Markets Make Humans WEIRDer: Evidence from 1850-1920 United States

Max Posch and Itzchak Tzachi Raz*

June, 2024

PRELIMINARY AND UPDATED FREQUENTLY

[Please read the latest version, available here]

Abstract

This paper studies the impact of market access on individualistic cultural traits, focusing on the expansion of the railroad network and population growth in the U.S. from 1850 to 1920. A county-level analysis leverages excess variation in counties' market access that is orthogonal to the expansion of local railroad networks. An individual-level analysis uses a difference-in-differences approach to estimate the impact of migrating to locations with a higher market access relative to lower market access. Both empirical strategies reveal that market access fosters individualistic cultural traits. The findings indicate that this relationship is due to the direct influence of commerce on culture and psychology, rather than indirect effects through market-induced changes in population diversity, economic development, access to information, or legal institutions.

Keywords: Markets, Trade, Universalism, Culture, Psychology

JEL codes: Z10, Z13, N71, N72, R49

*Posch: Department of Economics, the University of Exeter. Email: m.posch@exeter.ac.uk. Raz: Department of Economics and PPE, The Hebrew University of Jerusalem. Email: iraz@mail.huji.ac.il. Roee Diler provided valuable research assistance. This paper benefited from comments and suggestions by conferences and seminars participants at the Hayek workshop on institutions and political economy in historical perspective at LSE, Growth History and Development workshop at SDU, NICEP Conference at the University of Nottingham, Hebrew University, Lund University, Tel-Aviv University, and Ben-Gurion University.

1 Introduction

Individualistic cultural traits, or what Henrich et al. (2010b) have called WEIRD (Western, Educated, Industrialized, Rich, and Democratic) psychology, are thought to be foundational for the evolution, functioning and success of market-based economies (Greif, 1993, 1994; Henrich, 2020). This paper reverses the lens and examines whether the evolution of market economies, in turn, fosters the development of WEIRD cultural and psychological characteristics.

Social scientists and philosophers have long debated the social and psychological consequences of markets. For example, enlightenment thinkers such as Montesquieu (1752) proposed that "Commerce is a cure for the most destructive prejudices; for it is almost a general rule that wherever manners are gentle there is commerce; and wherever there is commerce, manners are gentle". This *douce commerce* hypothesis is consistent with an influential body of recent theories positing that market interactions promote internalization of impersonal prosocial norms because anonymous market-based cooperation benefits from fair dealing and honesty with strangers (e.g., Henrich et al., 2001, 2005). Others have argued that markets commodify social relationships and exacerbate inequalities, reducing prosociality, and leading to alienation and exploitation (Marx and Engels, 1848; Polanyi, 1944; Sandel, 2012).[1]

The current evidence on the medium- to long-term cultural and psychological impacts of markets primarily stems from correlations found in behavioral experiments in a limited number of small contemporary communities, evidence from the folklore of pre-industrial societies, and studies on interethnic violence, such as between Hindus and Muslims in India (e.g., Henrich et al., 2010a; Jha, 2013; Margalit and Shayo, 2021a; Enke, 2022; Agneman and Chevrot-Bianco, 2023; Rustagi, 2023). At the individual level, the challenge in establishing causality lies in the potential self-selection of individuals with specific traits, such as universalist moral values or tolerance for diverse social norms, into market environments, leading them to urban areas with higher market integration. At an aggregate level, the main challenge is addressing reverse causality (Buggle, 2020; Gorodnichenko and Roland, 2011, 2017; Eruchimovitch et al., 2023).

In this paper, we investigate the impact of market integration on the development of WEIRD culture and psychology in the United States. We use the expansion of the railroad network and the significant immigration waves from 1850 to 1920 as sources of exogenous variation in market integration across counties. This historical context enables us to establish a causal relationship between market integration and WEIRD psychology and culture in a highly market-integrated economy over both short (years) and long (decades) time spans, and across a broad geographical area. We find a large positive impact of market access on WEIRD psychological and cultural traits. This effect is concentrated among individuals employed in commerce-intensive industries, while we find no effect in occupations unrelated to commerce. Moreover, we find that the relationship between market access and WEIRD traits is not due to increased

[1] See also Hirschman (1982) for a classic summary of the major perspectives on the impact of market economies on society and individuals.

intercultural contact, economic development, the inflow of information and ideas from other regions, or the development of local legal intuitions. Our findings imply that greater market integration fostered economic interdependence and interactions among unrelated individuals, contributing to the development of WEIRD psychology and culture.

To measure market integration, we build on the seminal work by Donaldson and Hornbeck (2016) and compute a local-level and time-varying measure of 'market access', which captures the degree of market integration potential, for each decade from 1850 to 1920. The metric reflects the ease with which residents of a county can access markets in other counties, a factor that evolves with the growth of the railroad network and changes in population sizes across counties.

To measure key aspects of WEIRD psychology and culture, namely the centrality of the in-group, moral universalism, and social and religious norm looseness, we draw on full-count census data and compute county- and individual-level scores, following the methodology in Raz (2024). In-group centrality and universalism is measured using the Local Name Index (LNI), which captures the extent to which the local communal identity is prevalent in parents' social-identity relative to the national one, and intra-community marriage, which captures in-group bias. Norm looseness is measured using the variability in family related behaviors and religious affiliations.

We conduct two complementary analyses to estimate the causal impact of increased market access on WEIRD cultural and psychological traits, each based on a distinct identification assumption. The first analysis is conducted at the county level, following the approach in Donaldson and Hornbeck (2016). This specification estimates the effect of greater market access on WEIRD psychological traits, controlling for county fixed effects, state-by-year fixed effects, and polynomials of longitude and latitude interacted with year fixed effects. The key source of variation for identification comes from the uneven expansion of the railroad network across counties, leading to varying changes in market access. The identifying assumption is conditional exogeneity of excess changes to counties' market access relative to the rest of the state and broad geographical patterns. That is, that these differential excess changes in the railroad network affecting a county's market access must not be related to unobserved factors that also influence WEIRD cultural and psychological traits.

Using this framework, we first document that market access caused an increase in commerce-related content in local newspapers. This "zero-stage" result validates the market access measure and demonstrates that the local socioeconomic environment responded to variation in market access. We then proceed to explore the impact of market access on WEIRD traits. Our findings suggest that increased market access led to greater universalism and looser norms. It is associated with a lower emphasis of the local, or particular, identity relative to the national one, fewer intra-community marriage, and less variability in family related behaviors and religious affiliations.

The main threat for a causal interpretation of these estimates is the potential endogeneity of railroad construction. Specifically, the concern is that the decision to build railroads in or to a particular county might

be influenced by unobserved local factors that also affect WEIRD traits. For instance, if railroads were built during periods of economic growth in a county, this economic boom could independently contribute to greater universalism and more relaxed social norms, thereby confounding the observed association between market access and WEIRD traits.

To address concerns about the endogeneity of railroad construction, we implement two strategies. First, following Donaldson and Hornbeck (2016), we exploit the network structure of market access and the fact that it is also affected by changes to the railroad infrastructure in far away destinations, and introduce time-varying control for the presence and mileage of local railroads in and around each county. This isolates the identifying variation to changes in market access that are orthogonal to local expansions of the railroad network. The robustness of our results to the inclusion of those controls suggests that they are not confounded by unobserved factors related to local railroad construction and universalism and norm tightness.

Second, following Raz (2024), we implement a second empirical strategy, leveraging individual-level data and within sibling variation in a sample of domestic migrants. Specifically, we use the Census Linking Project (Abramitzky et al., 2022a,b,c,d,e) and information on children's state and year of birth to construct a sample of families that migrated across counties between two decennial censuses and proxy the year in which they migrated. We then compute the difference in market access between the destination county and the county of origin. Finally, using children's LNI to measure parental WEIRD traits, we estimate the causal impact of moving to higher versus lower market access county in a dynamic difference-in-differences framework.

Our results show that relocating to a county with higher market access results in lower Local Name Index (LNI) scores, relative to migrating to a lower market access county, indicating increased parental universalism. Following a parallel trend in the pre-migration period, the LNI score of children born after their family migrated to a higher market access county drops relative to those born after migration to a lower market access county. The impact is immediate, as the effect becomes apparent after one year in the new county, and it persists for at least a decade. Crucially, this evidence aligns with our county-level analysis findings but is based on a distinct identification assumption. Taken together, these consistent results across different analytical approaches reinforce the conclusion that the observed relationship between market access and WEIRD cultural and psychological traits is not an artifact of local economic development or other unobserved local factors that might simultaneously influence both market access and these psychological traits.

Having established a positive effect of market access on WEIRD traits, we turn to explore mechanisms. Markets may affect culture and psychology directly by fostering economic interdependence among diverse individuals and indirectly through several pathways. Directly, integration into impersonal markets, characterized by competitive exchanges among strangers, may affect cultural traits because it increases economic interdependence among individuals from diverse backgrounds and promote transactions that go

beyond familiar networks of family and friends. In such a market setting, success increasingly hinges on the ability to cultivate a reputation for fairness, honesty, trustworthiness, tolerance, and cooperation with strangers (Smith, 1776; Tabellini, 2008; Buggle and Durante, 2021; Henrich, 2020). Indirectly, market access could enhance population diversity through migration, potentially enhancing inter-group contact, which could lead to greater universalism and normative looseness (e.g., Bursztyn et al., 2024; Gelfand, 2018). Another possibility is that market access boosts incomes, which in turn may induce universalism and normative looseness (e.g., Inglehart, 2018). Greater market access might also facilitate the influx of information and ideas from other regions, potentially exposing individuals to universalism and normative looseness. Finally, a higher market integration could support the development of local legal intuitions that are needed to support trade by solving the "fundamental problem of exchnage" (Greif, 1993; Cantoni and Yuchtman, 2014). By improving institutional quality, this might contribute to the development of WEIRD traits (Gorodnichenko and Roland, 2017; Henrich, 2020; Eruchimovitch et al., 2023).

Our findings align more closely with the direct channel than with the indirect channels. First, using the difference-in-differences framework, we find that the impact of market access on WEIRD traits is concentrated in individuals employed in commerce-intensive industries, defined as industries engaged in trade with distant markets (e.g., agriculture) or fundamental to market operations (e.g., wholesale and transportation), contrasting with industries focused on local service provision (e.g., utilities and public administration). This suggests a direct link between commerce and WEIRD traits, rather than through socioeconomic environmental factors.

Second, further analyses of the indirect channels using county-level data indicate that while there is an initial positive association between market access and the most plausible candidates for indirect channels, these associations weaken or become insignificant once local railroad connectivity is accounted for. Specifically, measuring population diversity using the immigrant population share or birthplace diversity within counties, we find positive associations with market access in our baseline specification, but when we control for local railroad infrastructure, the coefficients drop in magnitude, and, unlike the case of WEIRD traits, become insignificant. Similarly, we find positive effects on occupational income score—a common proxy for income for this historical period when direct income data is unavailable—and on the per capita number of telegraph workers in the county, serving as a proxy for access to information from distant places. However, these coefficients become statistically insignificant when we control for local railroad connectivity.[2] The only potential indirect channel that the evidence from this empirical exercise support is the development of legal intuitions.

Third, we find that including any or all of these variables as controls in our county-level analysis of WEIRD culture and psychology on market access has little impact on the results. We note that these variables may be "bad controls"—being potential outcomes of market access themselves— and therefore do not provide causal evidence. Nevertheless, they suggest that the effect of market access on WEIRD

[2]We also find negative or negligible effects of market access on urbanization rates and the number of manufacturing establishments per capita.

culture and psychology is not significantly mediated through these indirect channels. In summary, the evidence leans towards a direct impact of market interactions on WEIRD traits, rather than through increased population diversity, economic growth, information flow, or the development of legal institutions.

Our research contributes to several strands of literature. It adds to the growing interdisciplinary literature on the historical roots of individualism-collectivism, moral universalism, cultural tightness and related cultural cleavages (Schulz et al., 2019; Henrich, 2020; Bazzi et al., 2020; Beck-Knudsen, 2019; Enke, 2019; Gelfand, 2011; Raz, 2024; Posch, 2021). Our paper highlights the role of market integration in shaping aspects of WEIRD psychology and culture. The most closely related work to ours is Henrich et al. (2010a), who find an association between calories purchased from markets and fairness in behavioral games across 15 mostly small-scale societies; Agneman and Chevrot-Bianco (2023), who find a correlation between occupational choice and honesty in experiments across 13 villages in Greenland; and Rustagi (2023), who finds a potentially causal link between market proximity and civic values (measured by cooperative behavior in public goods games) across 52 villages among the Oromo in Ethiopia and attributes a significant role to the demand for such values when information about goods and services is asymmetric. Similarly, Enke (2022) shows a correlation between market-related concepts in a pre-industrial societies' folklore and folklore-based measures of morality. We contribute to this earlier work by demonstrating causality and shedding light on the mechanisms through which market integration shaped WEIRD psychology in the historical United States.

This paper also relates to the line of research studying the impact of markets and trade on conflict and compromise, ethnic tension, and general trust (Jha, 2013; Jha and Shayo, 2019; Margalit and Shayo, 2021b; Buggle and Durante, 2021). Our results suggest that the impact on those factors may be one aspect of a broader impact on WEIRD cultural and psychological traits.

Finally, our paper ties into the literature on the contribution of the railroads to the development of the American economy (Fogel, 1964; Donaldson and Hornbeck, 2016; Hornbeck and Rotemberg, in press) and the importance of trade to growth more generally. Our results suggest that trade may have a so far underexplored indirect impact on long-run economic development, by nurturing cultural and psychological traits conducive to growth and innovation.

The rest of this paper is organized as follows: Section 2 briefly describes the conceptual framework and historical background. In section 3, we explain how we measure market access and aspects of WEIRD culture and psychology. Section 4 presents our main results, and section 5 explores potential mechanisms. Section 6 concludes.

2 Concepts and Historical Background

2.1 Conceptual Framework

Cultural evolutionary theory suggests that individualistic cultural traits evolve to facilitate cooperation in large-scale societies that extend beyond immediate family and in-group members. This theory posits that the mechanisms which enable cooperation in smaller, kin-based groups are unsuitable for the complex social interactions found in larger, more integrated markets and societies (Henrich et al., 2005; Ensminger and Henrich, eds, 2014; Henrich and Muthukrishna, 2021). Individualistic traits such as impersonal fairness, generalized trust, and norm tolerance are seen as adaptive responses to the challenges of cooperating in large-scale societies where interactions with strangers are common. Key elements of this perspective have been introduced to the economics literature by Tabellini (2008).

Market interactions may not only necessitate but also promote the development and reinforcement of individualistic norms and traits (Henrich et al., 2010a). This is because markets often involve impersonal transactions with anonymous others, which are facilitated by individualistic cultural traits. The anonymity of market transactions contrasts with the personalized exchanges typical within kinship groups, requiring a cultural adaptation towards more universalistic norms and a greater tolerance for norm diversity. These traits enable individuals to engage effectively in market-based cooperation, which is essential for the functioning of complex economies.

From this perspective, market integration is predicted to act as a catalyst for cultural evolution by directly influencing people's psychology and culture. This direct influence is two-fold: it involves the long-term evolution of "market norms" (Henrich, 2020) —i.e., established standards for judging oneself and others in impersonal transactions and internalization of motivations for trust, fairness, and cooperation with strangers and anonymous others—as societies become increasingly integrated into market economies, and it also involves the shorter-term learning or adaptation of individuals to market norms as they engage in market activities.

Indirectly, market access could affect the development of WEIRD traits through four main pathways. First, it could induce migration, increasing population diversity, which in turn may reduce prejudice as diverse groups interact more closely (Allport, 1954). This may also foster a more individualistic culture, including looser social norms, as people learn to become more tolerant of other groups with different norms (Gelfand, 2018).

The second pathway through which greater market access may indirectly influence individualistic cultural traits is by spurring the transition from traditional, agrarian societies (where social cohesion and integration come from the homogeneity of individuals) to modern, industrial societies (where cohesion arises from the interdependence of individuals performing specialized tasks), benefiting the cultivation of more individualistic cultural traits, as these traits are adaptive in environments where social and economic interactions extend beyond the immediate community to include a wide range of impersonal and diverse

relationships (Durkheim, 1984; Greenfield, 2009; Inglehart, 2018).

The third possibility for how market integration may indirectly affect culture is by facilitating the dissemination of new ideas and information. This process can occur through various channels, including migrants, newspapers, or communication technologies like the telegraph, which expose communities to a broader array of cultural norms, values, and behaviors, which can catalyze changes in local cultures.

Finally, due to the necessity to solve the "fundamental problem of exchange", a higher degree level of trade and market integration may have induced the local development of legal intuitions (Greif, 1993; Cantoni and Yuchtman, 2014). This more generally potentially brought about an increase in the quality of local institutions and public administration, which in turn, could have strengthened WEIRD cultural and psychological traits (Gorodnichenko and Roland, 2017; Henrich, 2020; Eruchimovitch et al., 2023).

2.2 Historical background

Between 1850-1920, the U.S. experienced a significant expansion of its railroad network. In our data, the total railroad mileage increased from $8,996$ miles in 1850 to $237,675$ in 1920. Appendix Figure A.1 visualize this expansion by plotting the railroad network at each decade between 1850-1920. This significant expansion brought about a dramatic decrease in the cost of transportation across the country. Importantly, the construction of the transcontinental railroads connected the Pacific coast, and more generally the West, to the eastern railroad network, making them more accessible for trade and migrants. But this expansion did not only lower transportation costs across long distances. Some locations, such as the Midwest and the Northeast, benefited from a denser railroad network that also significantly lowered the cost of local transportation.

At the same time, the U.S. also experienced a dramatic increase in total population, which rose from about 23 to 106 million. This was the "Age of Mass Migration", during which the "US borders were completely open to European immigrants" (p. 468 Abramitzky et al., 2014) and about 30 million of them arrived at the U.S. Beside Europe, migrants were also arriving in large numbers from other counties in North and South America, mainly Argentina, Canada, and Brazil.

The combination of a large domestic market and cheaper means to transport goods, implied a significant increase in market access for both consumers and producers across the country, which was conducive to economic development and the settlement of the rural areas of the country (Donaldson and Hornbeck, 2016; Chan, 2022).

3 Data

3.1 Market Access

Building on a model of trade among U.S. counties, Donaldson and Hornbeck (2016) define an empirical first-order approximation to counties' market access as follows:

$$MA_{ot} = \sum_{d \neq o} \tau_{od,t}^{-\theta} N_{dt}$$

Where o denotes the county, d denotes all other counties that are potential trade partners to o, and t denotes year. $\tau_{od,t}$ is the trade costs between o and d in year t, and N_{dt} is the size of the population in county d and year t, which proxies for the size of its market. θ is the trade elasticity, which, following Donaldson and Hornbeck (2016), is set to equal 8.22 in the baseline specification.

We use data on county-to-county transportation cost matrices from Donaldson and Hornbeck (2016) and county-level population data from Manson et al., 2020 to calculate counties' market access for each decade between 1850-1920. The transpiration cost matrices hold cost parameters and county borders constant at 1890 levels. Variation in county-to-county costs are therefore driven by changes in transportation infrastructure—water canals and railroads. To match the transportation cost data, we harmonize population holding county borders fixed at 1890 using the procedure in Hornbeck (2010).

Appendix Figure A.2 maps log market access for each census year between 1850-1920. Significant differences in market access across different regions of the U.S. are visible. Specifically, market access is generally the highest in the Northeast and the Midwest, and lowest in the West. Panel A in Figure 1 documents the significant increase in average log market access within our sample period. The blue curve represents market access calculated using the contemporaneous transportation costs and population, and the dark red curve fixes transportation costs to 1850. This figure makes clear that the main driver for the increase in market access was the decline in transportation costs due to the expansion of the railroad network. Panel B shows that the average increase masks significant spatial heterogeneity. Areas that had lower levels of market access in 1850, which were generally the less settled and developed areas of the county, tended to experience a larger absolute increase in market access between 1850-1920.

3.2 Market Language in Newspapers

We develop a metric for commerce-related content in historical U.S. newspapers. To construct this metric, we draw on text data from *newspapers.com*, the largest online archive of historical U.S. newspapers. This archive digitizes newspapers via optical character recognition (OCR), allowing for the retrieval of keyword frequencies by newspaper or county, rather than full text downloads.

Given this data access limitation, our methodology involves a dictionary-based measure of commerce-related content. We generate the dictionary by inputting five commerce-related seed words into *ChatGPT 4*, instructing it to augment this list to 100 keywords reflective of 19th-century U.S. newspaper language.[3] The resulting top ten keywords are: "buy", "sell", "money", "price", "trade", "market", "exchange", "goods", "services", and "commerce". For each keyword, we compute the share of pages featuring the

[3]We use this prompt: *I want to compile a dictionary of keywords to detect content related to commerce, markets, and exchange in 19th century US newspapers. examples are "buy", "sell", "money", "price", "trade". Create a list of 100 keywords.*

keyword. In our main analysis, we define the dependent variable as the mean share of the top ten keywords to obtain a composite market language indicator. For validation, we extend this approach to the top 20, 50, and 100 keywords, finding a strong correlation among these indicators ($\rho > 0.94$).

3.3 WEIRD Culture and Psychology

We use several county and individual-level measures of WEIRD cultural and psychological traits from Raz (2024), calculated using the 1850-1920 full count censuses (Ruggles et al., 2020) and the censuses of religious bodies (Manson et al., 2020). The outcome variables are constructed maintaining 1890 county boundaries using the harmonizing procedure in Hornbeck (2010).

The Local Name Index (LNI). The LNI is focused on in-group identity, and uses children's first names to measure the extent to which the local communal identity is prevalent in parents' social-identity, relative to the national social identity. Following Fryer and Levitt (2004), the LNI is defined as:

$$LNI_{nlgt} = 100 \times \frac{Pr(n|l,g,t)}{Pr(n|l,g,t) + Pr(n|-l,g,t)}$$

where n is a particular first name, l is the county, $-l$ is all other locations, g is gender, and t is the census year. The index captures the probability that a name is given to a local child relative to a child in different locations in the U.S. It ranges from 0-100, where values of 100 and 0 reflect distinctively local and foreign names, respectively, and a value of 50 implies that a name is equally likely to be given to local children and children elsewhere in the country.

Similar indices following Fryer and Levitt (2004) and focusing on in-group identity were recently used by studies in the immigration and assimilation literature (e.g., Fouka, 2019; Abramitzky et al., 2020). Here, the focus is on locality rather than race, ethnicity of nationality.

Panels A and B in Figure 2 plots the spatial distribution of the LNI in 1850 and 1920, and Panel A in Appendix Figure A.3 plots the change in the LNI between those years. The spatial distribution of the LNI in 1850 and 1920 captures intuitive cultural patterns. First, in early stages of development (e.g., frontier counties in 1850), names tented to be more "local," indicating lower universalism. Second, the cultural spatial patterns in 1920 match many of the cultural pattern evident today. Specifically, the West coast, the Northeast, and large metro areas tend to be universalist, while for the South, the wheat belt, and Utah the opposite is true. Finally, locations that were in early stages of development in 1850 experienced on average a high decrease in the tendency to give children local names.

Intra-Community Marriage (ICM). The ICM focuses on in-group preference in spouse selection by measuring the tendency of individuals to marry within the community. The in-group is defined in terms of birthplace: for native-born individuals we use the state of birth and for foreign-born individuals the country of birth. The county-level ICM is the share of married couples that have a common birthplace.

Panels C and D in Figure 2 plots the spatial distribution of the ICM in 1850 and 1920, and Panel B in Appendix Figure A.3 plots the change. Some of the spatial patterns described above for the LNI are also evident for the ICM, however, the ICM also displays a clear East-West division, whereby the share of same-birthplace spouses in the East tends to be much higher.

Tight Norms Index (TNI). The TNI is focused on cultural tightness (Gelfand et al., 2006; Gelfand, 2011; Posch, 2021) of familial norms. The index is constructed in the following way: first, the coefficient of variance of the mother's age at first birth, the total number of children, and the number of distinct families residing in the same house are computed. Then, the first component from a PCA is defined as the TNI. When computing the index, the sample is restricted to households with married mothers between the ages of 35-44 to avoid capturing variation originating from demographics rather than culture and psychology.

Panels E and F in Figure 2 and Panel C in Appendix Figure A.3 plots the spatial distributions of the TNI in 1850, 1920, and the change between those years, respectively. Here too it seems that the level of development matters for WEIRD traits, as counties in early stages of settlement in 1850 tend to be highly tight. In 1920, the West, and to a lower extent, the Northeast, seem to be quite loose, while Utah and much of the South and Midwest tend to be tighter. Also, large metro areas (e.g., Dallas county in Taxes, Jefferson County in Alabama, or Shelby and Davidson Counties in Tennessee) tend to be more loose than surrounding counties.

The Religious Homogeneity Index (RHI). The RHI is focused on religious tightness. County-level data on the number of members of religious institutions by denomination between 1850-1916 (Manson et al., 2020) is used to calculate the Herfindahl–Hirschman Index over the share of members of religious denominations. Intuitively, the index captures the degree to which multiple religious identities exist within a community. Formally:

$$RHI_{ot} = \sum_{j} s_{ojt}^2$$

where s_{ojt} is the share of members of religious denomination j in county o in year t out of the total number of members in religious institutions in county o year t. The RHI is standardize into z-scores within each year.

Panels G and H in Figure 2 and Panel D in Appendix Figure A.3 plots the spatial variation in the data.

4 Main Result

In this section we explore the impact of market access on WEIRD culture and psychology using two different empirical frameworks. First, we use a county-level analysis that exploits excess changes in counties' market access that are orthogonal to local variation in railroad network (section 4.1). Second, we exploit individual-level data on domestic migrants in a difference-in-differences framework (section

4.2). Using both strategies we find that market access had a positive impact on WEIRD cultural and psychological traits.

4.1 County-Level Analysis

4.1.1 Estimation framework

We start by following the baseline specification in Donaldson and Hornbeck (2016) and estimate regressions of the following form:

$$outcome_{ot} = \beta ln(MA_{ot}) + \delta_o + \delta_{s(o)t} + f(x_o, y_o)\delta_t + X'_{ot}\gamma + \epsilon_{ot} \quad (1)$$

Where o and t denote county and year, respectively, δ_o is a county fixed effect, $\delta_{s(o)t}$ is a state-by-year fixed effect, $f(x_o, y_o)\delta_t$ is a cubic polynomial in longitude and latitude interacted with year fixed effects, and X_{ot} is a vector of additional potential time-varying controls. β is the coefficient of interest, representing the relationship between log market access and the outcome of interest. We cluster standard errors at arbitrary spatial grids to account for spatial auto-correlation, as proposed by Bester et al. (2011). Our baseline specification uses a grid size of 100 miles square, but results are robust to using cells of different sizes.

The identifying assumption in this framework is conditional exogeneity. County fixed-effects imply that the impact is identified from counties' temporal variation in market access, after all the variation resulting from average cross-sectional differences has been partialled out. The additional county-by-year fixed effects further remove all of the temporal variation that is shared by all counties in the same state, which can relate to both geographical and institutional factors, therefore identifying the impact of *excess* changes in counties' market access relative to other counties in the state. Finally, the cubic spatial polynomial interacted with year fixed effects flexibly removes from the data all time-varying smooth geographical variation, implying that the impact of market access is identified from counties' excess changes relative to their state and broad flexible spatial patterns in the country.

While those controls deal with the most obvious threats to identification given the historical context, a remaining identifying concern is that even those excess conditional changes in counties' market access might also be endogenous. There are two general concerns. The first is a reverse causality concern. Specifically, it may be the case that counties that experienced an excess increase in WEIRD traits became more favorable to trade, which generated endogenous expansions of the local railroad network. The second is an omitted variable concern. For example, it might be the case that a positive shock to counties' economic development would positively impact both local railroad connectivity and local WEIRD traits.

Following Donaldson and Hornbeck (2016), we address this concern by exploiting the network structure of market access, which implies that counties' market access is affected not just by trade infrastructure in the county itself or close-by, but also from changes in far away destinations. Therefore, by controlling for

local railroads, the impact of market access can be estimated using only the variation in excess changes in market access that are orthogonal to the expansion of the railroad network in and around the county.

4.1.2 Results

Market Language. First, we use equation 1 to explore the impact of market access on the commerce-related content in local newspapers. Table 1 presents the results. We find a robust and stable relationship between market access and market language. The baseline specification (column 2) suggest that a 1 percent increase in market access increases the mean share of commerce-related content in local newspapers by 0.0158 (p-value < 0.01). This is a substantial effect relative to a mean and standard deviation of 0.466 and 0.116.6, respectively. The impact remains remarkably stable when time-varying controls for local railroad access in and around the county are introduced (columns 3-6). Following the specification in Donaldson and Hornbeck (2016), in column 3, we add a time-varying dummy variable that equals one of the county has any railroad track, and zero otherwise. In column 4, we also control for a cubic polynomial in total railroad mileage in the county. Column 5 additionally controls for railroad presence and a cubic polynomial in railroad mileage within a 10-mile buffer around each county, and column 6 adds the same for 20, 30, and 40-mile buffers. Appendix Table B.1 documents that this finding is robust to using different thresholds for the words most related to commerce-related content. Specifically, the result hold when a threshold of 20, 50, or 100 top words are used.

We view this empirical exercise as a "sanity check" or a "zero-stage" result. First, it validates the measure of market access. Second, is shows that the local socioeconomic environment is responding to changes in market access, and that this response can be identified even from counties' excess changes in market access that are orthogonal to local expansions of the railroad network.

WEIRD Traits. Next, we turn to explore the impact of market access on WEIRD cultural and psychological traits, using all four measures. Table 2 reports results for six different specifications, and Figure 3 plots graphical representations of the results from the baseline specification (column 2).

Panel A focuses on the LNI, and finds that market access resulted in a lower tendency of parents to identify with the local identity relative to the national one. The results from column 2 suggest that a 1 percent increase in market access results in a 0.93 (p-value < 0.01) decrease in the average LNI, a substantial impact relative to a mean value of 67.81 and standard deviation of 6.6. Columns 2-6 suggest that a relatively large share of this impact is driven by the expansion of railroads in and around the county. Yet even when the existence of railroads and a cubic polynomial in railroad length in the county, and in 10, 20, 30, and 40-mile buffers around it are controlled for, the association between market access and the LNI remains negative and economically and statistically significant (p-value = 0.033).

In Panel B we examine the impact of market access on a preference for an in-group spouse. We find a robust negative association, however statistical power is low. The results of our baseline specification in

column 2 suggest that a 1 percent increase in market access is associated with a 0.69 (p-value = 0.062) percent decrease in the tendency to marry a same-birthplace spouse. However, when controls for local railroad connectedness beyond a dummy variable for railroad in the county are introduced, the coefficients attenuates and become statistically insignificant.

Panels C-D focus on cultural tightness and find strong and highly robust negative effects. That is, that markets contribute to a looser culture. In our baseline specification, the impact of a 1 percent increase in market access is a 0.17 and 0.272 (p-values < 0.01) standard deviation drop in the TNI and the RHI, respectively. Controlling for local railroads and identifying an impact using only variation in excess market access that is orthogonal to the expansion of railroads in and around the county (columns 3-6) results in some attenuation of the coefficients, yet they remain highly economically and statistically significant.

Robustness. Appendix Table B.2 shows that the baseline results are not sensitive to the inclusion or exclusion of immigrants and non-whites in the sample from which the county-level measures of WEIRD traits are calculated. Appendix Figure B.1 documents robustness to alternative ways to account for spatial auto-correlation.

4.2 Individual-Level Analysis

We follow Raz (2024) and leverage individual-level data on the children of domestic migrants and their LNI scores to estimate the causal treatment effect of moving to location with a higher market access in a difference-in-differences framework. To construct the sample of domestic migrants, we first use the Census Linking Project (Abramitzky et al., 2022a,b,c,d,e) to link heads of household to their record in the previous decennial census. Focusing on individuals that migrated across states, we then use information on their children's year and state of birth to proxy for the year of migration as the midpoint between the year of birth of the last child born in the state of origin and the first child born in the destination state. We fuzzy match households counties of residence in both periods to 1890 counties to match the market access data based on the geographical overlap of counties' boundaries. In this probabilistic match, individuals can be matched to multiple 1890 counties of origin and destination, with varying probability weights. Finally, we compute the difference in market access between the destination county and the county of origin at the time of the later census.

Estimation framework. To identify the causal impact of market access on universalism, we use a fully dynamic *Difference-in-Differences* framework, comparing the LNI score of children born in families that migrated to a higher versus lower market access county, before and after the migration. Regressions take the form:

$$LNI_i = \delta_{b(i)} + \theta_{f(i)} + \sum_{b \neq 0} \beta_b \cdot \mathbb{1}\left[b(i) = b\right] \cdot \mathbb{1}\left[MA_{d(i)} > MA_{o(i)}\right] + X_i\Omega + \epsilon_i \tag{2}$$

where LNI_i is the LNI score of child i, who currently resides in county $d(i)$, and was born $b(i)$ years relative to the year the family $f(i)$ migrated from county $o(i)$ to county d. $\delta_{b(i)}$ is a relative-year-of-birth fixed effect, which controls for the dynamics in universal identification relative to the year of migration in the baseline of families that migrated into a lower market access county. $\theta_{f(i)}$ is a family fixed effect, which removes all of the variation that is common among siblings, including the family's migration path from county of origin o to destination d, as well as its fixed cultural and economic characteristics. X_i is a vector of child i characteristics, which includes gender, birth order, and a 5-year cohort fixed effects, that we include as a robustness check. We cluster standard errors ϵ_i at the county of destination d (Bertrand et al., 2004), but results are robust to two-way clustering. Whenever families are fuzzy-matched into multiple 1890 county borders, we treat duplicated families as separate, and weigh observations by the probability that an individual i is matched to 1890 counties o and d, such that the total weight of each individual is one. β_b are the coefficients of interest, which identify the impact of moving to a higher versus lower market access county on communal identification. We normalize β_{-1} to zero so that β_b is interpreted as the effect relative to the year just before the migration. Note that this specification uses "event-time" rather than "calendar-time", implying that all families are first treated between $b = 0$ and $b = 1$. Therefore, concerns relating to negative weights in TWFE regressions with staggered treatment timing, or more generally in designs in which groups experience different evolution of their exposure to treatment over time, as highlighted in the recent literature (e.g. Borusyak et al., 2024; De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Sun and Abraham, 2020), do not arise.

Results. We find that migrating to a location with a higher market access increases universalism. Figure 4 plots estimates of and 95% confidence intervals β_b from our baseline specification. Before the migration, we find no differential trends in universalism, as captured by children's LNI, across families that moved to a higher market access county, relative to families that moved to a lower market access county. This validates the empirical design, suggesting that there was no selective in-migration on prior trends of universal identification. However, in the first year after the migration the trends diverge. The LNI score of a child born one year after her family moved to a higher market access county drops by -2.45 ($p-value < 0.01$) points relative to a child born one year after migration to a lower market access county. The impact remains roughly stable in the following years, as the LNI score of a child born 10 year after the family migrated to a higher market access county is -2.85 ($p-value < 0.01$) points lower from that of a child born to a family that experienced a decline in market access. Table 3 reports the estimates from "static" DID and designs that aggregates the effect over all post-migration periods. The findings are consistent with that of the dynamic specifications. The estimate in column 1 suggests that the LNI of children born to families that experienced an increase in market access due to migration was about 2.35 ($p-value < 0.01$) points lower relative to children born to families that experienced a decrease in market access.

One concern with interpreting the results as indicating a negative impact of market access on the cen-

trality of local identity, is that migration implies a change in the definition of "local". That is, the LNI measures that degree to which the local or communal identity is prevalent in parents' social-identity relative to the national social identity, but because here we are focusing on migrants, maintaining a higher degree of social identification with the origin is likely to imply a lower degree of social identification with the destination. If that is the case, then a relative decrease in the LNI may reflect an decrease in universalism rather than an increase. To explore this possibility, we also compute a version of the LNI in which we hold fix the definition of "local" at the county of origin. That is, for children born after migration, the LNI is *not* computed for their county of birth, but for their family's previous county of residence. We then use this version of the LNI and equation 2 to estimate the impact of moving to a higher versus lower market access county on identification with the *previous* community. Column 3 in Table 3 and Appendix Figure A.4 present the results. The findings are qualitatively similar, documenting a negative and highly significant causal impact of market access on local identification, that is, a positive impact on universalism. Quantitatively, the impact in smaller.

Robustness. This finding is robust to variation to specification, treatment definition, and inference. Appendix Figure B.2 and columns 2 and 4 in Table 3 document that the finding is robust to controlling for gender, birth order, and a 5-year cohort fixed effects. Appendix Figure B.3 documents that the finding is robust to two way clustering at the counties of destination and origin. Appendix Figure B.4 documents that the finding is robust to using a continuous definition of treatment—the difference in log market access, instead of a binary one.

5 Channels

This section examines mechanisms. Market access may influence WEIRD culture and psychology though both direct and indirect channels. Directly, economic interdependence with anonymous others may induce humans to learn a sense of impersonal prosociality, universalism and tolerance of other norms, for example, as they experience the benefits of economic interactions with them. Indirectly, market access could affect WEIRD traits via four pathways: increased migration enhancing population diversity and thereby fostering a more universalist and less tightly-knit local culture (Allport, 1954; Gelfand, 2018); economic development prompted by markets leading to more universalist culture, as suggested by (Greenfield, 2009); the dissemination of new ideas and information through migrants, newspapers, or technologies like the telegraph, which could change local cultures (e.g., Beach and Hanlon, 2023); and the development of local legal institutions (Greif, 1993; Cantoni and Yuchtman, 2014), which can improve institutional quality and induce WEIRD traits (Gorodnichenko and Roland, 2017; Henrich, 2020; Eruchimovitch et al., 2023).

We present evidence suggesting that, first, market integration has a direct impact on WEIRD traits, as it affects only individuals working in commerce-intensive industries. And, second, that relationship

between market access and WEIRD culture and psychology is unlikely to be attributable solely to the indirect channels considered.

5.1 The direct impact of commerce

We present evidence suggesting that the impact of market access on WEIRD traits steam from a direct and inherent effect of commerce. To do so, we use information on the industries migrants worked in. Intuitively, if indeed the impact relates to the fact that commerce generates a dependence on, or requires the cooperation of, anonymous out-group members, then, as some industries are more commerce-intensive than others, the extent to which migrants are expected to be impacted by a change in market access depends on the industry they work in.

We divide industries into two broad categories. The first category, which we refer to as *commerce-intensive*, includes industries that tend to sell to far-away markets (e.g., manufacturing and agriculture), or those that form an essential part of the functioning of markets (e.g., wholesale, retail, and transportation). The second, which we refer to as *commerce-moderate*, includes industries that mostly service the local economy (e.g., construction, utilities, real estate, entertainment and recreation, personal and professional services, and public administration). We then limit the sample of domestic migrants to households in which the father remained in the same category before and after the migration, and estimate the causal impact of moving to a higher market access county separately for each category.

Figure 5 presents the results. Panel A plots the dynamic impact of moving to a higher market access county, relative to moving to a lower market access county, when the sample only includes individuals working in commerce-intensive industries. The dynamic effect is similar to that estimated using the whole sample, suggesting a positive impact on WEIRD traits. Panel B plots the dynamic impact when the sample only includes individuals working in commerce-moderate industries. It suggests that moving to a higher vs lower market access county has no impact on WEIRD traits in this group. This pattern of heterogeneous response to changes in market access supports the hypothesis that market integration has an inherent and direct impact on WEIRD traits. Furthermore, the finding of a null impact among individuals working in commerce-moderate industries suggests that it is unlikely that the relationship between market access and WEIRD traits is driven by the indirect channel, since those can be expected to affect all residence in the county, at least to some extent.

There are two related concerns regarding this results. About 53% of domestic migrants' households in which the father remained in the same category were farmers. Since farmers belong to the commerce-intensive category, one might be concerned that the finding is unique to, or driven by, farmers, or that it is driven by the significant differences in sample size across the two broad categories.[4] To address those concerns, in Appendix Figure A.5 we splits the commerce-intensive group into two sub-groups: those

[4]Specifically, the DID analysis in the commerce-intensive category has 266,001 observations, compared to 25,390 in the commerce-moderate category.

who were farmers in both periods, and those who where non-farmers in both periods,[5] and estimate the impact of moving to a higher market access county separately in each subgroup. The figure documents that the impact on both subgroups is similar, suggesting that the finding is not driven by farming or number of observations.

5.2 Indirect channels

In this section we provide a few indirect tests to evaluate potential role of indirect channels in generating the positive impact of market access of WEIRD traits, and find that they are unlikely to be central. While informative, the test we present below only provide suggestive evidence that can not rule out the possibility that indirect channels played an important role.

Population diversity. Before discussing the additional analysis exploring the potential role of population diversity, it is useful to recall that our results are robust to the inclusion or exclusion of immigrants and non-whites in the sample (Appendix Table B.2), suggesting that diversity is unlikely to be a central mediating factor. Nevertheless, we proceed to test the possibility that market access affected WEIRD psychology and culture through its impact on population diversity more formally. To do so, we calculate for each county-decade the population share of immigrants and a birthplace diversity index, defined as one minus the Herfindahl-Hirschman Index over birthplaces.

We then use those measure to conduct three tests. First, we estimate the effect of market access on these two outcomes using equation 1. Panel A and B of Table 4 presents the results. We find a positive and significant association between market access and both measures of population diversity in columns 1 and 2, which become insignificant and drop in magnitude once local connectivity to railroads is controlled for (columns 3-6). This suggests that population diversity is not affected by market access per se, but by local connectivity to railroads.

Second, we include both variables separately as additional "bad controls" in equation 1 to examine their potential role as mediators. The results are presented in columns 2 and 3 of Table 5. Column 1 repeats our baseline estimate without the additional controls. We find that the estimated impact of market access on WEIRD culture and psychology is virtually unchanged by the inclusion of both measures of population diversity. This suggests that the relationship between market access and WEIRD traits does not operate through an increase in local population diversity.

Third, we estimate the treatment effect of migrating to a county with a higher immigrant share and a higher birthplace diversity, relative to county with lower values, using the framework (equation 2). The results are presented in Appendix Figure A.6. We fail to find an effect.

Taken together, these findings suggest that the relationship between market access and WEIRD culture

[5] Note that since some individuals change their occupation after the migration, the union of the two sub-groups is smaller than the commerce-intensive group. The DID analysis of farmers includes 152,319 observations, and of the commerce-intensive non-farms 50,430.

and psychology is unlikely to be driven by population diversity.

Economic development. To test for the role of economic development as a channel, we would ideally have a measure of economic development such as GDP or income at the county-decade level. Unfortunately, such data is not available for the time period we study. Instead, we use three common proxies for local economic development in the period of our study: the share of the urban population, the number of manufacturing establishments per captia, and the mean occupational income score. We then estimate the effect of market access on these three outcomes using equation 1. Panel C-E of Table 4 present the results. We find *negative* effects of market access for the first two measures of economics development, which are statistically significant for the urban population share. This is consistent with the evidence in Chan (2022), who finds that market access increased total agricultural output but not in per capita terms, as the increase was offset by a rise in rural population. Somewhat contrary to that, we find a positive relationship with the mean occupational income score, we find a positive relationship, but it becomes statistically insignificant when local connectivity to railroads above having any railroad in the county is controlled for (columns 4-6).

Next, we include the three proxies for economic development separately as additional controls in equation 1. The results are presented in columns 4-6 of Table 5. We find that the estimated impact of market access on WEIRD culture and psychology changes little when the share of urban population or occupational income scores are included as a controls, and it becomes more *negative* for three of four outcomes when manufacturing establishments per capita is included, although the change in coefficient size is not statistically significant and is mostly a result of the change in sample due to data availability.

In sum, these findings are inconsistent with the possibility that the effect of market access on WEIRD culture and psychology can be explained through its effect on economic development.

Information flow. We also explore the role of information flow as a channel. While we do not have direct measures of information flow, we use the number of telegraph workers per 1,000 workers in the county as a proxy for the potential inflow of information through the emerging telegraph technology. We then estimate the effect of market access on this outcome using equation 1. Panel F of Table 4 presents the results. We find a positive and significant association between market access and the population share of telegraph works in columns 1 to 3, which become insignificant and drop in magnitude once local connectivity in the form of railroad mileage is controlled for (columns 4-6). Next, we include the telegraph measure as an additional "bad control" in equation 1. As reported in column 7 of Table 5, the estimated impact of market access on WEIRD culture and psychology is virtually unchanged by this inclusion. Hence, these results lead us to conclude that the inflow of information is unlikely to be a major channel through which market access affected WEIRD culture and psychology. This conclusion remains preliminary, however, as we plan to conduct additional test with a wider set of proxy measures for information flow.

Legal Institutions. Finally, it is also possible that the increase in trade following higher market access induced the development of local legal institutions, due to the need to solve the "fundamental problem of exchange" (Greif, 1993; Cantoni and Yuchtman, 2014). The increase in institutional quality might have, in turn, strengthened WEIRD cultural and psychological traits (Gorodnichenko and Roland, 2017; Henrich, 2020; Eruchimovitch et al., 2023). To assess this possibility, we use data on the number of lawyers and judges per 1,000 workers in the county to proxy for the development of legal institutions. Panel G in Table 4 documents a positive and significant association between market access and the degree of development of local legal institutions, that is robust to local railroad connectivity. This provides further empirical support for the centrality of legal institutions for trade. However, the findings presented in column 8 of Table 5 suggest that legal institutions were is unlikely to be a central part of the story, as the estimated impact of market access on WEIRD culture and psychology remains stable when the time-varying proxy for legal institutions is included as a "bad control" in the estimation of equation 1.

6 Conclusions

Focusing on the United States, during the period when it rose to become the world's largest and most integrated economy (1850-1920), we study the impact of market integration on WEIRD culture and psychology. A large body of theories and scholars going back to enlightenment thinkers posit that market interactions benefit from fair dealing and honesty with strangers, giving rise to a demand for impersonal prosocial norms. We measure counties' market integration by their market access, as developed by Donaldson and Hornbeck (2016), which evolved as a function of the growth of the railway network and mass immigration from 1850 to 1920. To measure the centrality of the in-group, moral universalism and norm looseness, key aspects of WEIRD psychology and culture, we use a variety of measures from census and newspaper data, including the Local Name Index (LNI) and the looseness of family norms and religious affiliations. In our analysis, we first identify the causal effect of market access on WEIRD psychology and culture in a county-level framework that leverages excess changes in market access that are orthogonal to local changes in railroad infrastructure. We find that increased market access led to greater universalism and looser norms. We then move to an individual-level difference-in-differences analysis, estimating the impact of migrating to a higher versus lower market access location. We find that, following a parallel trend in the pre-migration period, the LNI score of children born after their family migrated to a higher market access county drops relative to those born after migration to a lower market access county. Building on distinct identification assumption, these analysis suggest a consistent conclusion: market integration foster WEIRD psychology and culture. Our analysis closes by presenting results documenting that the impact is limited to individuals working in commerce-intensive industries, and suggesting that the impact is not explained by an indirect effect operating through markets' impact on population diversity, economic development, access to information, or the development of local legal institutions. This leads us to conclude that market integration directly influence culture and psychology.

The findings indicate that current debates on the potential negative impacts of markets on prosocial behavior should also take into account the long-term effects of markets on prosocial tendencies. For example, distrust of strangers, xenophobia, and racism are typically more evident in remote regions and among their populations. If markets and globalization integrate these remote areas into wider networks of economic exchange, promoting mutual benefits, it is possible that a growing number of people will adopt impersonal prosocial norms.

References

Abramitzky, Ran, Leah Boustan, and Katherine Eriksson, "Do immigrants assimilate more slowly today than in the past?," *American Economic Review: Insights*, March 2020, *2* (1), 125–41.

_ , _ , _ , Myera Rashid, and Santiago Pérez, *Census Linking Project: 1850-1860 Crosswalk*, Harvard Dataverse, 2022. https://doi.org/10.7910/DVN/KO5J44, V2.

_ , _ , _ , _ , and _ , *Census Linking Project: 1860-1870 Crosswalk*, Harvard Dataverse, 2022. https://doi.org/10.7910/DVN/TXNANS, V2.

_ , _ , _ , _ , and _ , *Census Linking Project: 1870-1880 Crosswalk*, Harvard Dataverse, 2022. https://doi.org/10.7910/DVN/OCWCFR, V2.

_ , _ , _ , _ , and _ , *Census Linking Project: 1900-1910 Crosswalk*, Harvard Dataverse, 2022. https://doi.org/10.7910/DVN/XUXYSR, V2.

_ , _ , _ , _ , and _ , *Census Linking Project: 1910-1920 Crosswalk*, Harvard Dataverse, 2022. https://doi.org/10.7910/DVN/Q2QJ2V, V2.

_ , Leah Platt Boustan, and Katherine Eriksson, "A nation of immigrants: Assimilation and economic outcomes in the age of mass migration," *Journal of Political Economy*, 2014, *122* (3), 467–506.

Agneman, Gustav and Esther Chevrot-Bianco, "Market Participation and Moral Decision-Making: Experimental Evidence from Greenland," *The Economic Journal*, February 2023, *133* (650), 537–581.

Allport, Gordon W., *The Nature of Prejudice* The Nature of Prejudice., Oxford, England: Addison-Wesley, 1954.

Bazzi, Samuel, Martin Fiszbein, and Mesay Gebresilasse, "Frontier Culture: The Roots and Persistence of "Rugged Individualism" in the United States," *Econometrica*, 2020, *88* (6), 2329–2368.

Beach, Brian and W Walker Hanlon, "Culture and the Historical Fertility Transition," *The Review of Economic Studies*, July 2023, *90* (4), 1669–1700.

Beck-Knudsen, Anne Sofie, "Those who stayed: Selection and cultural change during the age of mass migration," *Unpublished Manuscript*, 2019.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, "How much should we trust Differences-In-Differences estimates?," *The Quarterly Journal of Economics*, 02 2004, *119* (1), 249–275.

Bester, Alan C., Timothy G. Conley, and Christian B. Hansen, "Inference with dependent data using cluster covariance estimators," *Journal of Econometrics*, 2011, *165* (2), 137–151.

Borusyak, Kirill, Xavier Jaravel, and Jann Spiess, "Revisiting event-study designs: robust and efficient estimation," *Review of Economic Studies*, 2024, p. rdae007.

Buggle, Johannes C, "Growing collectivism: irrigation, group conformity and technological divergence," *Journal of Economic Growth*, 2020, *25* (2), 147–193.

_ and Ruben Durante, "Climate risk, cooperation and the co-evolution of culture and institutions," *The Economic Journal*, 2021, *131* (637), 1947–1987.

Bursztyn, Leonardo, Thomas Chaney, Tarek A. Hassan, and Aakaash Rao, "The Immigrant Next Door," *American Economic Review*, February 2024, *114* (2), 348–384.

Cantoni, Davide and Noam Yuchtman, "Medieval universities, legal institutions, and the commercial revolution," *The Quarterly Journal of Economics*, 2014, *129* (2), 823–887.

Chaisemartin, Clément De and Xavier d'Haultfoeuille, "Two-way fixed effects estimators with heterogeneous treatment effects," *American Economic Review*, 2020, *110* (9), 2964–2996.

Chan, Jeff, "Farming Output, Concentration, and Market Access: Evidence from the 19th-Century American Railroad Expansion," *Journal of Development Economics*, June 2022, *157*, 102878.

de Secondat Montesquieu, Charles, *The Spirit of Laws* Eighteenth Century Collections Online, the second edition corrected and considerably improved. ed., London: Printed for J. Nourse, and P. Vaillant, 1752.

Donaldson, Dave and Richard Hornbeck, "Railroads and American economic growth: A "market access" approach," *The Quarterly Journal of Economics*, 2016, *131* (2), 799–858.

Durkheim, Emile, *The division of labour in society*, New York: Free Press, 1984.

Enke, Benjamin, "Kinship, Cooperation, and the Evolution of Moral Systems," *The Quarterly Journal of Economics*, May 2019, *134* (2), 953–1019.

_ , "Market Exposure and Human Morality," *Nature Human Behaviour*, November 2022, *7* (1), 134–141.

Ensminger, Jean and Joseph Henrich, eds, *Experimenting with social norms: Fairness and punishment in cross-cultural perspective*, New York: Russell Sage Foundation, 2014.

Eruchimovitch, Israel, Moti Michaeli, and Assaf Sarid, "On the coevolution of individualism and institutions," *Journal of Economic Growth*, 2023, pp. 1–42.

Fogel, Robert William, *Railroads and American Economic Growth*, Johns Hopkins Press Baltimore, 1964.

Fouka, Vasiliki, "Backlash: The unintended effects of language prohibition in U.S. schools after World War I," *The Review of Economic Studies*, 05 2019, *87* (1), 204–239.

Fryer, Roland and S. Levitt, "The causes and consequences of distinctively Black names," *The Quarterly Journal of Economics*, 2004, *119* (3), 767–805.

Gelfand, Michele J, *Rule Makers, Rule Breakers: How Culture Wires Our Minds, Shapes Our Nations and Drive Our Differences*, Robinson, 2018.

_ **, Lisa H Nishii, and Jana L Raver**, "On the nature and importance of cultural tightness-looseness.," *Journal of applied psychology*, 2006, *91* (6), 1225.

Gelfand, MJ, "Differences between tight and loose cultures: A 33-nation study (vol 332, pg 1100, 2011)," *Science*, 2011, *333* (6045), 937–937.

Goodman-Bacon, Andrew, "Difference-in-differences with variation in treatment timing," *Journal of Econometrics*, 2021.

Gorodnichenko, Yuriy and Gerard Roland, "Individualism, Innovation, and Long-Run Growth," *Proceedings of the National Academy of Sciences*, December 2011, *108* (Supplement 4), 21316–21319.

_ **and** _ , "Culture, institutions, and the wealth of nations," *Review of Economics and Statistics*, 2017, *99* (3), 402–416.

Greenfield, Patricia M, "Linking social change and developmental change: shifting pathways of human development.," *Developmental Psychology*, 2009, *45* (2), 401.

Greif, Avner, "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition," *The American Economic Review*, 1993, *83* (3), 525–548.

_ , "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies," *Journal of Political Economy*, October 1994, *102* (5), 912–950.

Henrich, Joseph, *The Weirdest People in the World* 2020.

_ **and Michael Muthukrishna**, "The Origins and Psychology of Human Cooperation," *Annual Review of Psychology*, January 2021, *72* (1), 207–240.

_ **, Jean Ensminger, Richard McElreath, Abigail Barr, Clark Barrett, Alexander Bolyanatz, Juan Camilo Cardenas, Michael Gurven, Edwins Gwako, Natalie Henrich, Carolyn Lesorogol, Frank Marlowe, David Tracer, and John Ziker**, "Markets, Religion, Community Size, and the Evolution of Fairness and Punishment," *Science*, March 2010, *327* (5972), 1480–1484.

_ **, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, Herbert Gintis, and Richard McElreath**, "In Search of Homo Economicus: Behavioral Experiments in 15 Small-Scale Societies," *American Economic Review*, May 2001, *91* (2), 73–78.

_ , _ , _ , _ , _ , _ , _ **, Michael Alvard, Abigail Barr, Jean Ensminger, Natalie Smith Henrich, Kim Hill, Francisco Gil-White, Michael Gurven, Frank W. Marlowe, John Q. Patton, and David Tracer**, ""Economic

Man" in Cross-Cultural Perspective: Behavioral Experiments in 15 Small-Scale Societies," *Behavioral and Brain Sciences*, December 2005, *28* (6), 795–815.

_ , Steven J. Heine, and Ara Norenzayan, "The Weirdest People in the World?," *Behavioral and Brain Sciences*, June 2010, *33* (2-3), 61–83.

Hirschman, Albert O., "Rival Interpretations of Market Society: Civilizing, Destructive, or Feeble?," *Journal of Economic Literature*, 1982, *20* (4), 1463–1484.

Hornbeck, Richard, "Barbed wire: Property rights and agricultural development," *The Quarterly Journal of Economics*, 2010, *125* (2), 767–810.

_ and Martin Rotemberg, "Growth Off the Rails: Aggregate Productivity Growth in Distorted Economies," *Journal of Political Economy*, in press.

Inglehart, Ronald, *Cultural Evolution: People's Motivations Are Changing, and Reshaping the World*, Cambridge University Press, March 2018.

Jha, Saumitra, "Trade, Institutions, and Ethnic Tolerance: Evidence from South Asia," *American Political Science Review*, November 2013, *107* (4), 806–832.

_ and Moses Shayo, "Valuing peace: the effects of financial market exposure on votes and political attitudes," *Econometrica*, 2019, *87* (5), 1561–1588.

Margalit, Yotam and Moses Shayo, "How Markets Shape Values and Political Preferences: A Field Experiment," *American Journal of Political Science*, 2021, *65* (2), 473–492.

_ and _ , "How markets shape values and political preferences: A field experiment," *American Journal of Political Science*, 2021, *65* (2), 473–492.

Marx, Karl and Friedrich Engels, *Manifesto of the Communist Party*, 2013 ed. simon & schuster ed. 1848.

Polanyi, Karl, *The Great Transformation,* Human Relations Collection, New York: Rinehart & Co., inc, 1944.

Posch, Max, "Do disasters affect the tightness of social norms," *Unpublished Manuscript*, 2021.

Raz, Itzchak Tzachi, "Soil heterogeneity and the formation of close-knit communities," *Unpublished Manuscript*, 2024.

Rustagi, Devesh, "Market Exposure, Civic Values, and Rules," 2023.

Sandel, Michael J, *What Money Can't Buy : The Moral Limits of Markets*, London ; New York: Allen Lane, 2012.

Schulz, Jonathan F., Duman Bahrami-Rad, Jonathan P. Beauchamp, and Joseph Henrich, "The Church, Intensive Kinship, and Global Psychological Variation," *Science*, November 2019, *366* (6466).

Smith, Adam, *The wealth of nations* 1776.

Steven Manson, Jonathan Schroeder, David Van Riper, Tracy Kugler, and Steven Ruggles, "IPUMS National Historical Geographic Information System: Version 15.0 [dataset]," 2020. Minneapolis, MN: IPUMS.

Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas and Matthew Sobek, "IPUMS USA: Version 10.0 [dataset]," 2020. Minneapolis, MN: IPUMS.

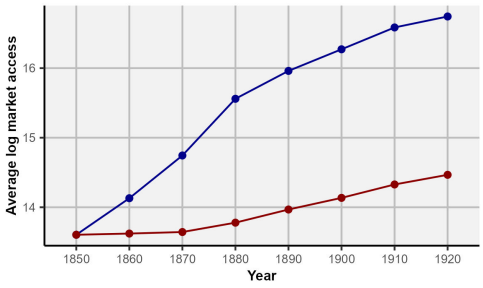
Sun, Liyang and Sarah Abraham, "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects," *Journal of Econometrics*, 2020.

Tabellini, Guido, "The Scope of Cooperation: Values and Incentives*," *The Quarterly Journal of Economics*, August 2008, *123* (3), 905–950.

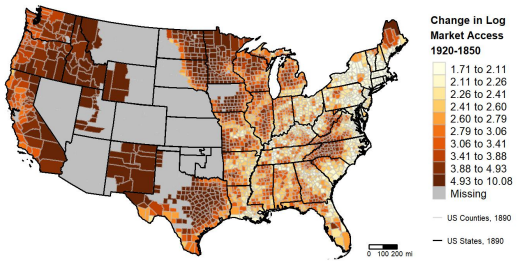
Figures

Figure 1: The change in log market access between 1850-1920

(a) Average log market access by year



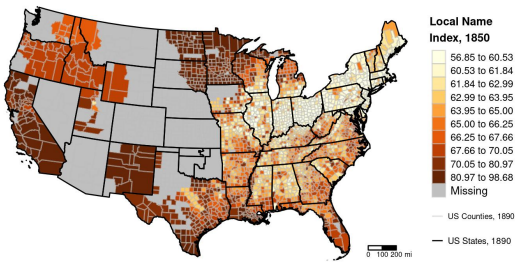
(b) Differences in log market access, 1850-1920



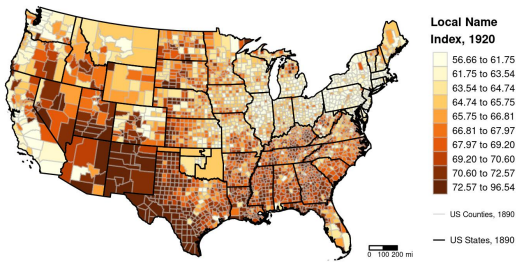
Note: This figure plots the changes in log market access over time. Panel A plots the average log market access by decade. The blue curve represents market access calculated using the contemporaneous transportation costs and population, and the dark red curve fixes transportation costs to 1850. Panel B maps the difference between log market access in 1920 and 1850.

Figure 2: Aspects of WEIRD Culture and Psychology:
Universalism and Cultural Tightness, 1850 and 1920

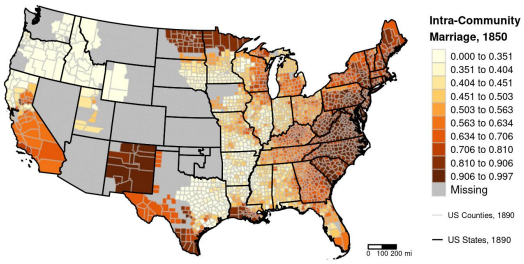
(a) Local Name Index, 1850



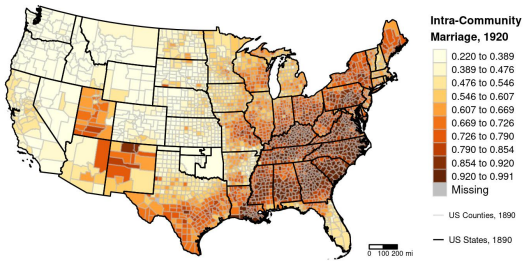
(b) Local Name Index, 1920



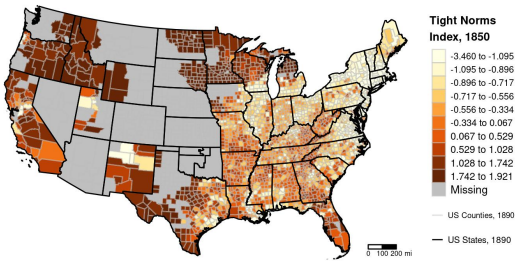
(c) Intra-Community Marriage, 1850



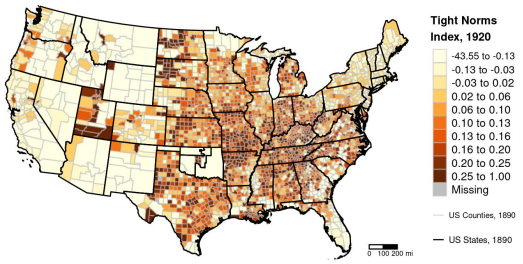
(d) Intra-Community Marriage, 1920



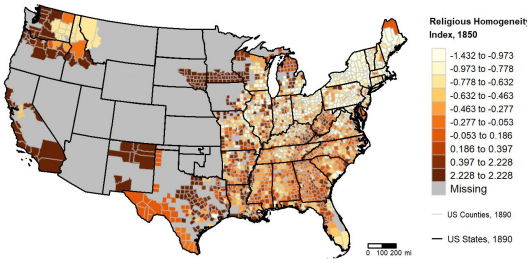
(e) Tight Norms Index, 1850



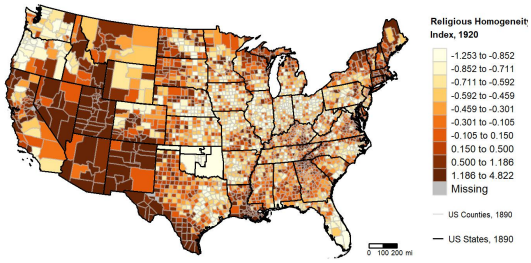
(f) Tight Norms Index, 1920



(g) Religious Homogeneity Index, 1850



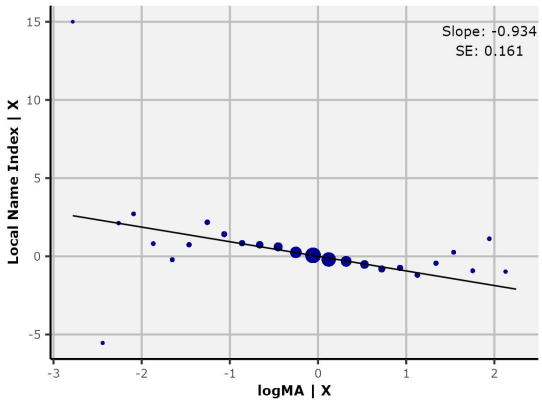
(h) Religious Homogeneity Index, 1920



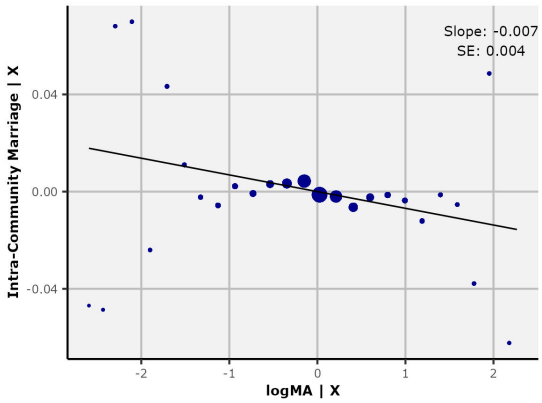
Note: This figure plots the spatial distributions of all four measures of WEIRD cultural and psychological traits, in 1850 (left column) and in 1920 (right column). A lighter color implies a higher prevalence of WEIRD cultural and psychological traits.

Figure 3: County-level Bin Scatter Plots. Market Access and Aspects of WEIRD Culture and Psychology

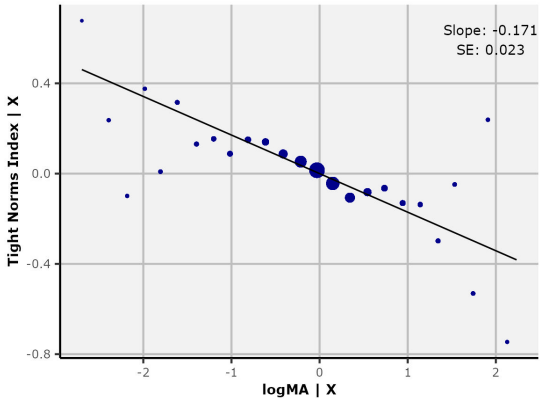
(a) Local Name Index



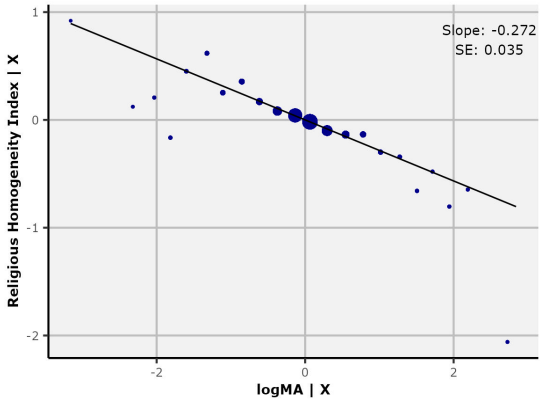
(b) Intra-Community Marriage



(c) Tight Norms Index

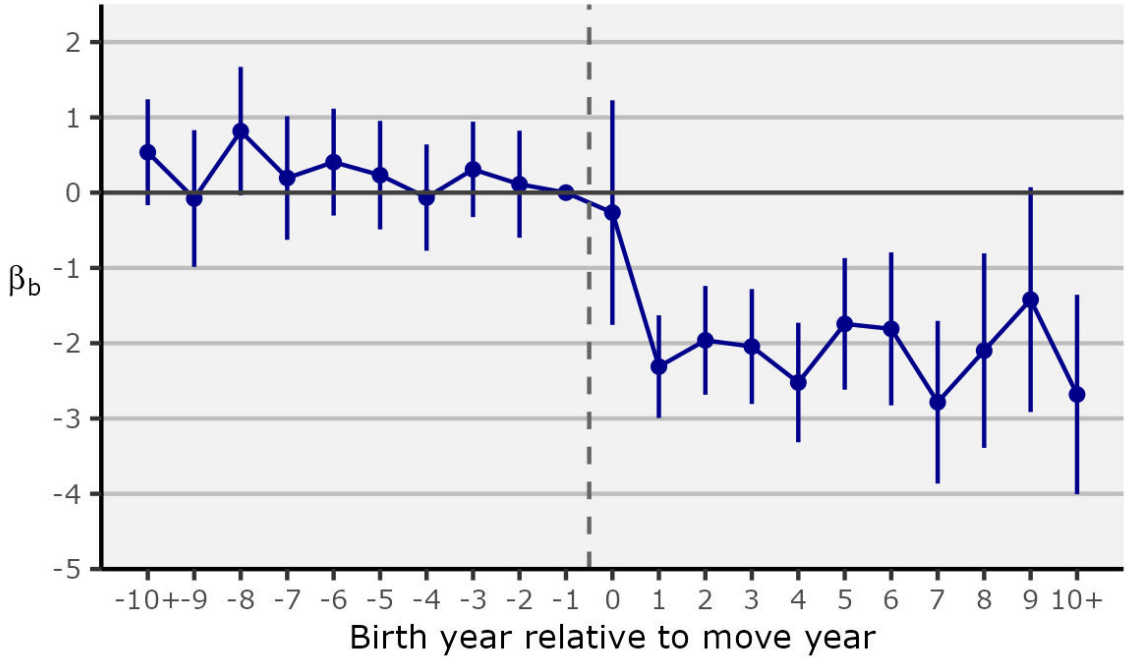


(d) Religious Homogeneity Index



Note: This figure presents bin scatter plots of the relationship between log market access and WEIRD cultural and psychological traits, using equation 1. The plots present the conditional relationship after partialling out the baseline controls, corresponding to column 2 in Table 2. The size of the points is representative of the number of observations within each bin.

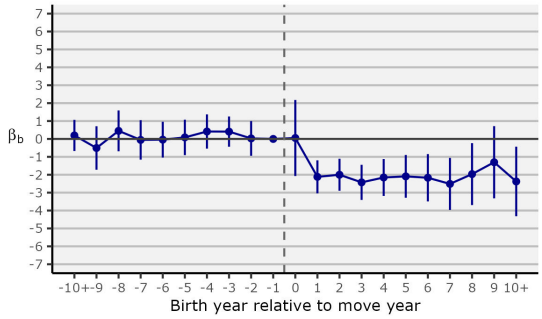
Figure 4: The impact of moving to a higher market access county on communal identification



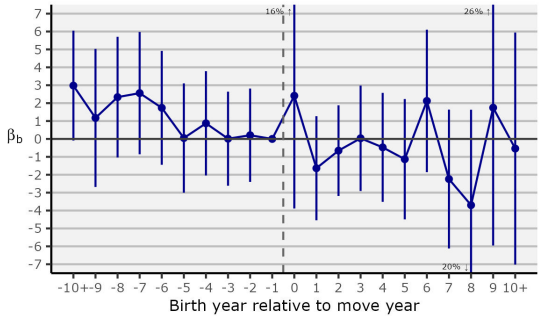
Note: This figure plots the estimates of β_b and 95% confidence intervals from the difference-in-differences estimation (equation 2).

Figure 5: Market access affects individuals working in commerce-intensive industries

(a) Commerce-intensive



(b) Commerce-moderate



Note: This figure plots the estimates of β_b and 95% confidence intervals from the difference-in-differences estimation (equation 2). In Panel A, the sample is restricted to households in which the father was working in a commerce-intensive industry before and after the migration. In Panel B, the sample is restricted to households in which the father was working in a commerce-moderate industry before and after the migration.

Tables

Table 1: Market Access and Market Language

	Dependent variable: Mean top 10 market terms share (mean=0.466, sd=0.116)					
	(1)	(2)	(3)	(4)	(5)	(6)
Log market access	0.0181***	0.0158***	0.0122**	0.0177***	0.0174***	0.0170***
	(0.0043)	(0.0044)	(0.0050)	(0.0053)	(0.0056)	(0.0059)
Observations	8,610	8,610	8,610	8,610	8,610	8,610
R^2	0.628	0.629	0.629	0.631	0.632	0.634
County Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Location cubic polynomial × State		Yes	Yes	Yes	Yes	Yes
Any railroad			Yes	Yes	Yes	Yes
Railroad length				Yes	Yes	Yes
Railroads within nearby buffer					Yes	Yes
Railroads within further buffers						Yes

Note: This table reports estimates of equation 1 with additional controls for local railroad infrastructure when the dependent variable is the mean share of the 10 semantically most related keywords to "buy", "sell", "money", "price", "trade" in 19th century US newspapers, according to chatGPT. Any railroad is a dummy variable that equals one if the county o had any railroads in it in year t, and zero otherwise. Railroad length is a cubic polynomial in the length of railroads in county o and year t. Railroad within nearby buffer is a railroad dummy and length polynomial calculated for a 10-mile buffer around county o in year t. Railroad within further buffers are railroad dummies and length polynomials calculated for 20, 30, and 40-mile buffers around county o in year t. Standard errors clustered at arbitrary grid cells of 100 miles square in parentheses (Bester et al., 2011). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Market Access and Aspects of WEIRD Culture and Psychology

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Local Name Index (mean = 67.81 , sd = 6.6)					
Log market access	-1.147***	-0.9342***	-0.7131***	-0.5650***	-0.4772***	-0.3669**
	(0.1608)	(0.1614)	(0.1686)	(0.1699)	(0.1739)	(0.1705)
Observations	18,178	18,178	18,178	18,178	18,178	18,178
R^2	0.796	0.806	0.807	0.810	0.811	0.810
	Panel B: Intra-Community Marriage (mean = 0.618 , sd = 0.2)					
Log market access	-0.0061*	-0.0069*	-0.0072*	-0.0044	-0.0056	-0.0055
	(0.0037)	(0.0037)	(0.0039)	(0.0040)	(0.0040)	(0.0041)
Observations	18,175	18,175	18,175	18,175	18,175	18,175
R^2	0.904	0.908	0.908	0.909	0.910	0.910
	Panel C: Tight-Norms Index (mean = 0 , sd = 1)					
Log market access	-0.2224***	-0.1709***	-0.1538***	-0.1636***	-0.1417***	-0.1225***
	(0.0220)	(0.0226)	(0.0228)	(0.0234)	(0.0231)	(0.0230)
Observations	18,094	18,094	18,094	18,094	18,094	18,094
R^2	0.620	0.642	0.642	0.643	0.647	0.651
	Panel D: Religious Homogeneity Index (mean = -0.001 , sd = 0.998)					
Log market access	-0.2927***	-0.2717***	-0.2346***	-0.2218***	-0.2072***	-0.1951***
	(0.0374)	(0.0348)	(0.0363)	(0.0384)	(0.0383)	(0.0385)
Observations	17,295	17,295	17,295	17,295	17,295	17,295
R^2	0.673	0.681	0.682	0.683	0.684	0.687
County Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Location cubic polynomial × State		Yes	Yes	Yes	Yes	Yes
Any railroad			Yes	Yes	Yes	Yes
Railroad length				Yes	Yes	Yes
Railroads within nearby buffer					Yes	Yes
Railroads within further buffers						Yes

Note: This table reports estimates of equation 1 with additional controls for local railroad infrastructure when the dependent variables are different historical features of WEIRD psychology: the LNI (Panel A), the share of ICM (Panel B), the TNI (Panel C), and the RHI (Panel D). Any railroad is a dummy variable that equals one if the county o had any railroads in it in year t, and zero otherwise. Railroad length is a cubic polynomial in the length of railroads in county o and year t. Railroad within nearby buffer is a railroad dummy and length polynomial calculated for a 10-mile buffer around county o in year t. Railroad within further buffers are railroad dummies and length polynomials calculated for 20, 30, and 40-mile buffers around county o in year t. Standard errors clustered at arbitrary grid cells of 100 miles square in parentheses (Bester et al., 2011). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: The impact of moving to a higher market access county on communal identification

	Dependent variable: Local Name Index			
Local is:	Birth County (mean = 58.854 , sd = 18.225)		Origin County (mean = 55.335 , sd = 16.591)	
	(1)	(2)	(3)	(4)
Post Migration × Higher Market Access	-2.348***	-1.994***	-0.5194***	-0.3782***
	(0.2250)	(0.2130)	(0.1284)	(0.1301)
Observations	470,937	470,937	431,717	431,717
R^2	0.321	0.323	0.336	0.337
Family Fixed-Effects	Yes	Yes	Yes	Yes
Relative-year-of-birth Fixed-Effects	Yes	Yes	Yes	Yes
Individual Controls		Yes		Yes

Table 4: Possible Indirect Channels and Mediators

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Share Immigrants (mean = 0.166 , sd = 0.193)					
Log market access	0.0074**	0.0075***	0.0040	0.0021	0.0009	-0.0002
	(0.0035)	(0.0028)	(0.0031)	(0.0032)	(0.0032)	(0.0033)
Observations	18,278	18,278	18,278	18,278	18,278	18,278
R^2	0.899	0.903	0.904	0.904	0.905	0.906
	Panel B: Birthplace Diversity (mean = 0.249 , sd = 0.247)					
Log market access	0.0133***	0.0143***	0.0094***	0.0068*	0.0054	0.0045
	(0.0039)	(0.0033)	(0.0036)	(0.0036)	(0.0037)	(0.0036)
Observations	18,278	18,278	18,278	18,278	18,278	18,278
R^2	0.923	0.925	0.926	0.926	0.927	0.928
	Panel C: Share Urban (mean = 0.106 , sd = 0.199)					
Log market access	-0.0104***	-0.0085***	-0.0065*	-0.0168***	-0.0174***	-0.0187***
	(0.0034)	(0.0033)	(0.0036)	(0.0035)	(0.0037)	(0.0037)
Observations	21,183	21,183	21,183	21,183	21,183	21,183
R^2	0.801	0.804	0.804	0.821	0.818	0.821
	Panel D: Manufacturing Est. PC (mean = 0.354 , sd = 0.312)					
Log market access	-0.0013	-0.0035	-0.0137	-0.0196*	-0.0237*	-0.0139
	(0.0100)	(0.0101)	(0.0114)	(0.0117)	(0.0125)	(0.0141)
Observations	15,371	15,371	15,371	15,371	15,371	15,371
R^2	0.612	0.618	0.619	0.620	0.620	0.622
	Panel E: Mean Occupational Income Score (mean = 17.38 , sd = 3.265)					
Log market access	0.2477***	0.3125***	0.2359***	0.1246	0.0971	0.0384
	(0.0785)	(0.0762)	(0.0796)	(0.0818)	(0.0815)	(0.0803)
Observations	18,264	18,264	18,264	18,264	18,264	18,264
R^2	0.745	0.750	0.751	0.758	0.759	0.761
County Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Location cubic polynomial × State		Yes	Yes	Yes	Yes	Yes
Any railroad			Yes	Yes	Yes	Yes
Railroad length				Yes	Yes	Yes
Railroads within nearby buffer					Yes	Yes
Railroads within further buffers						Yes

Note: This table reports estimates of equation 1 with additional controls for local railroad infrastructure when the dependent variables are measures of potential indirect channels: population diversity (Panels A-B), economic development (Panels C-E), information (Panel F), and legal institutions (Panel G). Any railroad is a dummy variable that equals one if the county o had any railroads in it in year t, and zero otherwise. Railroad length is a cubic polynomial in the length of railroads in county o and year t. Railroad within nearby buffer is a railroad dummy and length polynomial calculated for a 10-mile buffer around county o in year t. Railroad within further buffers are railroad dummies and length polynomials calculated for 20, 30, and 40-mile buffers around county o in year t. Standard errors clustered at arbitrary grid cells of 100 miles square in parentheses (Bester et al., 2011). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Possible Indirect Channels and Mediators (cont.)

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel F: Telegraph Workers per 1,000 (mean = 0.954 , sd = 2.676)					
Log market access	0.1739**	0.1931**	0.1998**	0.1012	0.1178	0.1251
	(0.0686)	(0.0893)	(0.0887)	(0.0830)	(0.0809)	(0.0793)
Observations	18,244	18,244	18,244	18,244	18,244	18,244
R^2	0.394	0.402	0.400	0.410	0.413	0.415
	Panel G: Lawyers and Judges per 1,000 (mean = 5.933 , sd = 6.347)					
Log market access	0.9568***	0.7914***	0.6988***	0.7001***	0.6294***	0.6166***
	(0.1873)	(0.1945)	(0.2087)	(0.2098)	(0.2142)	(0.2178)
Observations	18,244	18,244	18,244	18,244	18,244	18,244
R^2	0.474	0.477	0.478	0.480	0.481	0.482
County Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Location cubic polynomial × State		Yes	Yes	Yes	Yes	Yes
Any railroad			Yes	Yes	Yes	Yes
Railroad length				Yes	Yes	Yes
Railroads within nearby buffer					Yes	Yes
Railroads within further buffers						Yes

Note: This table reports estimates of equation 1 with additional controls for local railroad infrastructure when the dependent variables are measures of potential indirect channels: population diversity (Panels A-B), economic development (Panels C-E), information (Panel F), and legal institutions (Panel G). Any railroad is a dummy variable that equals one if the county o had any railroads in it in year t, and zero otherwise. Railroad length is a cubic polynomial in the length of railroads in county o and year t. Railroad within nearby buffer is a railroad dummy and length polynomial calculated for a 10-mile buffer around county o in year t. Railroad within further buffers are railroad dummies and length polynomials calculated for 20, 30, and 40-mile buffers around county o in year t. Standard errors clustered at arbitrary grid cells of 100 miles square in parentheses (Bester et al., 2011). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Market Access and Communalism: Controlling for possible channels

	Dependent variable:								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Panel A: Local Name Index								
logMA	-0.9342***	-0.8867***	-0.8122***	-1.001***	-1.493***	-0.8723***	-0.9441***	-0.8856***	-1.402***
	(0.1614)	(0.1587)	(0.1550)	(0.1602)	(0.1996)	(0.1590)	(0.1601)	(0.1596)	(0.1899)
Observations	18,178	18,178	18,178	18,159	12,435	18,164	18,160	18,160	12,418
R^2	0.806	0.808	0.813	0.811	0.830	0.808	0.807	0.808	0.841
	Panel B: Intra-Community Marriage								
logMA	-0.0069*	-0.0080**	-0.0064*	-0.0077**	-0.0135***	-0.0051	-0.0064*	-0.0067*	-0.0096**
	(0.0037)	(0.0037)	(0.0036)	(0.0037)	(0.0048)	(0.0036)	(0.0037)	(0.0037)	(0.0046)
Observations	18,175	18,175	18,175	18,156	12,427	18,161	18,151	18,151	12,404
R^2	0.908	0.910	0.908	0.910	0.925	0.911	0.911	0.911	0.935
	Panel C: Tight-Norms Index								
logMA	-0.1709***	-0.1717***	-0.1716***	-0.1736***	-0.2227***	-0.1670***	-0.1728***	-0.1641***	-0.2165***
	(0.0226)	(0.0226)	(0.0226)	(0.0225)	(0.0339)	(0.0226)	(0.0227)	(0.0222)	(0.0337)
Observations	18,094	18,094	18,094	18,075	12,387	18,080	18,072	18,072	12,365
R^2	0.642	0.642	0.642	0.644	0.678	0.643	0.642	0.646	0.678
	Panel D: Religious Homogeneity Index								
logMA	-0.2717***	-0.2473***	-0.2378***	-0.2732***	-0.2345***	-0.2268***	-0.2494***	-0.2415***	-0.1775***
	(0.0348)	(0.0359)	(0.0357)	(0.0344)	(0.0389)	(0.0365)	(0.0361)	(0.0369)	(0.0421)
Observations	17,295	14,618	14,618	17,280	12,026	14,604	14,604	14,604	9,348
R^2	0.681	0.708	0.709	0.682	0.709	0.709	0.706	0.707	0.741
County Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location cubic polynomial × State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Share Immigrants		Yes							Yes
Birthplace Diversity			Yes						Yes
Share Urban				Yes					Yes
Manufacturing Est. PC					Yes				Yes
Occupational Income Score						Yes			Yes
Telegraph Workers per 1,000							Yes		Yes
Lawyers and Judges per 1,000								Yes	Yes

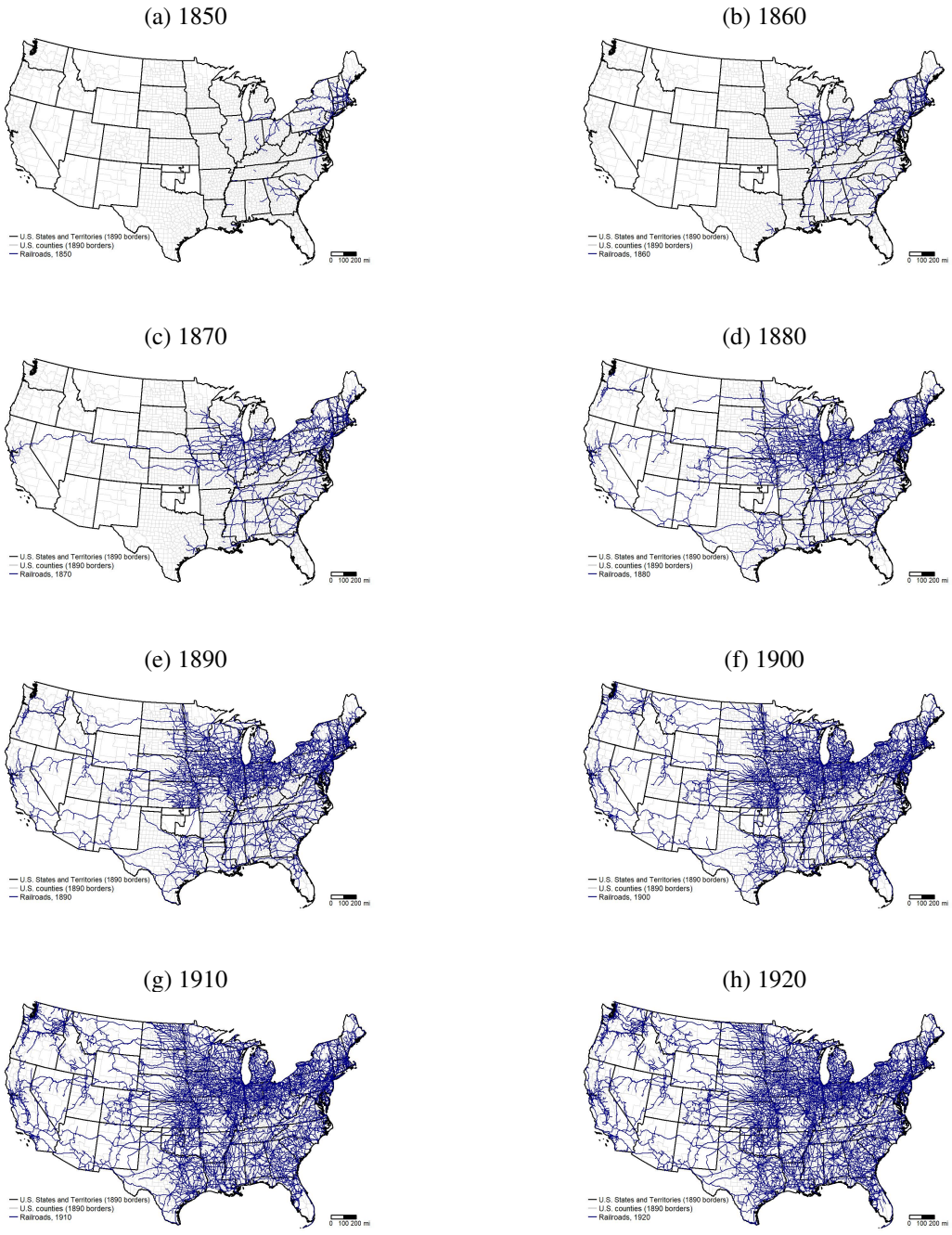
Note: This table reports estimates of equation 1 with additional controls for local railroad infrastructure and potential indirect channels, when the dependent variables are different historical features of WEIRD psychology: the LNI (Panel A), the share of ICM (Panel B), the TNI (Panel C), and the RHI (Panel D). Any railroad is a dummy variable that equals one if the county o had any railroads in it in year t, and zero otherwise. Railroad length is a cubic polynomial in the length of railroads in county o and year t. Railroad within nearby buffer is a railroad dummy and length polynomial calculated for a 10-mile buffer around county o in year t. Railroad within further buffers are railroad dummies and length polynomials calculated for 20, 30, and 40-mile buffers around county o in year t. Standard errors clustered at arbitrary grid cells of 100 miles square in parentheses (Bester et al., 2011). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Online Appendices

Content

A Other results, figures and tables

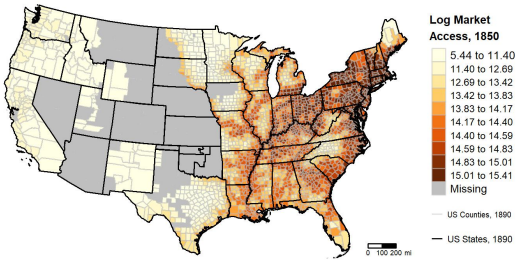
Figure A.1: The Railroad Network, 1850-1920



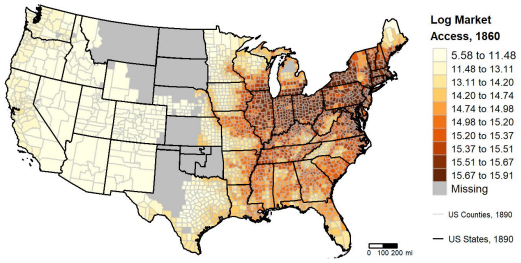
Note: This figure plots the railroad network for each decade between 1850-1920.

Figure A.2: Log market access, 1850-1920

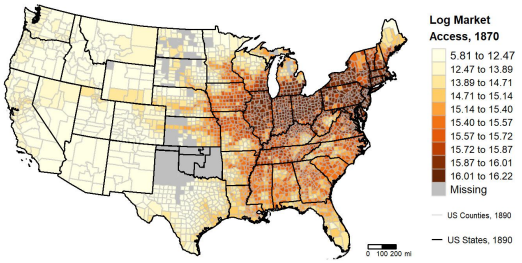
(a) 1850



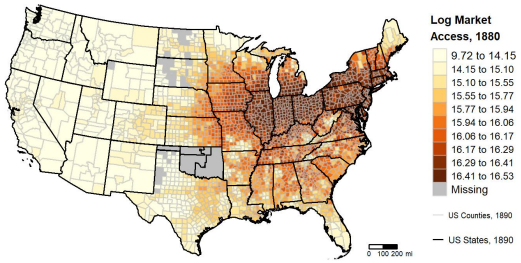
(b) 1860



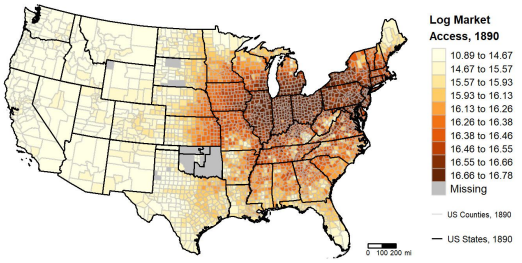
(c) 1870



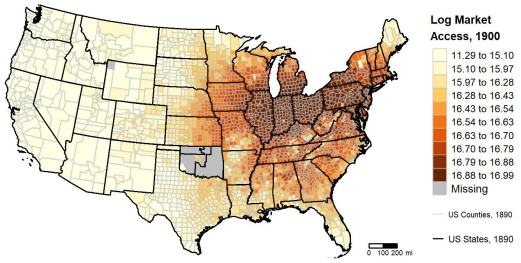
(d) 1880



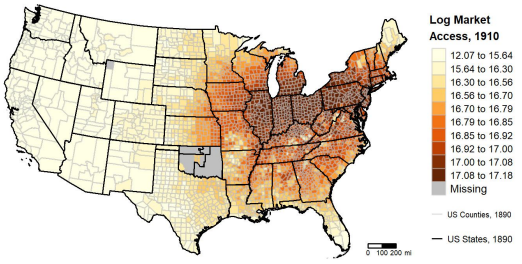
(e) 1890



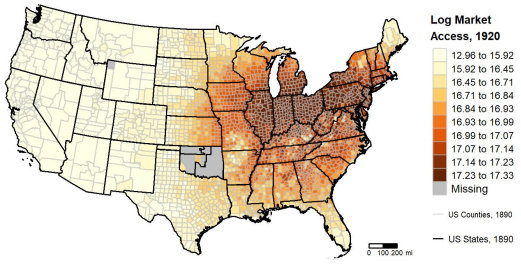
(f) 1900



(g) 1910



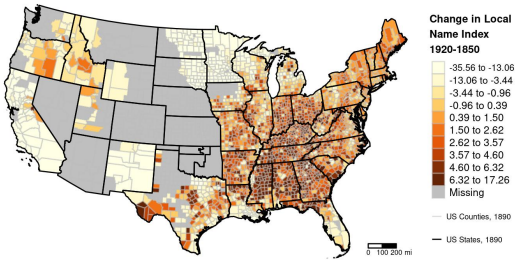
(h) 1920



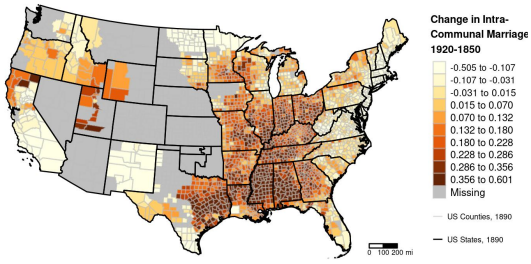
Note: This figure plots the spatial distributions of log market access for each decade between 1850-1920. Within each decade, a darker color implies a higher market access.

Figure A.3: The change in outcome measures between 1850-1920

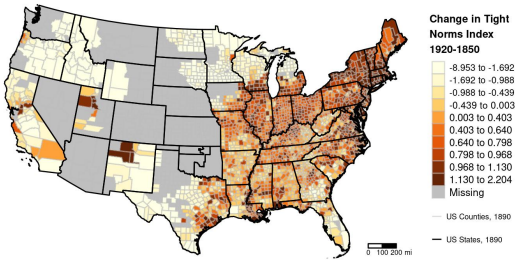
(a) Local Name Index



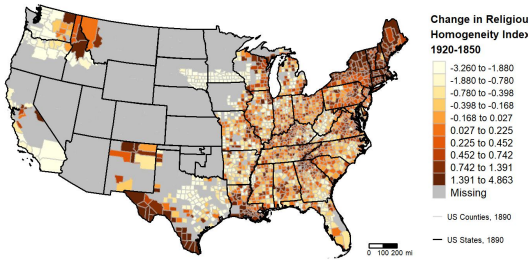
(b) Intra-Communal Marriage



(c) Tight Norms Index

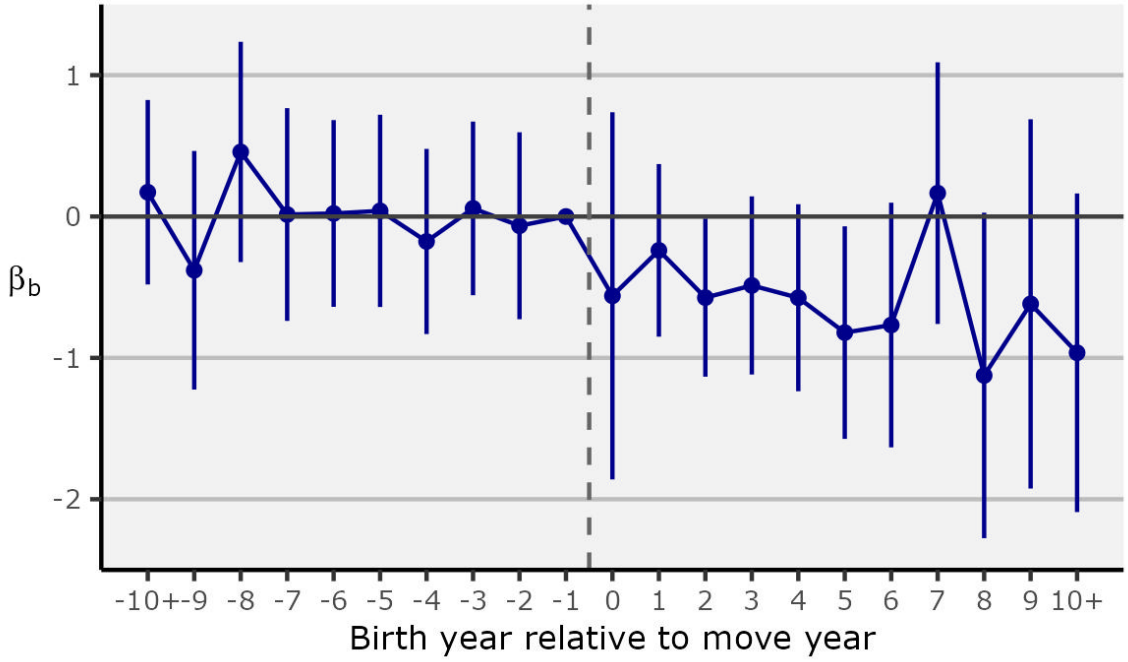


(d) Religious Homogeneity Index



Note: This figure plots the difference in the outcome measures between 1920 and 1850.

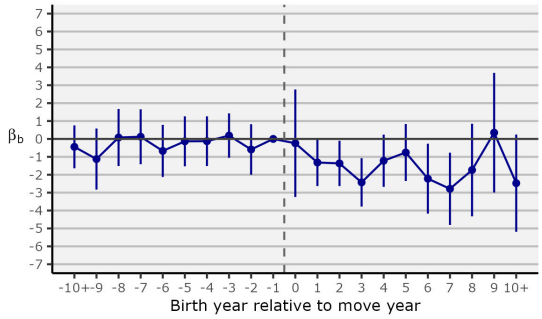
Figure A.4: The impact of moving to a higher market access county on communal identification



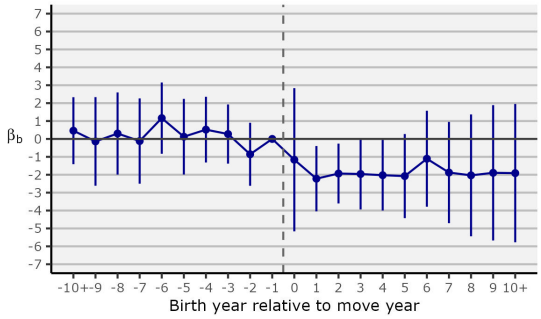
Note: This figure plots the estimates of β_b and 95% confidence intervals from the difference-in-differences estimation (equation 2), with an LNI measure in which "local" is always the county of origin

Figure A.5: DID: The impact on farmers and migrants working in other commerce-intensive industries

(a) Commerce-intensive: farmers



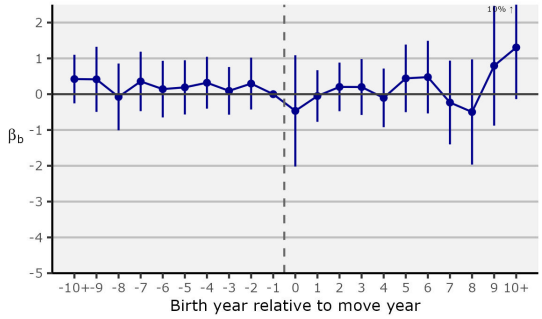
(b) Commerce-intensive: non-farmers



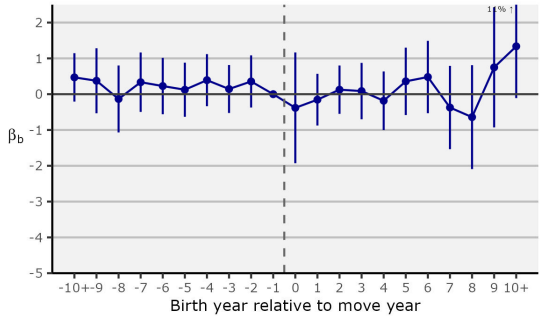
Note: This figure plots the estimates of β_b and 95% confidence intervals from equation 2. The sample in Panel A is restricted to migrants' households in which the father worked as a farmer before and after the migration. In Panel b, is restricted to migrants' households in which the father worked in a non-farming commerce-intensive industry before and after the migration.

Figure A.6: DID: the impact of share immigrants and birthplace diversity

(a) Share Immigrants



(b) Birthplace diversity



Note: This figure plots the estimates of β_b and 95% confidence intervals from equation 2 when the treatment is defined in terms of differences in the share of immigrants (Panel A) and the difference in birthplace diversity (Panel B).

B Robustness of the results

B.1 Robustness of county-level results

Table B.1: Market Access and Market Language: More market terms

	Dependent variable:					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Mean top 20 market terms share (mean= 0.365 , sd= 0.097)					
Log market access	0.0141***	0.0129***	0.0098**	0.0140***	0.0136***	0.0132***
	(0.0036)	(0.0038)	(0.0042)	(0.0045)	(0.0047)	(0.0050)
Observations	8,610	8,610	8,610	8,610	8,610	8,610
R^2	0.642	0.642	0.642	0.644	0.645	0.647
	Panel B: Mean top 50 market terms share (mean= 0.227 , sd= 0.062)					
Log market access	0.0098***	0.0088***	0.0069***	0.0093***	0.0088***	0.0084***
	(0.0023)	(0.0024)	(0.0026)	(0.0028)	(0.0029)	(0.0031)
Observations	8,610	8,610	8,610	8,610	8,610	8,610
R^2	0.642	0.643	0.643	0.645	0.646	0.647
	Panel C: Mean top 100 market terms share (mean= 0.169 , sd= 0.047)					
Log market access	0.0073***	0.0065***	0.0050**	0.0067***	0.0063***	0.0060**
	(0.0018)	(0.0019)	(0.0020)	(0.0022)	(0.0023)	(0.0023)
Observations	8,610	8,610	8,610	8,610	8,610	8,610
R^2	0.642	0.643	0.643	0.644	0.645	0.647
County Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Location cubic polynomial × State		Yes	Yes	Yes	Yes	Yes
Any railroad			Yes	Yes	Yes	Yes
Railroad length				Yes	Yes	Yes
Railroads within nearby buffer					Yes	Yes
Railroads within further buffers						Yes

Note: This table reports estimates of equation 1 with additional controls for local railroad infrastructure when the dependent variables are the mean shares of top market words: top 20 (Panel A), top 50 (Panel B), and top 100 (Panel C). Any railroad is a dummy variable that equals one if the county o had any railroads in it in year t, and zero otherwise. Railroad length is a cubic polynomial in the length of railroads in county o and year t. Railroad within nearby buffer is a railroad dummy and length polynomial calculated for a 10-mile buffer around county o in year t. Railroad within further buffers are railroad dummies and length polynomials calculated for 20, 30, and 40-mile buffers around county o in year t. Standard errors clustered at arbitrary grid cells of 100 miles square in parentheses (Bester et al., 2011). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

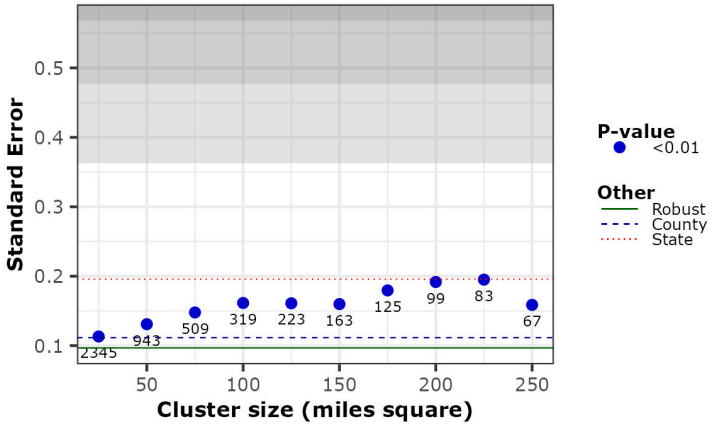
Table B.2: Robustness to the Inclusion of Immigrants and Non-Whites

	Dependent variable:			
Sample:	Baseline	Exclude foreign-born	Exclude non-whites	Exclude non-whites and foreign-born
	(1)	(2)	(3)	(4)
	Panel A: Local Name Index			
logMA	-0.9342***	-0.8147***	-1.014***	-0.9070***
	(0.1614)	(0.1684)	(0.1654)	(0.1745)
Observations	18,178	18,178	18,178	18,178
R^2	0.806	0.812	0.811	0.816
	Panel B: Intra-Community Marriage			
logMA	-0.0069*	-0.0145***	-0.0011	-0.0082*
	(0.0037)	(0.0044)	(0.0035)	(0.0042)
Observations	18,175	18,166	18,174	18,158
R^2	0.908	0.911	0.909	0.917
	Panel C: Tight-Norms Index			
logMA	-0.1709***	-0.1854***	-0.1762***	-0.1889***
	(0.0226)	(0.0241)	(0.0232)	(0.0247)
Observations	18,094	17,994	18,072	17,966
R^2	0.642	0.635	0.642	0.633
County Fixed-Effects	Yes	Yes	Yes	Yes
State × Year Fixed-Effects	Yes	Yes	Yes	Yes
Location cubic polynomial × State	Yes	Yes	Yes	Yes

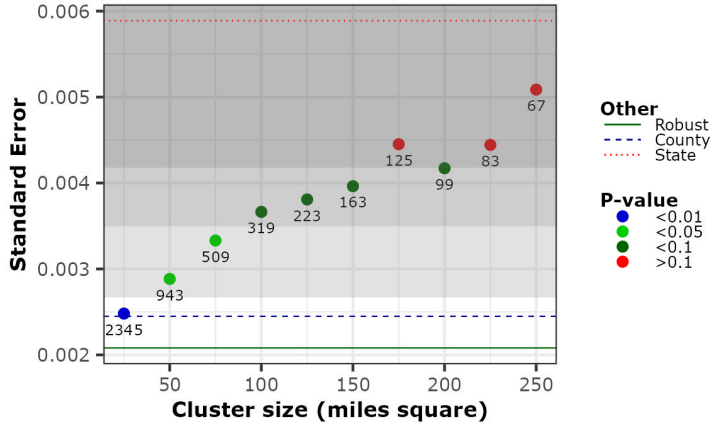
Note: This table reports estimates of equation 1 when the dependent variables are the LNI (Panel A), the share of ICM (Panel B), and the TNI (Panel C). The base sample used to calculate the county-level measures in column 1 includes all of the population not residing in group quarters. In column 2 the sample excludes foreign-born, in column 3 it excludes non-whites, and in column 4 it excludes all non-whites and foreign-born.

Figure B.1: Robustness to Different Standard Errors

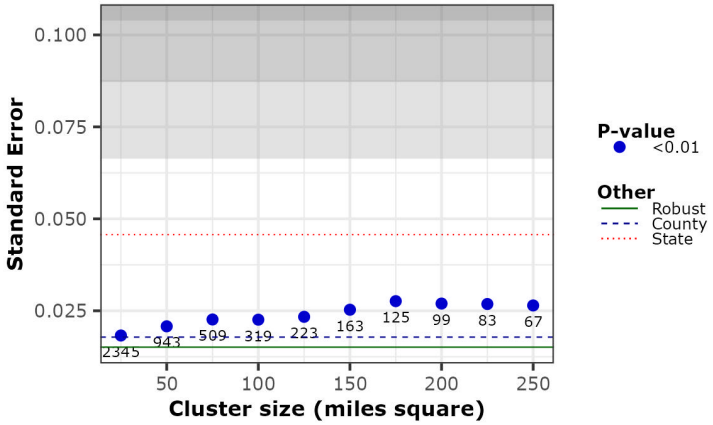
(a) Local Name Index



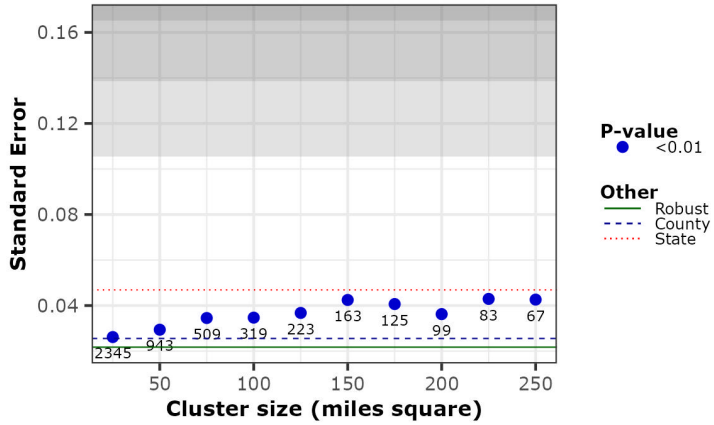
(b) Intra-Community Marriage



(c) Tight Norms Index



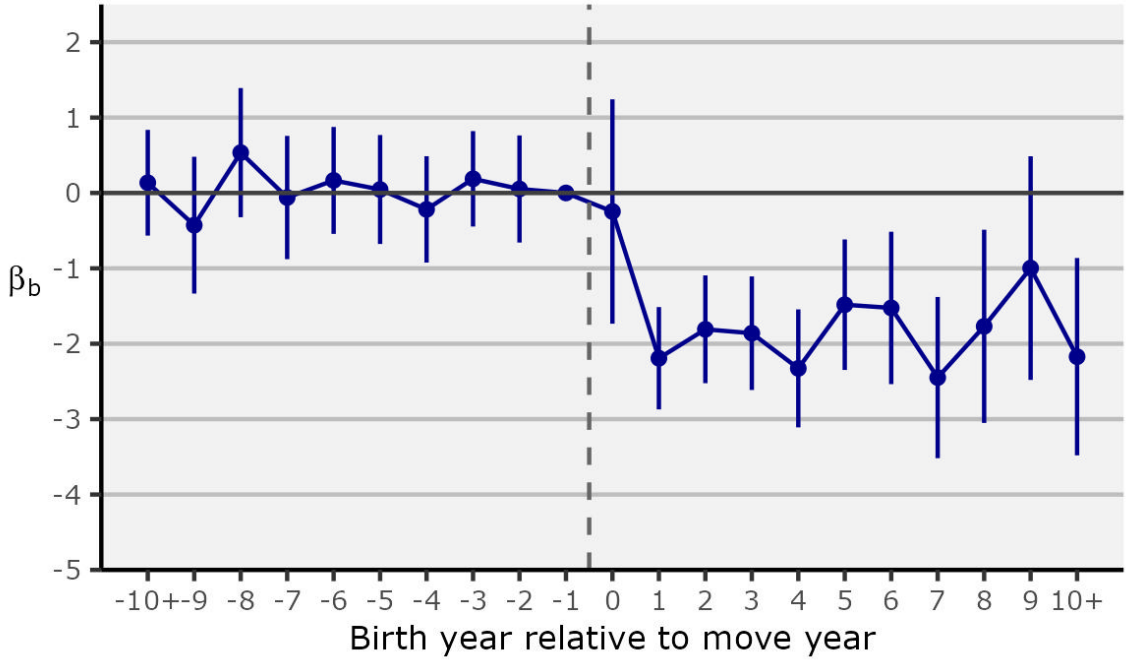
(d) Religious Homogeneity Index



Note: This figure plots the standard errors of β from the preferred specification of equation 1 using different approaches for inference. The blue dots represent the standard errors (on the y-axis) using arbitrary grid-cell of different sizes (on the x-axis), as proposed by Bester et al. (2011). The numeric label under each dot indicates the number of spatial clusters. The dotted dark green horizontal line plots the HC robust standard errors, the dashed dark blue horizontal line plots the standard errors when clustering at the county level, and the dash-dotted red horizontal line plots the standard errors when clustering at the state level. The background color is indicative of the level of statistical significance. The p-value is < 0.01 in the white area, and < 0.05, < 0.1 and > 0.1 in the light to dark shades of gray.

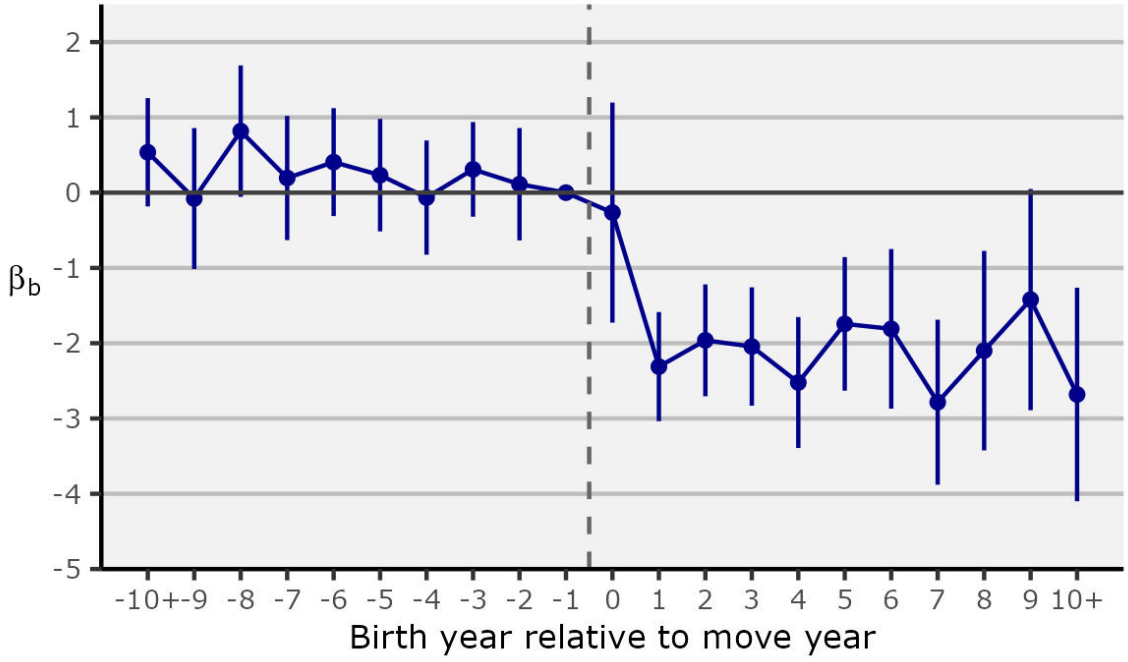
B.2 Robustness of DID results

Figure B.2: DID robustness: controlling for children's characteristics



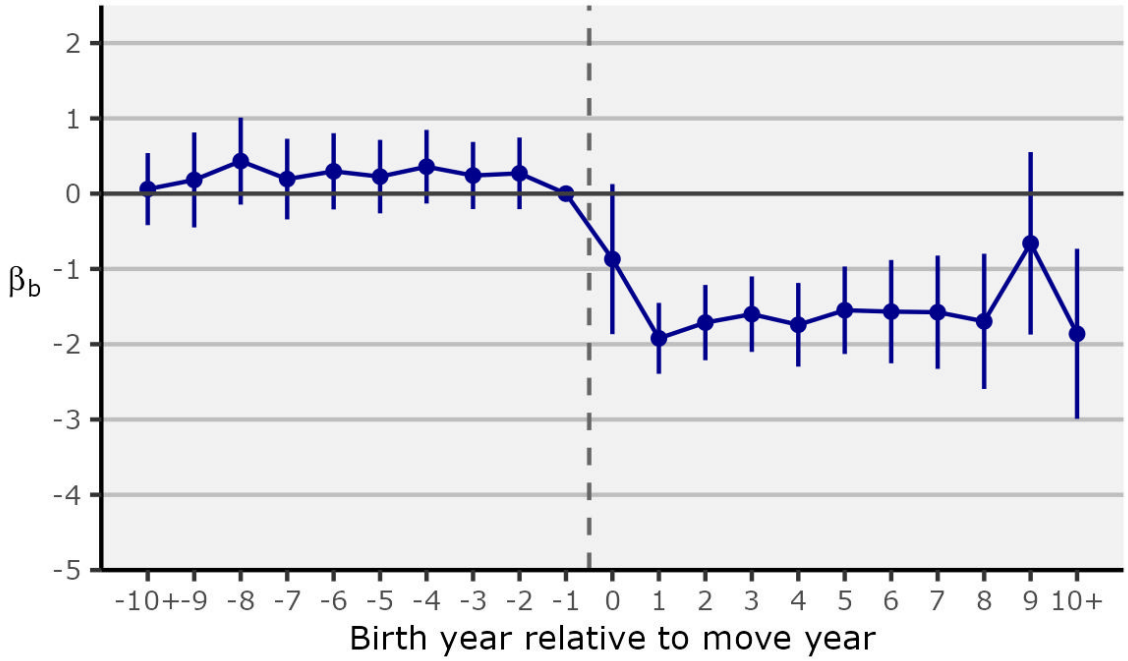
Note: This figure plots the estimates of β_b and 95% confidence intervals from the difference-in-differences estimation (equation 2), with additional child-level controls: gender, birth order, and a 5-year cohort fixed effects.

Figure B.3: DID robustness: two-way clustering at origin and destination counties



Note: This figure plots the estimates of β_b and 95% confidence intervals from the difference-in-differences estimation (equation 2) with two-way clustering of standard errors are at the county of destination and the county of origin.

Figure B.4: DID robustness: continuous treatment



Note: This figure plots the estimates of β_b and 95% confidence intervals from the difference-in-differences estimation when treatment is defined in a continuous way and equals the difference in log market access between the county of destination and the county of origin.