering travel and trade more difficult prior to advances in transportation beginning with railroad expansion in the late 19th century (20, 22). Counties within a (modern) CZ could therefore have faced sharply different exposure to macroeconomic shocks, generating variation in settlement pressure and, hence, TFE. As a case in point, Columbus, with access to transportation via the Scioto River, spent just 10 y on the frontier while Union County, lacking such easy access to waterways, spent 26 y on the frontier.

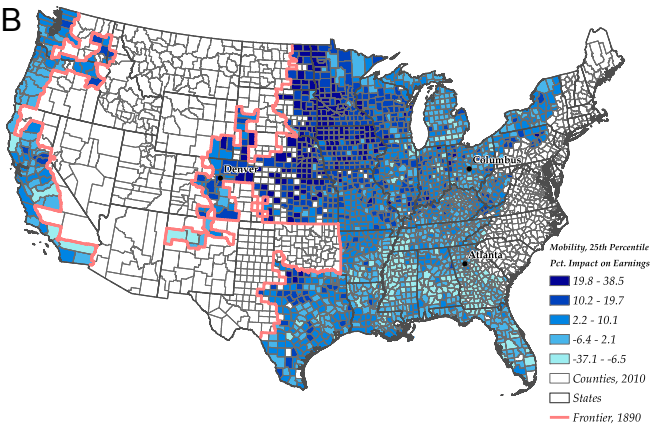
Empirical Strategy. Our primary objective is to characterize the relationship between TFE and modern CEP on income. To do this, we follow Bazzi et al. (1) and estimate a series of linear regressions with various county-level controls and alternative fixed effects:

$$CEP_{ij} = \alpha_1 TFE_i + \lambda \vec{X}_i + \delta_j + \varepsilon_{ij}, \quad [1]$$

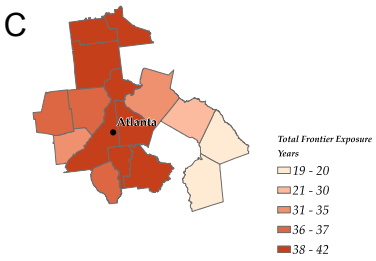
where $\vec{X}_i$ includes the baseline geographic and agroclimatic controls from ref. 1, δ_j denotes a vector of spatial fixed effects, and ε_{ij} is an error term. CEP_{ij} is the predicted percentage change earnings at age 26 y associated with living in county i from birth to age 20 y,



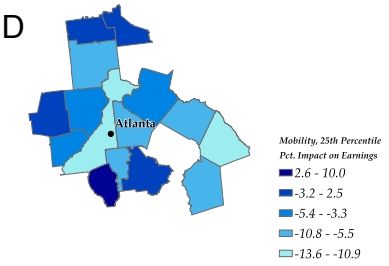
Total Frontier Experience



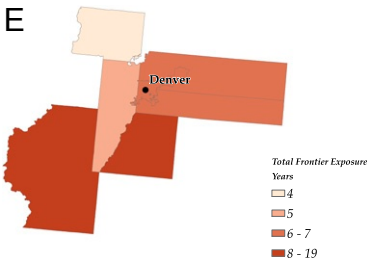
Effect on Income, 25th Percentile



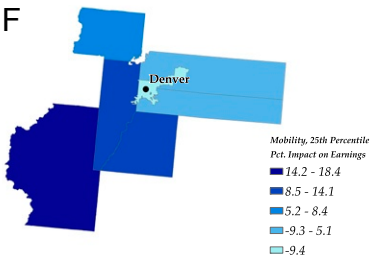
TFE, Atlanta CZ



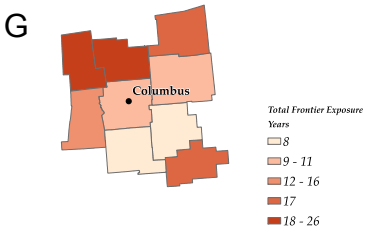
Effect on Income, Atlanta CZ



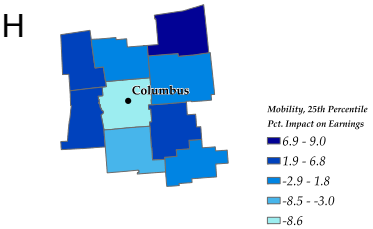
TFE, Denver CZ



Effect on Income, Denver CZ



TFE, Columbus, OH CZ



Effect on Income, Columbus, OH CZ

Fig. 1. Frontier Experience and the CEP on Income. (*A*) TFE. (*B*) Effect on income, 25th percentile. (*C*) TFE, Atlanta, GA CZ. (*D*) Effect on income, Atlanta, GA CZ. (*E*) TFE, Denver, CO CZ. (*F*) Effect on income, Denver, CO CZ. (*G*) TFE, Columbus, OH CZ. (*H*) Effect on income, Columbus, OH CZ. This figure depicts TFE (darker shading = more TFE) based on the 1890 frontier from ref. 1 and the CEP on income (darker shading = more positive CEP) from ref. 2 for US counties. The national sample in *A* and *B* excludes counties beyond the 1890 frontier and counties on the eastern seaboard because the region was past the frontier threshold by the time county-level population data were available. National figures for the 1950 frontier and income of children of 75th percentile parents are provided in *SI Appendix,* Fig. S1.

based on a sample of individuals who were born between 1980 and 1986 (2). We estimate different versions of Eq. **1** using CEP_{ij} for the 25th and 75th percentiles to characterize mobility for children of parents both relatively low and relatively high in the income distribution.

Because TFE is predetermined with respect to modern outcomes, the primary threat to identification of α_1 is the presence of omitted variables that are correlated with both TFE and modern income mobility. Our approach for addressing this concern is anchored on the identification strategy developed by Bazzi et al. (1, 16), who show that the effect of TFE on modern measures of individualism is highly robust to the inclusion of state fixed effects and various geographic controls, and that IV estimates based on exogenous shocks to international migration flows are not statistically different from baseline ordinary least squares (OLS) estimates. Hence, for an omitted factor to compromise identification of α_1, it would have to be correlated with both TFE and mobility, within states and conditional on the previously vetted controls in $\vec{X}_i$, which include county area; the latitude and longitude of each county's centroid; average elevation; average annual rainfall; proximity to coastlines, rivers, and lakes; and potential agricultural productivity.

We extend the baseline identification approach by employing three different sets of fixed effects for δ_j. Whereas Bazzi et al. (1) utilize state fixed effects, Chetty and Hendren (2) characterize the variation in mobility both within and between CZs. Accordingly, we also estimate a version of Eq. **1** with 451 CZ fixed effects. This specification is more restrictive than the identification strategy employed by Bazzi et al. (16) but may be problematic if CZs themselves are endogenous to TFE. Accordingly, we employ a third set of fixed effects that are spatially arbitrary but also vary within state. To do this, we utilize the spatially uniform 60-square-mile grid cells constructed by Bazzi et al. (1) for clustering their SEs (which we do as well) and include 379 grid-cell fixed effects that partition counties into arbitrary spatial clusters. Our preferred estimates focus on within-CZ variation in mobility and TFE, but we also show that our core results are robust to the use of the Bazzi et al. (1) immigration instrument with state fixed effects. As in Bazzi et al. (1), the IV estimates are comparable to the various fixed effects estimates. We also conduct a variety of robustness checks, described in the results below.

Results

The Effect of Frontier Experience on Intergenerational Mobility. Table 1 provides the estimated relationship between TFE (measured in decades) and mobility from estimating Eq. **1**. The top portion uses the 1890 frontier depicted in Fig. 1 to define TFE, whereas the bottom portion uses the extended 1950 frontier (depicted in *SI Appendix*, Fig. S1). The dependent variable in columns 1 to 3 is the forecasted CEP for children of parents in the 25th percentile of earnings from Chetty and Hendren (2): the predicted percentage change in earnings at age 26 for individuals who live in county i from birth to age 20 y. Columns 4 to 6 focus on children of parents in the 75th percentile of earnings. All models include the full suite of baseline geographic controls from Bazzi et al. (1, 16) described in *Empirical Strategy*. All columns include state fixed effects, but columns 2 and 5 add 60-square-mile grid cell fixed effects and columns 3 and 6 add CZ fixed effects. SEs are clustered by 60-square-mile grid cells and reported in parentheses.

Across all specifications, TFE is a significant predictor of CEP. Estimates for the 25th percentile (Table 1, columns 1 to 3) tend to become larger with the addition of grid cell and CZ fixed effects, whereas the estimates for the 75th percentile (Table 1, columns 4 to 6) become smaller as fixed effects are added. Overall, though, the inclusion of higher-resolution fixed effects has a modest effect on the coefficients. Our preferred estimates in columns 3 and 6 utilize within-CZ variation to identify the effect of TFE on CEP. These estimates show that growing up in a county with another decade of frontier experience would increase adulthood earnings by 1.25% for a child born into the 25th percentile or 0.49% for a child born into the 75th percentile. Hence, another decade of frontier experience increases the CEP within CZs by roughly 25% $\left(\frac{1.247}{4.938}\right)$ for the 25th percentile and 14% $\left(\frac{0.485}{3.333}\right)$ for the 75th percentile.

Several patterns emerge from Table 1. First, frontier experience seems to affect children born to parents in the 25th

Table 1. Frontier experience and income mobility

	1	2	3	4	5	6
	y = % impact from birth, 25th percentile			y = % impact from birth, 75th percentile		
1890 frontier						
TFE	1.129 (0.199)	1.161 (0.263)	1.247 (0.272)	0.640 (0.0980)	0.534 (0.148)	0.485 (0.147)
Observations	1,923	1,895	1,885	1,923	1,895	1,885
Adjusted R^2	0.607	0.684	0.678	0.366	0.460	0.469
Mean dependent variables	5.070	5.090	4.938	3.355	3.377	3.333
No. of fixed effects	29	379	451	29	379	451
No. of clusters	378	350	374	378	350	374
1950 frontier						
TFE	0.546 (0.135)	0.672 (0.166)	0.663 (0.167)	0.384 (0.0726)	0.392 (0.0748)	0.286 (0.0818)
Observations	2,321	2,296	2,237	2,321	2,296	2,237
Adjusted R^2	0.549	0.623	0.664	0.379	0.467	0.523
Mean dependent variables	5.615	5.652	5.404	3.150	3.171	3.139
No. of fixed effects	38	410	559	38	410	559
No. of clusters	397	372	394	397	372	394
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Grid-cell FE	No	Yes	No	No	Yes	No
CZ FE	No	No	Yes	No	No	Yes

This table presents the results of estimating Eq. **1**. The top portion uses the 1890 frontier to define TFE, and the bottom portion uses the extended 1950 frontier. The dependent variable is the predicted percentage increase in an adult's earnings at age 26 y associated living in a county from birth to age 20 y. Columns 1 to 3 focus on children of parents in the 25th percentile of the income distribution. Columns 4 to 6 focus on children of parents in the 75th percentile of the income distribution. All models control for county area; the latitude and longitude of each county's centroid; average elevation; average annual rainfall; proximity to coastlines, rivers, and lakes; and potential agricultural productivity. Observations across models vary because singletons (fixed effects defining only one observation) are dropped to avoid overstating statistical significance. SEs are clustered by 60-square-mile grid cells (following ref. 1) and reported in parentheses. The estimating sample in the top portion is based on the main sample reported in refs. 1 and 16, which omit counties along the West Coast frontier. The sample in the bottom portion uses the extended 1950 frontier, which includes the West Coast.

percentile more than the 75th percentile. In the top portion, the effects in columns 4 to 6 are roughly 40 to 50% smaller than those in columns 1 to 3. These differences are even more pronounced in the bottom portion, which uses the extended 1950 frontier to define TFE. Second, the effect of the extended 1950 frontier in the bottom portion is consistently about 50% smaller than the effect of the main 1890 frontier in the top portion. This is broadly consistent with the findings of Bazzi et al. (1, 16), who argue that the 1890 frontier is a better benchmark for measuring frontier culture based on Turner's (21) argument that the frontier was "closed" in 1890, implying that subsequent settlement was less path-breaking and entailed less "rugged individualism."

We perform a variety of robustness checks to confirm the validity of the results reported in Table 1, all provided in *SI Appendix*. First, we show that the results are robust to the inclusion of a suite of controls from Bazzi et al. (16). These include population density in 2000, average annual temperature, the share of the population that is White, median household income, and the share of the population with a bachelor's degree. In *SI Appendix*, Tables S2–S4 we report the baseline estimate in column 1, add each control individually in columns 2 to 6, and add all of the controls simultaneously in column 7. Column 8 includes all controls except for the share of the population that is White. *SI Appendix*, Table S2 uses state fixed effects only, *SI Appendix*, Table S3 adds grid cell fixed effects, and *SI Appendix*, Table S4 adds CZ fixed effects. Each table reports the results for the 25th percentile in the top portion and the 75th percentile in the bottom portion.

The effect of TFE on income mobility is robust across the majority of specifications. Including the full suite of controls simultaneously does reduce the magnitude and precision of the TFE effect, especially for the 25th percentile and especially with the inclusion of finer fixed effects (column 7 of *SI Appendix*, Tables S2–S4). It is worth noting that many of the results in Bazzi et al. (16) also do not survive the column 7 specification with all controls, even with just state fixed effects.

The sensitivity of our results in column 7 of *SI Appendix*, Tables S2–S4 appears to be driven primarily by the share of the population that is White: The main effect of TFE is robust to including all controls except White share (column 8 of *SI Appendix*, Tables S2–S4) with the sole exception of the effect on the 75th percentile using CZ fixed effects (*SI Appendix*, Table S4, bottom portion). This raises important questions surrounding the connection between race, individualism, and mobility. Bazzi et al. (1) point out that individualistic beliefs associated with TFE are less prevalent among the Black population. Hence, the effect of TFE on mobility may vary by race, and high-TFE locations may have larger CEPs because they tend to be more White. This group tends to have higher income mobility and is more likely to adopt individualistic culture.

Unfortunately, we cannot parse out heterogeneous effects by race because race-specific measures of the CEPs are not publicly available. We do note that Chetty et al. (19) show that although place-based measures of Black mobility are lower than White mobility, the two are positively correlated. The upshot is that race is unlikely to be the primary mechanism for the effect of TFE on income mobility because the same areas with larger CEPs for Whites appear to also have better outcomes for Blacks, albeit to a lesser degree.

Next, we use the IV approach developed by Bazzi et al. (1), instrumenting for TFE with predicted immigration flows from Europe, based on climate shocks. The intuition for this approach is that climate shocks in Europe can induce more rapid emigration to the United States, accelerating westward expansion and reducing TFE for counties that happened to be on the frontier when the shocks occurred (see ref. 1 for details on how the instrument is constructed). *SI Appendix*, Table S5 reports the results, mimicking the structure of *SI Appendix*, Table S2. The instrument, which is based on aggregate immigration shocks that influence counties differentially based on their distance to the frontier when shocks occur, lacks power for predicting TFE within CZs. Accordingly, we view the IV and CZ fixed effects approaches as substitutes for one another. We also report the Kleibergen–Paap first-stage F statistic and the P value from the Hausman test for the equality of the IV and OLS coefficients. Across all specifications, the first-stage F statistics are well above 100. In all but one specification, the IV and OLS coefficients are statistically indistinguishable from the OLS coefficients, in addition to being quite similar in magnitude (compare to *SI Appendix*, Table S2). Hence, there is limited evidence that unobservable county-specific factors are driving the relationships reported in Table 1.

SI Appendix, Table S6 demonstrates the robustness of the results across various samples. The estimates in Table 1 restrict the sample to Bazzi et al.'s (1) main estimating sample, which excludes the noncontiguous West Coast frontier counties depicted in Fig. 1. Column 1 of *SI Appendix*, Table S6 extends the sample to include the West Coast counties, whereas columns 3 to 5 restrict the sample to the Midwest, the South, and the West, respectively. The two top portions report estimates for the 25th and 75th percentile using the 1890 frontier to define TFE, whereas the two bottom portions use the 1950 frontier (resulting in larger samples). Across regions, point estimates are all positive and significant besides the West in 1890, which is positive but imprecisely estimated because only 126 counties remain in the sample.

Finally, *SI Appendix*, Table S7 tests the robustness of the TFE effect to nonlinear controls for population density using a flexible binned approach. We include a dummy variable for each quintile of the distribution of population density and reestimate the specification associated with column 1 of *SI Appendix*, Tables S2–S5. The top portion indicates that the results for the 25th percentile are robust across all fixed effects and the IV model. In the bottom portion, the results for the 75th percentile are insignificant with the inclusion of CZ fixed effects. However, there is likely little identifying variation in TFE within CZs after flexibly controlling for quintiles of population density, which is itself highly correlated with TFE. Overall, TFE is strongly associated with more positive CEP.

Possible Mechanisms

Given the strong relationship between TFE and upward mobility identified above, individualism is a significant determinant of upward mobility. However, the exact mechanism or mix of channels that it operates through remains an important question. Here we discuss three potential channels and return to the data to provide some suggestive empirical evidence.

First, a culture of individualism can manifest itself through formal policies. Theoretical and empirical analyses have found that the appetite for redistributive policies is often smaller as the perceived opportunity for upward mobility increases, especially across countries (17, 23–25). Within the United States, Bazzi et al. (1) find that individualism fostered by TFE includes antistatist sentiments, confirming that higher TFE regions had preferences for lower taxes and less government spending. Less is known about the effect of redistributive policies on subsequent income mobility. On the one hand, redistribution of income would have increased absolute mobility in the United States (26). On the other hand, higher tax rates have been found to decrease relative mobility (27) and redistributive policies appear to have (noisy) negative relationships with the causal effect of place (tables A.12 and A.13 in ref. 2).

Second, individualistic cultures can transmit norms surrounding self-reliance, work ethic, and the value of innovative and

entrepreneurial efforts. Doepke and Zilibotti (14) explore the interdependence of parents' incentives to transmit both work ethic and patience (preferences for leisure and low discount rates) to their children depending on their expectations about future economic conditions, while Dohmen et al. (13) find evidence of both vertical (via parents) and oblique (via peers) transmission of willingness to trust others and to take risks. This informal dimension of individualistic culture is also discussed by Bazzi et al. (1), who find that higher TFE led to more unique names (in 1940), a commonly used proxy for individualism. It is also true that individuals in counties with greater TFE are less likely to comply with public health policies associated with COVID-19 (16).

These cultural manifestations of individualism could foster greater upward mobility if they have a persistent effect on the preferences (work ethic, risk preferences, discount rates, and trust) of individuals who grow up in high-TFE locations. Indeed, Giavazzi et al. (15) find that culturally transmitted beliefs about the importance of hard work vs. luck for achieving mobility are slow to adapt when immigrants face a new culture, while Barrios et al. (18) find that higher-TFE regions are associated with more entrepreneurship.

Finally, the historic frontier attracted individualistic migrants, made them more individualistic, and provided greater returns to their individualism (1, 28). Accordingly, the other channel we consider is migration. While modern migration differs from that in the 19th century, TFE counties may attract (or deter) individuals seeking out "opportunity." For instance, Abramitzky et al. (29) show that income mobility for immigrants is higher than for US-born individuals but that controlling for location of residence eliminates this difference. This suggests that immigrants move to places with greater income mobility. Given the nature of our income mobility measure (the effect of where one grows up, not where one lives as an adult) this channel may be harder to detect, but it is possible that high-TFE areas have higher income mobility today in part because they attract families that are more individualistic in the first place.

To bring some empirical evidence to bear, we gather measures of formal policy, informal culture, and migration. For ease of exposition and interpretation, we use principal component analysis to reduce the dimensionality of several measures from the literature into a single dimension for formal policy, a single dimension for informal culture, and a single dimension of migration. To capture formal policies, we use local property tax rates from Bazzi et al. (1) in addition to several measures developed by Chetty and Hendren (2): overall average tax rates based on total local, state, and federal tax revenues divided by total income; public expenditures per capita; and education spending per student. Measures of culture include uniqueness of children's names from Bazzi et al. (1), small and "very" small (<20 employees) businesses per capita as a measure of entrepreneurship, and standardized test scores, which Chetty and Hendren (2) find to be correlated with CEP even after controlling for education spending. For migration, characteristics of the movers themselves are unavailable for modern times. Instead, we consider the turnover, both the county in-migration and out-migration rates, and the share foreign born, all from Chetty and Hendren (2).

SI Appendix, Table S8 reports the principal components of the four policy variables, *SI Appendix*, Table S9 reports the principal components of the four informal culture variables, and *SI Appendix*, Table S10 reports the principal components of the three migration variables. Using these dimensions, we conduct mediation analysis to provide some insights into which channels appear to stand out more. Formal details and results can be found in *SI Appendix*. These relationships should be interpreted as suggestive, not causal, because we do not attempt to address the potential endogeneity of the various mediators.

Fig. 2 depicts the relationships between TFE, the mediators, and the causal effect of place for children with parents in the 25th percentile by plotting average values of each variable by quantile after controlling each for the covariates included in our main specification (see *SI Appendix*, Fig. S2 for the 75th percentile). Each row of figures decomposes the indirect effect of TFE via the given channel. The first column of figures shows how TFE correlates with the mediators and the second column shows the relationship between the mediators and the causal effect of place.

Fig. 2*A* shows that greater TFE is associated with "smaller" government in terms of revenue collection and expenditure and Fig. 2*B* indicates that smaller government within a CZ is associated with a more positive causal effect of place. Fig. 2*C* shows that greater TFE is associated with measures of more individualistic culture and Fig. 2*D* shows that these features are highly predictive of mobility outcomes. Finally, Fig. 2*E* shows that migration is negatively related to TFE: Areas with more historical exposure to the frontier have relatively less population turnover today. Furthermore, Fig. 2*F* reveals that migration has a slightly negative correlation with the causal effect of place on mobility.

The relative slopes of the formal policy, informal nonpolicy, and migration relationships suggest that informal culture plays the strongest role in mediating the effect of TFE on mobility. In *SI Appendix*, Table S11 we show the results of formal mediation analysis (*SI Appendix*, Eqs. **S1**–**S4**) using the first principal components as the mediators. The evidence corroborates the relationships depicted in Fig. 2. Formal policy mediates just 7.7% of the TFE effect on income (8.1% at the 75th percentile) and migration mediates only 4.8% for the 25th percentile, although a more sizeable share at the 75th percentile (24%), but informal cultural, nonpolicy factors mediate 49% (53% at the 75th percentile). To better understand these relationships we also conduct mediation analyses of the individual measures of each group of mediators (presented in *SI Appendix*, Tables S12–S14).

In sum, the results suggest that the informal portion of the culture of individualism directly influences economic outcomes more than the formal policy choices or migration patterns associated with individualism in the United States. The presence of more unique names is the measure that mediates the largest portion of the effect on its own (see *SI Appendix*, Table S13). However, the evidence is only suggestive: The direct effect of TFE when accounting for all three classes of mediators via their principal components simultaneously still accounts for over 45% of the effect, meaning much remains unexplained. Culture is difficult to measure, and this is why TFE, as an overarching proxy, is itself extremely useful for this analysis. Additional work is warranted to further probe how historically driven culture influences the geography of intergenerational mobility in the United States by focusing on developing plausible causal estimates for some of the key channels highlighted here.

Conclusion

This paper documents a robust positive relationship between historical "frontier experience" and modern intergenerational mobility across US counties that holds within CZs. Since Turner (21), the frontier has been associated with "rugged individualism," and recent work has shown that the frontier embedded a persistent culture of individualism through the present. This individualism expresses itself both informally and formally through more individualistic-oriented policies. We find that increases in TFE lead to large increases in the modern CEP estimated by Chetty and Hendren (2): An additional decade of TFE is

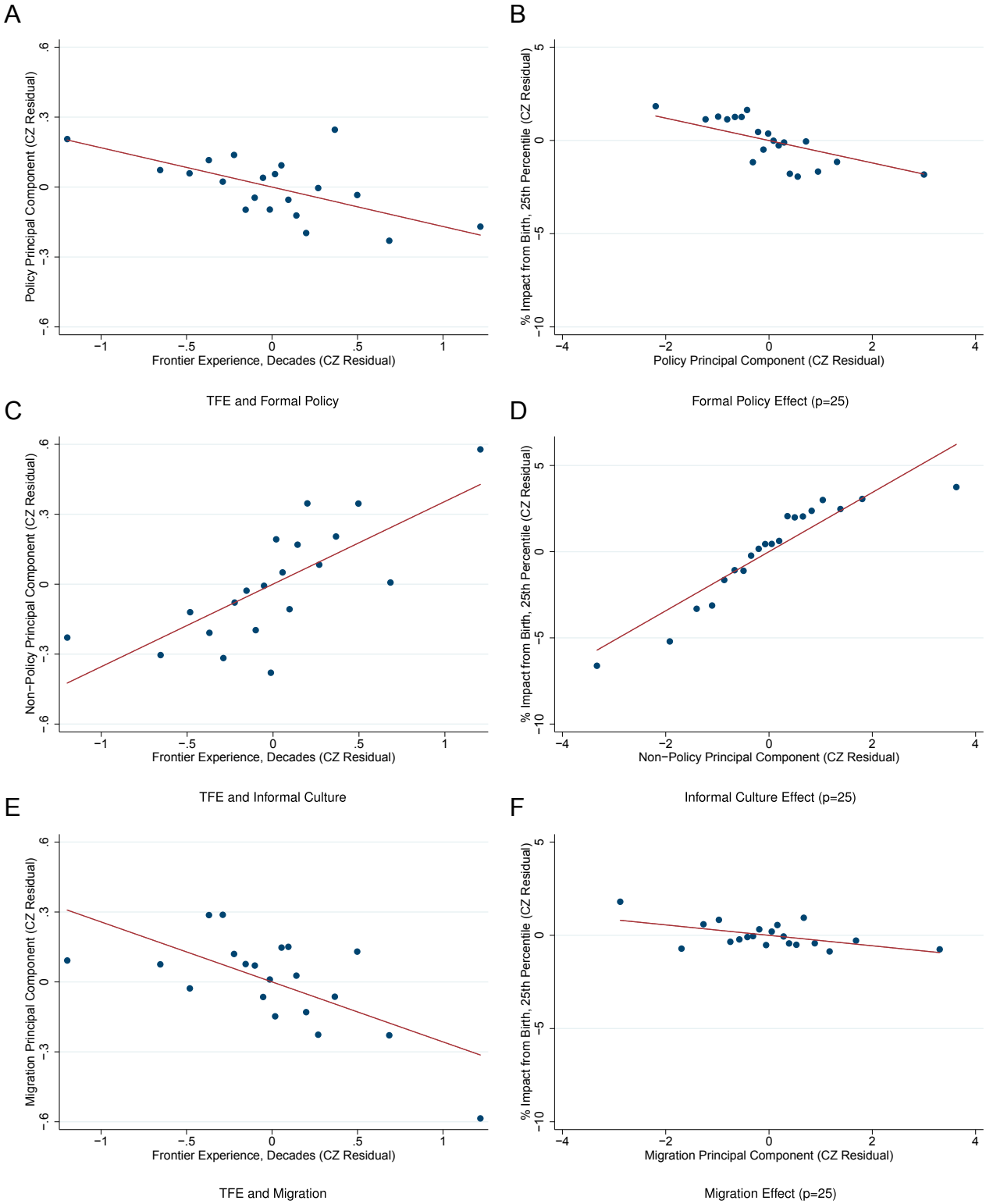


Fig. 2. Frontier experience, income (P = 25), and possible mechanisms. (*A*) TFE and formal policy. (*B*) Formal policy effect (P = 25). (*C*) TFE and informal culture. (*D*) Informal culture effect (P = 25). (*E*) Informal culture effect (P = 25). (*F*) Migration effect (P = 25). This figure depicts relationships between TFE, income (for children of 25th percentile families), and three possible channels: formal policy, informal culture, and migration. All variables are residuals having controlled for CZ fixed effects and baseline covariates. Formal policy, informal culture, and migration measures have been captured by their first principal components. All panels are created using binscatter, showing the average values for the observations within each bin.

associated with a 25% increase in the effect of place on adulthood earnings for children born to parents in the 25th income percentile, with a more modest 14% increase for children of parents in the 75th percentile. The empirical evidence demonstrates that a greater presence of individualistic culture where someone grows up leads to higher chances of upward mobility in the United States.

Our main finding raises several questions, including 1) whether the effect of individualism on income mobility is driven by informal components of individualistic culture—work ethic, innovation, and entrepreneurship—or by the formal policies adopted that tend to be less redistributive, 2) how these features interact with one another, and 3) how selective migration may amplify these effects. Our analysis suggests that all of these components are present but that the informal channel is dominant. We find that redistributive policies and migration play a small mediating role that is dwarfed by measures of informal individualistic culture including unique names and small businesses per capita.

Although our evidence on mediators is only suggestive, the hypothesis that the cultural manifestations of individualism matter more for mobility than policy would be consistent with the sensitivity of our results to racial controls, and with disparities in CEPs by race. Chetty et al. (19) find smaller CEPs for Blacks than for Whites, but the two are nevertheless positively correlated. This could be explained by the fact that the nonwhite population tends to be less embracing of individualistic culture (1). Hence, Whites' mobility is more likely to be affected by the informal culture and its formal manifestation via policy, whereas Blacks' mobility may be primarily affected by the formal policies that seem to have more modest effects. Future research should seek to leverage finer data on race-specific CEPs—not currently publicly available—to explore how individualistic culture, race, and income mobility interact.

More broadly, research is needed to rigorously test the hypothesis suggested by our results: that the informal features of individualistic culture matter more for economic outcomes than the associated policy preferences and adoption. Still, our results show that culture—particularly "rugged individualism"—offers an explanation for portions of intergenerational mobility that demographics and formal policies have not been able to account for in previous studies (4).

Data Availability. Previously published data were used for this work (1, 2).

ACKNOWLEDGMENTS. This work was supported by the National Science Foundation, SES-2117660. For helpful comments, we thank the editor, two anonymous reviewers, Josh Abbott, Christian Dippel, Edward Kosack, Ryan Oprea, and Zach Ward.

1. S. Bazzi, M. Fiszbein, M. Gebresilasse, Frontier culture: The roots and persistence of "rugged individualism" in the United States. *Econometrica* **88**, 2329–2368 (2020).
2. R. Chetty, N. Hendren, The impacts of neighborhoods on intergenerational mobility II: County-level estimates. *Q. J. Econ.* **133**, 1163–1228 (2018).
3. R. Chetty, N. Hendren, The impacts of neighborhoods on intergenerational mobility I: Childhood exposure effects. *Q. J. Econ.* **133**, 1107–1162 (2018).
4. D. S. Connor, M. Storper, The changing geography of social mobility in the United States. *Proc. Natl. Acad. Sci. U.S.A.* **117**, 30309–30317 (2020).
5. A. Greif, Cultural beliefs and the organization of society: A historical and theoretical reflection on collectivist and individualist societies. *J. Polit. Econ.* **102**, 912–950 (1994).
6. Y. Gorodnichenko, G. Roland, Culture, institutions, and the wealth of nations. *Rev. Econ. Stat.* **99**, 402–416 (2017).
7. Y. Gorodnichenko, G. Roland, Individualism, innovation, and long-run growth. *Proc. Natl. Acad. Sci. U.S.A.* **108** (suppl. 4), 21316–21319 (2011).
8. N. Voigtländer, H.-J. Voth, Nazi indoctrination and anti-Semitic beliefs in Germany. *Proc. Natl. Acad. Sci. U.S.A.* **112**, 7931–7936 (2015).
9. S. Lowes, N. Nunn, A. J. A. Robinson, J. L. Weigel, The evolution of culture and institutions: Evidence from the Kuba Kingdom. *Econometrica* **85**, 1065–1091 (2017).
10. P. Giuliano, N. Nunn, Understanding cultural persistence and change. *Rev. Econ. Stud.* **88**, 1541–1581 (2020).
11. A. Bisin, T. Verdier, The economics of cultural transmission and the dynamics of preferences. *J. Econ. Theory* **97**, 298–319 (2001).
12. A. Bisin, T. Verdier, "The economics of cultural transmission and socialization" in *Handbook of Social Economics*, J. Benhabib, A. Bisin, M. O. Jackson, Eds. (Elsevier, 2011), vol. 1, pp. 339–416.
13. T. Dohmen, A. Falk, D. Huffman, U. Sunde, The intergenerational transmission of risk and trust attitudes. *Rev. Econ. Stud.* **79**, 645–677 (2012).
14. M. Doepke, F. Zilibotti, Occupational choice and the spirit of capitalism. *Q. J. Econ.* **123**, 747–793 (2008).
15. F. Giavazzi, I. Petkov, F. Schiantarelli, Culture: Persistence and evolution. *J. Econ. Growth* **24**, 117–154 (2019).
16. S. Bazzi, M. Fiszbein, M. Gebresilasse, Rugged individualism and collective (in) action during the COVID-19 pandemic. *J. Public Econ.* **195**, 104357 (2021).
17. A. Alesina, G.-M. Angeletos, Fairness and redistribution. *Am. Econ. Rev.* **95**, 960–980 (2005).
18. J. M. Barrios, Y. Horchberg, D. Macciocchi, "Rugged entrepreneurs: The geographic and cultural contours of new business formation" (NBER Working Paper 28606, National Bureau of Economic Research, Cambridge, MA, 2021).
19. R. Chetty, N. Hendren, M. R. Jones, S. R. Porter, Race and economic opportunity in the united states: An intergenerational perspective. *Q. J. Econ.* **135**, 711–783 (2020).
20. D. Donaldson, R. Hornbeck, Railroads and American economic growth: A "market access" approach. *Q. J. Econ.* **131**, 799–858 (2016).
21. F. J. Turner. *The Significance of the Frontier in American History*. (Penguin, 1893.
22. R. W. Fogel, *Railroads and American Economic Growth* (Johns Hopkins Press, Baltimore, 1964).
23. T. Piketty, Social mobility and redistributive politics. *Q. J. Econ.* **110**, 551–584 (1995).
24. R. Benabou, A. Efe, Ok. Social mobility and the demand for redistribution: The poum hypothesis. *Q. J. Econ.* **116**, 447–487 (2001).
25. A. Alesina, S. Stantcheva, E. Teso, Intergenerational mobility and preferences for redistribution. *Am. Econ. Rev.* **108**, 521–554 (2018).
26. R. Chetty *et al*., The fading American dream: Trends in absolute income mobility since 1940. *Science* **356**, 398–406 (2017).
27. M. Alloza, The impact of taxes on income mobility. *Int. Tax Public Finance* **28**, 794–854 (2021).
28. J. P. Ferrie, "Migration to the frontier in mid-nineteenth century America: A re-examination of Turner's 'safety valve'" (Working Paper, Northwestern University and NBER, 1997).
29. R. Abramitzky, L. Boustan, E. Jácome, S. Pérez, Intergeneration mobility of immigrants in the United States over two centuries. *Am. Econ. Rev.* **111**, 580–608 (2021).