The Deep Roots of Economic Development in the U.S. States

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ABSTRACT: The "Deep Roots" literature investigates the effects of ancient cultural variables on economic outcomes. We extend Putterman and Weil's (2010) inquiry into the effects of State History and Agricultural History to the economic output in the heterogeneous populations of the fifty U.S. States. The ethnic and racial differences across the populations of the fifty U.S. states vary considerably due to historical immigration and slave flows that, as a result, produced radically different State History and Agricultural History scores across the states. The Deep Roots of economic development do not predict per capita levels of economic output across U.S. States. We also investigate the institutional channel for Deep Roots, and find that they impact some measures of institutions, but they do not impact the liberal economic institutions which may be essential for promoting economic growth and development.

Keywords: Deep Roots, State History, Agricultural History, Institutions, Economics of Migration

JEL Codes: O15; O43; Z13

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I. Introduction

There is a large and growing economics literature that seeks to explain how modern economic development and cross-country income differentials are the result of ancient historic, cultural, genetic, or other factors, whose effects persist in the modern world (Spolaore and Wacziarg 2013). Referred to by some as the "Deep Roots" literature, it broadly finds that these long-standing differences, whatever their mechanism, have powerful, positive predictive power in explaining modern levels of GDP per capita and other indicators of economic development. Drawing on Putterman and Weil (2010), we study the impact of deep roots as measured by ancestry by U.S. state, considering the average of how long each state's ancestors have lived (1) under a centralized state, a variable known as "State History," and (2) with settled agriculture, a variable known as "Agricultural History." The other contributions to this literature primarily focus on how State History and Agricultural History of the population affect economic development outcomes across countries. Instead, we look at its effects on economic output per capita across the U.S. States.

Putterman and Weil (2010) created a matrix of contemporary populations of each country based on their population's ancestral origin in the year 1500, building on earlier work by Bockstette et al. (2002) and Chanda and Putterman (2007). They use a variable, called State History, measuring how long a country has lived under a supra-tribal government, the geographic scope of that government, and whether that government was controlled by locals or by a foreign power. They then discount past State History by reducing the weight on each half-century before 1451-1500. For each half-century period, they construct a score, where 0 corresponds to no supra-tribal state, and 50 corresponds to an indigenous supra-tribal state covering most of the present day territory. Intermediate values were defined for foreign or intermittent rule. The State History variable is the discounted sum of the thirty half-century periods, normalized between 0 and 1 (Putterman and Weil 2010: 1640). Their second variable, Agriculture History, measures the number of millennia that have passed since a country transitioned from hunting and gathering to agriculture. Together, we refer to the State History and Agricultural History variables as the "Deep Roots Variables." Putterman and Weil then combine the matrices of ancestry with the Deep Roots Variables score to show how long each national origin group was governed by a centralized state and how long they had settled agriculture. The Deep Roots Variables score varies dramatically between peoples and locations. According to Spolaore and Wacziarg (2010), under "this approach, the United States has had a relatively short exposure to state centralization in terms of location, but once ancestry-adjusted it features a longer familiarity with state centralization, since the current inhabitants of the United States are mostly descended from Eurasian populations that have had a long history of centralized state institutions." They find that a country's Deep Roots Variables scores are positively correlated with GDP per capita today, which suggests that the drivers of economic development and GDP per capita cannot be separated from the deep cultural, historic, and/or genetic roots of human populations. Their findings stand in contrast to those that explain economic development and GDP per capita as the ultimate result of geography, institutions, or other conventional explanations.

Easterly and Levine (2016) find that European ancestry produces a substantial developmental advantage based on data of European settlement. They find that the share of the European population in colonial times has a large and significant impact on income per capita today, even in non-settler colonies governed by extractive economic institutions. Their finding remains large and significant upon controlling for the quality of contemporary institutions. The authors interpret this as consistent with theories favoring human capital as the driver of development. They conclude, "There are many other things that Europeans carried with them besides general education, scientific and technological knowledge, access to international markets, and human capital creating institutions. They also brought ideologies, values, social norms, and so on. It is difficult for us to evaluate which of these were crucial either alone or in combination."

Our contribution to this literature is to attempt to identify how ancestry affects economic development in the context of a large, industrialized nation. Confining our analysis to differences across U.S. States is proper for two reasons. First, there are wide differences in ethnic and racial heterogeneity across the U.S. States that produce radically different State Deep Roots Variables score. These scores often vary more considerably between U.S. States than between many countries found in the same continent. Second, focusing on the differences between the U.S. states allows us to implicitly control for various other factors that could better explain GDP per capita than deep roots. American states have considerable leeway in managing their own economic institutions and policies within a federal system and have measurably different ancestries. Federalism and different ancestries makes the U.S. States a fertile testing ground for the deep roots hypothesis. To this end, we constructed a matrix of U.S. State ancestries and computed State History and Agricultural History scores for American states, using this ancestry matrix. Next, we compared logged GDP per capita across the U.S. States with the Deep Roots Variables. We additionally compared these scores with the quality of economic institutions that are correlated with levels of logged GDP per capita.

We can only establish very marginal support for Putterman and Weil's (2010) findings at the state level. Furthermore, there is no statistically significant relationship between the Deep Roots Variables score and the liberalness of a state's economic institutions. Given the large literature on the importance of liberal economic institutions for economic growth and other outcomes (see, e.g., De Haan et al. 2006; Hall and Lawson 2014), the lack of a relationship between the quality of economic institutions and the Deep Roots Variables eliminates this institutional channel from the deep roots hypothesis.

The structure of this paper is as follows. In Section II, we describe how we apply Putterman and Weil's methods of measuring the Deep Roots Variables to the U.S. states. Section III compares the Deep Roots Variables to logged GDP per capita and other institutional measures and describes our results. Section IV concludes.

II. Application of Putterman and Weil to the U.S. States

We create a matrix of U.S. ancestry for the year 2010 based on where the various ancestors of the current population resided in the year 1500.[3] This matrix contains data on the percentage of the population from each ancestral group in each state in 2010. We construct our matrix by mimicking the methodology and ethnic groupings of Putterman and Weil (2010) with one difference: We split the respondents who self-identified their ancestry as "American" or "United States" evenly between Great Britain and Ireland, because they are overwhelmingly the

[3] We relied entirely on information gathered from the U.S. Census and the American Community Survey. The following explain the tables we relied upon for each survey for each group:
African Americans: S0201, American Community Survey
Asians: PCT5, U.S. Census
Natives: DP-1 America Fact Finder, Census Demographics
White European/Arabic/Sub-Saharan African/some Asian: B04006 American Community Survey, ACS 1 Year.
Hispanic/Latino/South American/Spanish/Spaniard: B03001 American Community Survey, ACS 1 Year.

descendants of the Scots-Irish (Woordard 2011: 8). Latinos and Hispanics have not settled uniformly across the United States so we adjusted the year-1500 ancestry matrix for each Latino or Hispanic ancestry group in each state. This is an important adjustment because Latinos in California are more likely to be of Mexican ancestry, while those in Florida are more likely to be Cuban, and those ancestries have different Deep Roots Variables scores. Native Americans, Native Alaskans, and Hawaiians were put in the "United States" category, as they are the only ancestry groups occupying the territory of what would become the United States in 1500.

Regrouping African Americas was not straightforward because of the slave trade that brought their ancestors to North America. We relied entirely on the same proportion of country origins for African Americans as determined by the slave trade, as was used by Putterman and Weil. We take the average African American ancestry and assume the proportional ancestral distribution is the same in every state. African Americans living in different states could, and very likely do, have different ancestries, but that information is not available in the Census or, as far as we know, anywhere else. We then add our constructed African American ancestries in each state to those who actually self-identify as being from those countries (in virtually all cases, these are recent immigrants or the descendants of immigrants). In constructing our final numbers, we ignored "unclassified" and "other" responses. Tables 1A and 1B provide our estimates for the Deep Roots Variables for each U.S. State. Greater detail is provided in Appendix A.

Our use of the U.S. Census and the America Community Survey (ACS) to identify the ancestries of U.S. state residents is inherently imperfect because the data is self-reported. Duncan and Trejo (2016) have found that "ethnic attrition" occurs over time as earlier generations of Asian and Hispanic immigrants and their descendants lose their ethnic identities.

As a result, many of the descendants of certain ethnic immigrants will not self-identify as a member of that group. Ethnic attrition is largely driven by intermarriage between members of immigrant ethnic groups and other ethnic groups (Abramitzky et al. 2016). As a result, the descendants of these immigrant ethnic groups are less likely to self-identify as members of their respective groups and thus could be undercounted. Ethnic attrition is a bigger concern when comparing the self-reported ancestries of Americans to ancestries in countries without a tradition of ethnic attrition. Thus, ethnic attrition is much less of a problem for our analysis; we are looking at the impact of deep roots at the state level within the United States, where there is a more uniform, nation-wide cultural tradition of ethnic attrition. By confining our paper to the self-reported ancestries within the United States, we at least in part resolve this issue for Putterman and Weil (2010).

The rapid rate of ancestral intermarriage in the United States does not just produce ethnic attrition, but also objectively inaccurate self-reporting. A better matrix would take account of the exact proportion of one's ancestry and not just the dominant or even mixed ancestry that they self-report. For instance, a Census or ACS respondent who is one-quarter English, one-quarter Irish, and half Iranian, would have a very different Deep Roots Variables score based on which ancestral group he or she self-identifies as *even though their actual ancestry is unchanged*. Adjusting for the high rate of ancestral intermarriage in the United States, or any other country, back to the ancestries in the year 1500 is likely impossible without a huge data set of genetic testing results that are unavailable on a state-by-state basis.

Another potential problem with a deep roots analysis across the U.S. states is the possibility of backwards causality, as cross-state migration within the United States is much cheaper, easier, and more likely than migration across international borders. Even so, the descendants of immigrants by ancestry tend to cluster in the regions where their immigrant ancestors entered the United States. The major wave of Italian immigration ended in the 1920s, yet 47 percent of Americans with Italian ancestry still live in a state with a major Age of Immigration port of entry: California, New Jersey, New York, Massachusetts, and Pennsylvania.[4] Moreover, since potential concerns regarding backwards causality are about a coefficient biased upwards, and since we conclude Putterman and Weil's findings are not present in the subnational data, this issue only reinforces the primary conclusions of this paper.

III. Replication and Extension of Putterman and Weil

We initially replicate Putterman and Weil's baseline univariate results and robustness checks using logged GDP per capita as the dependent variable. In emulation of Putterman and Weil (2010: 1648), we perform robustness checks of our findings by estimating the effects of the Deep Roots Variables conditional on the state's latitude, whether the state is landlocked, and dummy variables to capture the effect of the state's climate.[5] Descriptive statistics for those variables as well as the Deep Roots Variables score are in Table 2.[6] Table 3 contains our replication of Putterman and Weil.[7]

In the many regressions we run, the Deep Roots Variables score across the U.S. States weakly predicts logged GDP per capita in only certain specifications, in contrast to the Putterman and Weil's (2010) findings across countries. Regressions (1) and (6) reflect univariate

[4] See ACA S0201, 2011 for Italian ancestry
[5] Unlike Putterman and Weil (2010), we did not include a dummy variable for a Eurasian country in this robustness check because none of the U.S. States are in Eurasia.
[6] The simple number of years (thousands) was used for agricultural history. A normalized version of state history was used, specifically the "statehistn05v3" variable in the online dataset.
[7] Because of the nature of these regressions and the nature of the deep roots literature, the year for all these variables is simply most recent available.

relationships, while (2)-(4) and (7)-(9) pair the Deep Roots Variables score with the landlocked dummy, the state's latitude, and the vector of climate dummies. Regressions (5) and (10) include the complete vector of control variables. For all regressions, robust standard errors are employed.

The Deep Roots Variables score is only statistically significant in four out of the ten regressions that we will describe here. Regression (2) includes State History and a dummy for states that are landlocked, but excludes the other variables, finding a positive relationship of State History with logged GDP per capita at the 1% level. No other regression with State History as an independent variable finds a statistically significant relationship. Regression (4) finds a statistically insignificant *negative* relationship.

Shifting to Agricultural History, regressions (6), using no controls, and (7), which includes the landlocked dummy, find that Agricultural History is significant at the 1% level. Regression (7) also finds that being landlocked is significant at the 5% level. Agricultural History's statistically significant relationship with logged GDP per capita falls to 5% upon controlling for latitude in Regression (8). Regression (10) includes all dummies and controls and finds no statistically significant relationship between Agricultural History and logged GDP per capita, although it does find a negative and statistically significant relationship between our dependent variable and being landlocked. Regression (9), as did Regression (4) did above, finds a statistically insignificant negative relationship. Ultimately, neither State History nor Agricultural History has a statistically significant relationship with logged GDP per capita in our final specifications that employ the full set of geographic variables used by Putterman and Weil (2010). To the extent that Agricultural History appears to be correlated with output per capita, the variation is driven by geography.

The Deep Roots Variables score is not driven by the percent of the population that is non-Hispanic white when comparing countries, but it is in the United States. State History (R^2=0.535) is highly correlated with the percent of the state population that is white non-Hispanic, while Agricultural History (R^2=0.171) is less so (see by-state comparisons in Table 1a and Table 1b). If certain states enjoy a privileged economic status because of a disproportionately large population of non-Hispanic whites, or other related variables drive the relationship, it may confound this analysis. We thus supplement the replication of Putterman and Weil (2010) with additional regressions that look at the percent of a state's population that is white non-Hispanic in Table 4. The percent of a state's population that is white non-Hispanic actually correlates *negatively* with economic output across all eight specifications when we control for either of the Deep Roots Variables. This relationship is actually more robust than the relationship between the Deep Roots Variables and logged GDP per capita. The white non-Hispanic control actually marginally *improves* the statistical relationship between the Deep Roots Variables for the state's entire population and economic output. Six out of our ten regressions now produce statistically significant findings including Regression (15), at the 5% level, which includes all geographic controls. However, Agricultural History, when using all geographic controls as in Regression (20), still has a statistically insignificant relationship with logged GDP per capita. The inclusion of white non-Hispanic does not improve the relationship between the Deep Roots Variables and logged GDP per capita enough to salvage the original Putterman and Weil (2010) result as it applies to the U.S. state level, especially since to achieve even this, something akin to a specification search was performed. We include these results both to address the concern that non-Hispanic white drives whatever variation we observe between the Deep Roots Variables and logged GDP per capita, and as a curiosity for future research.

Economist Garett Jones (2016) suggests that the Deep Roots Variables in Putterman and Weil (2010) affect economic outcomes via the quality of economic institutions. Jones's view is that the greater the Deep Roots Variables scores are for a particular ancestry, the more members of that ancestry are likely to support liberal economic institutions conducive to growth. This is plausible as liberal economic institutions are robustly correlated with economic growth (see, for instance, de Haan et al. 2006). We assess Jones' mechanism via the same regressions we employed above but with indices of institutional quality as the dependent variable. The indices we use measuring liberal economic institutions are the Fraser Institute's *Economic Freedom of North America* ("EFNA") index (Stansel et al. 2015) and the Mercatus Center's *Freedom and the 50 States* ("F50") index (Ruger and Sorens 2013). We then also look at a measure of state-level government corruption (Glaeser and Saks 2006), the BGA-Alper Services Integrity Index (Better Government Association 2013), and social capital (Hawes and Rocha 2010). Additionally, the measures of government corruption, the BGA-Alper index, and the measure of social capital are closely analogous to the social and institutional variables used by Putterman and Weil (2010: 1654).

EFNA and F50 take very different approaches to measuring subnational economic institutions. EFNA uses the *Economic Freedom of the World* (Gwartney et al. 2015), also published by the Fraser Institute, as its starting point. It maximizes the number of years available and limits itself to variables available for both U.S. States and Canadian provinces. Its variation tends to be driven by fiscal variables and labor market regulation. F50 only considers U.S. States in more recent years with many more variables. F50 also includes non-economic social policy regulations; we consider both the overall index and a separate sub-index of F50 that only contains scores related to economic policies and institutions. The descriptive statistics for these variables are in Table 2.

Table 5 provides regression results where each row is the institutional measure. The first two columns use State History as the explanatory variable. The first column reports the results for the State History variable by itself without geographic controls and the second column runs State History variable using all geographic controls. State History has relationships at the 1% level with lower levels of state government employee corruption and social capital, both with and without controls. State History holds a relationship with the version of the F50 index inclusive of both social and economic freedom bordering just outside the conventional definition of statistical significance, but it has no significant relationship when considering only economic institutions. Of these institutional variables, the only statistically significant relationship for Agricultural History is with social capital, though this disappears upon the inclusion of the geographic controls. Neither the State History nor the Agricultural History variable holds a statistically significant relationship with the BGA-Alper Services Integrity Index. No regression shows any evident relationship between Deep Roots and economic institutions.

Finally, also in Table 5, we consider the relationship of Deep Roots with inequality as measured by the Gini Coefficient,[8] also following Putterman and Weil (2010: 1664). Qualitatively, the relationship of the variables with inequality are similar to their relationship with social capital. State History holds a negative and statistically significant relationship with inequality. Agricultural holds a negative relationship that is significant only in the absence of controls.

[8] Data on the Gini Coefficient is from Census.

There is a relationship between State History and measures of corruption and social capital at the U.S. state level. There is evidence that state government corruption diminishes and social capital increases with a longer State History, but Deep Roots may bear little relationship with the quality of economic institutions and policies that form important preconditions for economic growth. They may, it appears, have other positive social and institutional consequences, however. Lastly, it may be the case that deep roots can impact entire countries, but any subnational effects are too subtle to see even somewhere as heterogeneous as the United States.

V. Conclusion

Putterman and Weil's (2010) core result, a statistically significant, positive relationship between Deep Roots Variables and logged GDP per capita, *does not* hold at the subnational level in the United States. There is also no robust relationship between Agricultural History or State History with liberal economic institutions, although there is evidence that lower corruption, social capital, and reduced inequality are associated with State History. As we are able to still find some relationships between the Deep Roots Variables and other subnational data, we see our results as tempering the conclusions of Putterman and Weil (2010). Our findings suggest that the social scientific literature has not reached robust enough conclusions to glean any policy implications from the Deep Roots literature.

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Table 1a. State History (normalized) and Percent White Non-Hispanic by State.

State	State History	% White Non-Hispanic	State	State History	% White Non-Hispanic
Alabama	0.5563	66.6	Nebraska	0.6765	81.3
Alaska	0.6583	63.0	Nevada	0.6075	52.7
Arizona	0.6285	56.9	N. Hampshire	0.6917	91.8
Arkansas	0.6042	73.9	N. Jersey	0.5637	57.9
California	0.6152	39.2	N. Mexico	0.6153	39.7
Colorado	0.6642	69.4	N. York	0.5556	57.4
Connecticut	0.5924	70.0	N. Carolina	0.5799	64.5
Delaware	0.5866	64.3	N. Dakota	0.6772	88.1
Florida	0.5340	56.8	Ohio	0.6402	80.6
Georgia	0.5385	55.0	Oklahoma	0.6118	67.8
Hawaii	0.5830	22.8	Oregon	0.6744	77.6
Idaho	0.6889	83.4	Pennsylvania	0.6260	78.6
Illinois	0.6051	62.9	Rhode Island	0.6417	75.4
Indiana	0.6559	80.9	S. Carolina	0.5578	63.9
Iowa	0.6922	88.0	S. Dakota	0.6921	83.8
Kansas	0.6709	77.4	Tennessee	0.6087	75.0
Kentucky	0.6534	85.8	Texas	0.6006	44.3
Louisiana	0.5717	59.7	Utah	0.6951	79.8
Maine	0.7139	94.1	Vermont	0.7069	94.0
Maryland	0.5546	53.8	Virginia	0.5940	63.9
Massachusetts	0.6197	75.3	Washington	0.6583	71.4
Michigan	0.6321	76.1	West Virginia	0.6818	92.8
Minnesota	0.6566	82.3	Wisconsin	0.6700	82.8
Mississippi	0.5147	57.5	Wyoming	0.6983	84.6
Missouri	0.6519	80.5			
Montana	0.6911	87.2			

Table 1b. Agricultural History (000s of years) and Percent White Non-Hispanic by State.

State	Agricultural History	% White Non-Hispanic	State	Agricultural History	% White Non-Hispanic
Alabama	3.532	66.6	Nebraska	5.596	81.3
Alaska	4.948	63.0	Nevada	4.599	52.7
Arizona	4.519	56.9	N. Hampshire	4.971	91.8
Arkansas	3.982	73.9	N. Jersey	5.019	57.9
California	4.645	39.2	N. Mexico	4.291	39.7
Colorado	4.886	69.4	N. York	4.827	57.4
Connecticut	4.986	70.0	N. Carolina	3.793	64.5
Delaware	4.518	64.3	N. Dakota	6.036	88.1
Florida	3.980	56.8	Ohio	5.138	80.6
Georgia	3.626	55.0	Oklahoma	4.113	67.8
Hawaii	4.406	22.8	Oregon	4.738	77.6
Idaho	4.357	83.4	Pennsylvania	5.328	78.6
Illinois	5.060	62.9	Rhode Island	5.121	75.4
Indiana	4.924	80.9	S. Carolina	3.716	63.9
Iowa	5.571	88.0	S. Dakota	5.901	83.8
Kansas	5.028	77.4	Tennessee	3.826	75.0
Kentucky	4.053	85.8	Texas	4.240	44.3
Louisiana	4.387	59.7	Utah	3.547	79.8
Maine	4.449	94.1	Vermont	4.834	94.0
Maryland	4.397	53.8	Virginia	4.054	63.9
Massachusetts	4.934	75.3	Washington	4.719	71.4
Michigan	5.086	76.1	West Virginia	4.657	92.8
Minnesota	5.658	82.3	Wisconsin	5.874	82.8
Mississippi	3.437	57.5	Wyoming	4.898	84.6
Missouri	4.919	80.5			
Montana	5.114	87.2			

TABLE 2. Descriptive Statistics – Core Variables

Variable	Obs	Mean	St. dev.	Min	Max
State History (normalized)	50	0.629	0.052	0.515	0.714
Agricultural History (Thousands of Yrs)	50	4.6645	0.640	3.437	6.035
Percent White	50	70.650	15.533	22.8	94.1
Land Locked	50	0.46	0.472	0	1
Latitude	50	39.477	6.124	21.110	61.485
LN GDP Per Capita	50	10.807	0.148	10.550	11.107
Govt Emp Corruption	50	0.279	0.133	0.074	0.643
BGA Index	50	55.139	8.523	28.06	69.77
Social Capital	48	-0.191	0.602	-1.15	1.092
Economic Freedom NA	50	6.512	0.669	5.2	7.8
Mercatus, Overall	50	2.525	41.026	-150.208	66.629
Mercatus, Economic	50	3.550	37.929	-133.588	72.761

TABLE 3. Baseline Replication of Putterman and Weil

	(1)	(2)	(3)	(4)	(5)
State History	0.476 (0.428)	1.346*** (0.492)	0.133 (0.518)	-0.589 (0.520)	0.418 (0.703)
Landlocked Dummy		-0.170*** (0.046)			-0.161*** (0.053)
Latitude			0.006 (0.004)		-0.002 (0.006)
Climate Dummies	N	N	N	Y	Y
Constant	10.507*** (0.277)	10.038*** (0.303)	10.481*** (0.282)	11.238*** (0.339)	10.758*** (0.443)
R^2	0.028	0.230	0.078	0.258	0.396
n	50	50	50	50	50

	(6)	(7)	(8)	(9)	(10)
Agricultural History	0.081*** (0.029)	0.100*** (0.033)	0.066** (0.032)	-0.002 (0.051)	0.031 (0.053)
Landlocked Dummy		-0.117** (0.043)			-0.146*** (0.043)
Latitude			0.004 (0.004)		-0.002 (0.006)
Climate Dummies	N	N	N	Y	Y
Constant	10.429*** (0.141)	10.393*** (0.153)	10.338*** (0.170)	10.868*** (0.273)	10.834*** (0.352)
R^2	0.123	0.256	0.147	0.235	0.395
n	50	50	50	50	50

Standard Errors are robust. *** denotes 99%, ** denotes 95%, * denotes 90%.

TABLE 4. Replication of Putterman and Weil, with Percent White Non-Hispanic

	(11)	(12)	(13)	(14)	(15)
State History	1.377**	2.225***	1.074	0.741	1.617**
	(0.554)	(0.525)	(0.641)	(0.640)	(0.765)
Percent White Non-Hispanic	-0.004**	-0.004***	-0.004***	-0.006**	-0.006**
	(0.017)	(0.001)	(0.001)	(0.002)	(0.002)
Landlocked Dummy		-0.169***			-0.140**
		(0.046)			(0.057)
Latitude			0.007**		0.003
			(0.003)		(0.005)
Climate Dummies	N	N	N	Y	Y
Constant	10.231***	9.771***	10.167***	10.812***	10.201***
	(0.288)	(0.290)	(0.359)	(0.342)	(0.468)
R^2	0.115	0.314	0.185	0.353	0.479
n	50	50	50	50	50

	(16)	(17)	(18)	(19)	(20)
Agricultural History	0.107***	0.111***	0.091**	0.009	0.030
	(0.034)	(0.037)	(0.035)	(0.046)	(0.053)
Percent White Non-Hispanic	-0.003*	-0.001	-0.003**	-0.004**	-0.002
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Landlocked Dummy		-0.102**			-0.111**
		(0.044)			(0.052)
Latitude			0.007**		0.002
			(0.003)		(0.006)
Climate Dummies	N	N	N	Y	Y
Constant	10.490***	10.430***	10.358***	11.113***	10.884***
	(0.143)	(0.152)	(0.146)	(0.279)	(0.355)
R^2	0.183	0.270	0.243	0.338	0.420
n	50	50	50	50	50

Standard Errors are robust. *** denotes 99%, ** denotes 95%, * denotes 90%.

TABLE 5. The Effect of Deep Roots, Measures of Institutional Quality

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RHS Variable	State History	State History	Agricultural History	Agricultural History
Geographic Controls?	N	Y	N	Y
Govt Emp Corruption	-1.109*** (0.334)	-1.578*** (0.474)	-0.043 (0.035)	-0.002 (0.046)
BGA Index	-37.747 (23.848)	-5.010 (33.017)	-0.079 (1.778)	-0.671 (3.000)
Social Capital	5.166*** (1.526)	5.651*** (1.969)	0.450*** (0.108)	0.186 (0.222)
Economic Freedom NA	0.443 (2.199)	3.188 (4.358)	0.061 (0.170)	0.550 (0.330)
Mercatus, All	220.672* (124.78)	357.287* (203.305)	-5.307 (8.573)	11.018 (12.054)
Mercatus, Econ	151.625 (119.462)	262.867 (195.476)	-5.058 (8.564)	13.726 (12.708)
Gini Coefficient	-0.269*** (0.039)	-0.344*** (0.063)	-0.008** (-0.004)	0.008 (0.008)

Standard Errors are robust. *** denotes 99%, ** denotes 95%, * denotes 90%.

APPENDIX A. Elaboration of Application of Putterman & Weil's Method to the U.S. States

State Table

The table is a breakdown of U.S. state ancestry in 2010 with a target year of 1500. The table mimics the Brown University matrix created by Putterman and Weil (P&W) in means of data collection and presentation with a few small methodological changes. Data for this matrix came from the U.S. Census:

Natives: DP-1 America Fact Finder, Census Demographics

Asians: PCT5 Census

African Americas: S0201, B02009, 3 year or 5 year based on availability

White European/Arabic/Sub-Saharan African/some Asian: B04006 American Fact Find, ACS 3 Year or 5-year based on availability.

Hispanic/Latino/South American/Spanish/Spaniard: QT-P10 American Fact Find, 1SF 100%

Regrouping

These groups were separated on the Census but regrouped for this matrix (see below). T

<u>GBR- UK</u>

Includes Welsh, Scottish, ½ of the Scotts-Irish (those who answer "American" on the Census), English and British

<u>Ireland</u>

Includes Celtic, Ireland, and ½ of the Scotts-Irish

<u>French</u>

Includes Basque, French Canadian, and French

<u>German</u>

Includes Russian German, Pennsylvania German, and German

<u>Czech Republic</u>

Includes Czech Republic and Czechoslovakian

<u>Spain</u>

Includes Spanish, Spaniard, and Spanish American

<u>African American</u>

African-American ancestry is split between the African countries in the same proportions as P&W use. Below is a portion of the P&W Matrix Americas Appendix, as they explain[9]:

> Genetic admixture among African-Americans has been widely studied. We looked at five recent studies (Tishkoff et al. 2009, Parra et al. 2001, Parra et al. 1998, Smith et al. 2004, Lind et al. 2007) and found the estimates of European admixture among African-Americans generally fell between 15-20%, with 1-2% admixture from Amerindians. Lind et al. (2007) note that geneticists commonly use 20% as an estimate of white admixture in African-Americans. The five studies give data at local levels, with small sample sizes in individual cities or regions, usually between 20 and 45 individuals. However, the percentage of European and Amerindian admixture does not vary greatly, with the European share generally staying within 15-20%, and the Amerindian share around 1%. We treat 80% of the ancestors of contemporary African-Americans as having resided in Africa in 1500, allocating them among countries according to the principles in the Main Appendix. 19% of African-Americans' ancestors are assumed to have resided in Europe and are divided among European countries in the same proportions as European ancestors of other Americans.* 1% of African-Americans' ancestors are assumed to be Amerindian and thus native to the United States. Angela Brittingham and G. Patricia de la Cruz, "Ancestry: 2000 (Census 2000 Brief)," U.S. Census Bureau, June 2004. Lind, Joanne M. et al., 2007, "Elevated male European and female African contribution to the genomes of African American individuals," Human Genetics 120: 713-722.Parra, Esteban J. et al., 1998, "Estimating African American Admixture Proportions by Use of Population-Specific Alleles," American Journal of Human Genetics 63(6): 1839-1851. Parra, Esteban J. et al., 2001, "Ancestral Proportions and Admixture Dynamics in Geographically Defined African Americans Living in South Carolina," American Journal of Physical Anthropology 114:18-29.Smith, Michael W. et al., 2004, "A High Density Admixture Map for Disease Gene Discovery in African Americans, American Journal of Human Genetics 74(5): 1001-1013.Tishkoff, S.A. et al. 2009. "The genetic structure and history of Africans and African Americans." Science. 324(5930): 1035-44." African Country of Origin Region of Disembarkation in the Americas.

	Brazil	The Caribbean	U.S.A.	Other
Angola	42.1015%	14.51875%	15.364%	27.29525%
Benin	1.589%	6.2475%	1.0395%	4.9315%
Cameroon	0.5365%	7.5255%	5.3998%	2.262%
Congo	12.8135%	4.41875%	4.676%	8.30725%
Congo DRC	9.1525%	3.15625%	3.34%	5.93375%
Cote d'Ivoire	0	1.305%	2.103%	0.474%
Equatorial Guinea	0.111%	1.557%	1.1172%	0.468%
Gabon	9.5225%	8.34625%	7.064%	7.49375%
Gambia	0.15%	0.974%	4.264%	0.334%
Ghana	2.05%	15.1%	12.01%	21.19%
Guinea	0.091%	1.4625%	3.28575%	1.0465%
Guinea-Bissau	0.225%	1.461%	6.396%	0.501%
Liberia	0	3.045%	4.907%	1.106%
Madagascar	5.5392%	0.6816%	0.3968%	0.9536%
Mozambique	8.8281%	1.0863%	0.6324%	1.5198%
Nigeria	2.825%	16.71%	7.071%	9.385%
Sao Tome and Principe	0.2775%	3.8925%	2.793%	1.17%
Senegal	0.375%	2.435%	10.66%	0.835%
Sierra Leone	0.189%	3.0375%	6.82425%	2.1735%
Tanzania	2.9427%	0.3621%	0.2108%	.5066%
Togo	0.681%	2.6775%	0.4455%	2.1135%

[9] Americas 1.1
http://www.brown.edu/Departments/Economics/Faculty/Louis_Putterman/world%20migration%20matrix.htm

South American Division

Due to the set ancestral date of 1500, it is assumed that many of the Hispanic and Latino groups that have migrated into the USA would have ancestral lineage back to Europe and Africa as well as South America. We split up the Latino and Hispanic populations on the state level according to the ancestries as reported in their home countries.

Native Americans, Pacific Islanders, and Hawaiian

These citizens were grouped in the column USA.

Scandinavian and Yugoslavian

A small number of Census respondents answered that they were “Scandinavian” or “Yugoslavian.” We separated them by country of origin in this way:

Scandinavian- Sweden – 50%, Norway 45%, and Finland 5%

Yugoslavian- Croatia 65%, Slovenia 10%, Serbia 25%