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Trust and growth

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Abstract Using data from U.S. states, we find a positive relationship between trust and growth. According to our results, a 10 percentage point increase in trust increases the growth rate of GDP by 0.5 percentage points and the growth rate of manufacturing employment by 1.3 percentage points over a five-year period. Our results are robust to the endogeneity between trust and growth.

Keywords Trust · Economic growth

1 Introduction

Since Putnam's (1993) influential study, scholars increasingly have been interested in how social capital, particularly trust, relates to economic growth. According to Knack (1999), high-trust societies achieve faster growth rates due to lower transaction costs. The type of trust that facilitates growth is the 'generalized trust' defined as trust between strangers. As Knack (1999) argues, in societies where strangers can trust each other, people not only can leave their bicycles unattended and unlocked on the street, but also can trade without formal contracts. In a less complicated and contentious time, trade was conducted on a "handshake"—but still people prefer to make deals upon trust than on excessively complex contracts (Macaulay 1963; Gambetta 1988). As mentioned above, generalized trust is trust in strangers. Trust in strangers not only lowers transaction costs but also leads to greater tolerance among people who are different from each other and greater willingness to trade—both factors leading to faster economic growth (Uslaner 2002). Trust leads to higher institutional quality, particularly to lower corruption (Uslaner 2008a). As Rothstein (2003) argues, for

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people to have this type of trust, they are likely to think that not only most other people play by the rules in 'person-to-person' contacts, but they also 'play by the rules' in their contacts with government institutions. That is, they are less likely to corrupt these institutions. Several studies, such as Mauro (1995) and Glaeser and Saks (2006), show the negative effects of corruption on economic growth. Corruption simply acts as an additional tax which slows economic growth. Finally, trust leads to greater investment in ideas. As Knack and Keefer (1997) argue, innovation hardly takes place in low-trust societies. Entrepreneurs, rather than devoting more time innovating new products, have to devote more time to monitoring their employees. Since trust protects property and contractual rights, it is not necessary to divert resources from production to protection. Using data from a mixed group of countries, i.e., low, middle, and high-income, both Knack and Keefer (1997) and Zak and Knack (2001) find a positive relationship between trust and economic growth. However, Helliwell (1996), using data from a group of high-income OECD countries, finds a negative relationship. Beugelsdijk and van Schaik (2005), on the other hand, use regional data from high-income European countries and do not find a relationship at all. As Helliwell (1996) suggests, the next step in unraveling the puzzle requires social capital measures for a broader range of countries and regions, such as U.S. states. In this study, we use data from U.S. states, and find a positive relationship between trust and economic growth regardless of the economic growth measure used. Our results are robust to the endogeneity between economic growth and trust.

2 Data

In cross-country studies trust is measured using data from World Values Surveys (WVS). It is calculated for each country as the share of respondents who agree that "most people can be trusted" rather than the alternative that "you can't be too careful in dealing with people" (Knack 1999: 16). WVS cover approximately 1000 respondents in a small group of countries. The first wave of surveys was administered during the 1980s in mostly high-income countries while the second wave was in the 1990s in both middle and high income countries. The share of respondents who agree that most people can be trusted varies from 10% in Turkey to close to 50% in Canada. Our measure of trust is from Uslaner and Brown (2005). They calculate the shares of trusting people in 43 contiguous states and in Alaska in the 1990s using data from several other surveys in addition to the General Social Survey (GSS).[1] The standard question asked to measure trust is the same: "Generally speaking, do you believe that most people can be trusted, or can you not be too careful in dealing with people?"[2] Using data from U.S. states is quite advantageous for a variety of reasons. First, it is more likely that the relationship between the answers to survey trust questions and actual trust differs across countries than across states. Holm and Danielson (2005), for example, show that it differs considerably between Sweden and Tanzania. The standard deviation of

[1] American National Election Study, Pew Civic Engagement Survey, the Washington Post Trust in Government Survey, and the New York Times Millennium Survey. While calculating the shares of trusting people, they did not include the states in which the sample size used in the surveys was smaller than 50.

[2] Uslaner and Brown (2005) aggregate the survey data to calculate the shares of trusting people across states. Note that none of the surveys used are designed to produce measures across states. Nevertheless, as Brace et al. (2002) show, aggregating survey data does produce reliable measures. Putnam (2000), for example, aggregates data from GSS to calculate measures of social capital across states. See Uslaner and Brown (2005) for a discussion of the data.

Table 1 Summary statistics of the growth variables and trust

Variable	*N*	Mean	Std. Dev.	Min	Max
Growth Rate of GDP	88	0.048	0.030	−0.059	0.147
Growth Rate of Manufacturing Employment	88	0.001	0.038	−0.083	0.128
Trust	44	0.383	0.116	0.105	0.630

the cross-country trust measure that Knack and Keefer (1997) use, for example, is equal to 0.140, which is in fact larger than the cross-state trust measure that we use in our study which is equal to 0.116. Second, there are significant unobservable institutional differences across countries. U.S. states are much more similar than different countries regarding institutions and in other dimensions that are difficult to measure.

As Alesina and La Ferrara (2005) argue, although the growth rate of Gross Domestic Product (GDP) is a natural measure for cross-country growth regressions due to the relative immobility of labor across countries, it is not necessarily the case for the U.S. states. Within the United States, labor responds strongly and quickly to economic opportunities. Following Glaeser and Saks (2006), in addition to the growth rate of GDP by state, we use an additional variable as our measure of economic growth: the growth rate of manufacturing employment covering two time periods 1990–1994 and 1995–1999. Our GDP data are from the Bureau of Economic Analysis (BEA) and the employment data are from the Bureau of Labor Statistics (BLS). Summary statistics for each economic growth measure we use as well as our measure of trust are given in Table 1. The share of trusting people varies significantly across states. It is 10% in Arkansas, the lowest, and in New Hampshire it is above 60%, the highest. People who live in Midwestern states are, on average, more trusting. The share of trusting people in the Midwest is around 45% while it is below 30% in the South. The growth rates of GDP and the manufacturing employment follow the same pattern. The Midwest is the fastest growing region. GDP, on average, grows 5.5 percentage points over a 5 year period while manufacturing employment grows 2.5 percentage points. The South, on the other hand, is the slowest growing region. GDP and manufacturing employment grow 4 and −1 percentage points, respectively. In Louisiana, for example, the average growth rate of GDP is equal to 2% over a 5 year period while in Minnesota it is 6.5%. The average growth rate of manufacturing employment is equal to −1.5% in Alabama, while it is equal to 8% in North Dakota.

In every specification, we control for the initial values of our growth variables as well as for regional effects by entering dummy variables for South, Midwest, and West. In order to minimize omitted variable bias, we also include a set of control variables in our regressions. In the regressions where GDP by state is used to measure economic growth, we control for initial values of government spending and urbanization as well as education. Our measure of education is the share of the population age 25 and above with a college degree or higher given by the Census Bureau. We measure government spending as the total share of federal, state, and local government spending in GDP in each state given by the BEA. Our measure of urbanization is the share of the population living in urban areas reported by the Census Bureau. In the regressions where manufacturing employment growth is used to measure economic growth, in addition to government spending, we control for the institutional structure governing labor relations in each state with a dummy variable for right-to-work laws.

3 Results

We first estimate the following basic model by seemingly unrelated regression (SUR) for 43 contiguous U.S. states and Alaska for the periods 1990–1994 (period 1) and 1995–1999 (period 2):

$$Growth_{i1} = Intercept + \alpha Trust_{i1} + \beta X_{i1} + u_{i1},$$
$$Growth_{i2} = Intercept + \alpha Trust_{i2} + \beta X_{i2} + u_{i2}$$

where $Growth_{it}$ represents the growth rate of GDP and the growth rate of manufacturing employment in state i during period t, i.e., periods 1 and 2. $Trust_{it}$ represents the share of trusting people in each state and X_{it} represents the set of control variables that affect economic growth including the region dummies (*Education*, *Government Spending*, *Urban*, *Right to Work*, *South*, *Midwest*, *West*). SUR is a flexible form of Random Effects (RE) estimation and is widely used in cross-country growth regressions since it allows for the error terms to be correlated across periods (Alesina and La Ferrara 2005). We first formulate a separate regression for each period, then constrain the coefficients to be equal across periods and estimate the resulting system by generalized least squares (GLS). If the error terms are not correlated, there is no payoff to GLS estimation. GLS is then simply equation-by-equation ordinary least squares (OLS). The greater the correlation of the error terms, the greater the efficiency gain accruing to GLS (Greene 2003).

The results of the SUR estimation are given in Columns 1, and 4 of Table 2. The estimated coefficient of *Trust* is positive and highly significant in both specifications. According to the results of the SUR estimation, a 10 percentage point increase in *Trust* increases the growth rate of GDP by 0.5 percentage points and the growth rate of employment by 1.3 percentage points over a 5-year period. A 1 standard deviation increase in *Trust* increases the growth rate of GDP by almost 0.2 standard deviations, significantly bigger than the standardized coefficient of *Urban*. Similarly, a 1 standard deviation increase in *Trust* increases the growth rate of manufacturing employment by almost 0.4 standard deviations, same as the standardized coefficient of *Government Spending*. The partial regression plots between *Trust* and the growth rates of GDP and manufacturing employment are given in Figs. 1 and 2, respectively. Together with the control variables, *Trust* explains more than 45% of the variation in the growth rate of GDP, and more than 65% of the variation in the growth rate of manufacturing employment across U.S. states.

Second, to control for spatial autocorrelation, we estimate the following spatial autoregressive (i.e., spatial lag and spatial error) models by maximum likelihood (ML):[3]

$$Growth_{it} = Intercept + \alpha Trust_{it} + \beta X_{it} + \rho W X_{it} + u_{it}$$

and

$$Growth_{it} = Intercept + \alpha Trust_{it} + \beta X_{it} + \varepsilon_{it}$$

where

$$\varepsilon_{it} = \lambda W_{it} + u_{it}$$

[3] Economic growth in a state is likely to be affected by economic growth in neighboring states. Ignoring spatial autocorrelation in growth causes biased coefficient estimates as well as biased estimates of the standard errors.

Table 2 Trust and growth: SUR and ML estimation

	Growth Rate of GDP			Growth Rate of Manufacturing Employment		
	(1) Basic Model	(2) Spatial Lag Model	(3) Spatial Error Model	(4) Basic Model	(5) Spatial Lag Model	(6) Spatial Error Model
Trust	0.0524	0.0581	0.0568	0.1267	0.1113	0.1219
	(0.0286)**	(0.0283)**	(0.0280)**	(0.0276)***	(0.0335)***	(0.0344)***
Log *GDP*	−0.2422	−0.2422	−0.2436	−0.1731	−0.1600	−0.1715
	(0.0355)***	(0.0371)***	(0.0371)***	(0.0317)***	(0.0479)***	(0.0502)***
Log *Manufacturing*				−0.0137	−0.0124	−0.0130
Employment				(0.0051)***	(0.0061)**	(0.0066)**
Education	0.0014	0.0015	0.0015			
	(0.0008)**	(0.0007)**	(0.0008)**			
Government	−0.3947	−0.4278	−0.4459	−0.3344	−0.3169	−0.3119
Spending	(0.1039)***	(0.1183)***	(0.1167)***	(0.1362)***	(0.1267)***	(0.1334)***
Urban	0.0003	0.0003	0.0003			
	(0.0002)*	(0.0002)*	(0.0002)			
Right to Work				0.0220	0.0209	0.0225
				(0.0066)***	(0.0073)***	(0.0074)***
South	0.0109	0.0126	0.0121	0.0269	0.0194	0.0258
	(0.0093)	(0.0080)*	(0.0082)*	(0.0101)***	(0.0115)**	(0.0119)**
Midwest	0.0069	0.0059	0.0081	0.0396	0.0271	0.0381
	(0.0077)	(0.0059)	(0.0067)	(0.0074)***	(0.0087)***	(0.0090)***
West	0.0063	0.0094	0.0063	0.0413	0.0283	0.0372
	(0.0087)	(0.0103)	(0.0114)	(0.0091)***	(0.0119)***	(0.0136)***
Wald Test of ρ/λ						
χ^2		2.796	4.261		7.234	2.068
P-value		0.095	0.039		0.007	0.150
LM Test of ρ						
χ^2		3.590	5.214		8.108	3.185
P-value		0.058	0.022		0.004	0.074
R^2/Log Likelihood	0.48, 0.40	218.853	219.651	0.64, 0.43	204.255	202.237
N	44, 44	88	88	44, 44	88	88

Robust standard errors in parentheses. All tests one tailed except constants. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$

W is the spatial-lag weighting matrix and ρ and λ are the coefficients giving the sign and the strength of spatial autocorrelation in *Growth* and u, respectively. We adopt a simple weighting scheme of strict state contiguity, such that $w_{ij} = 1$ if $i \neq j$ and state i is contiguous to state j and $w_{ij} = 0$ otherwise.

The results of the ML estimation are given in Columns 2, 3, 5 and 6 of Table 2. According to Wald and LM tests, spatial autocorrelation is present in all but one specification. Even controlling for spatial autocorrelation, the estimated coefficient of *Trust* is positive and highly significant in all specifications.

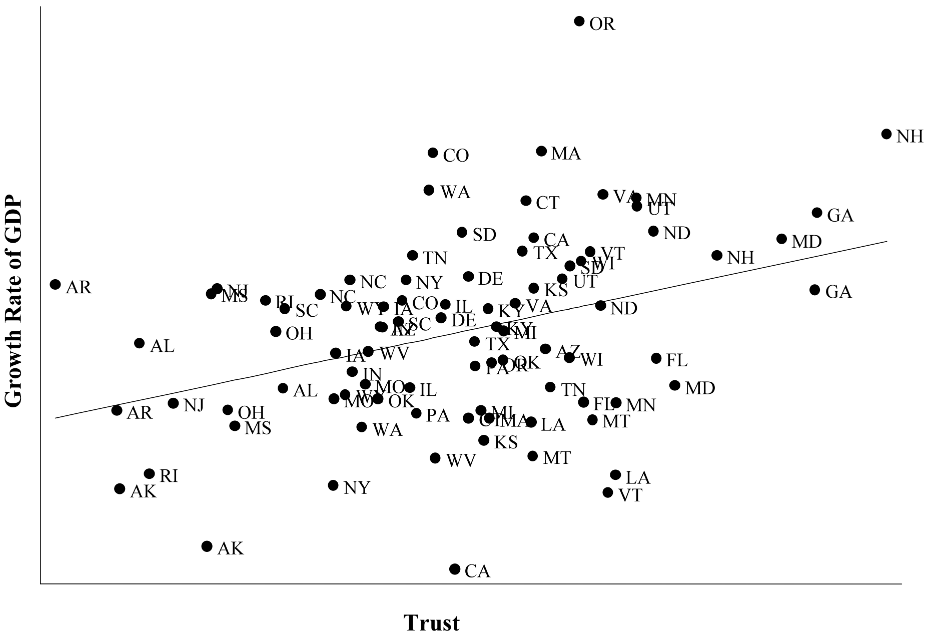

Fig. 1 Partial regression plot: Trust and growth rate of GDP

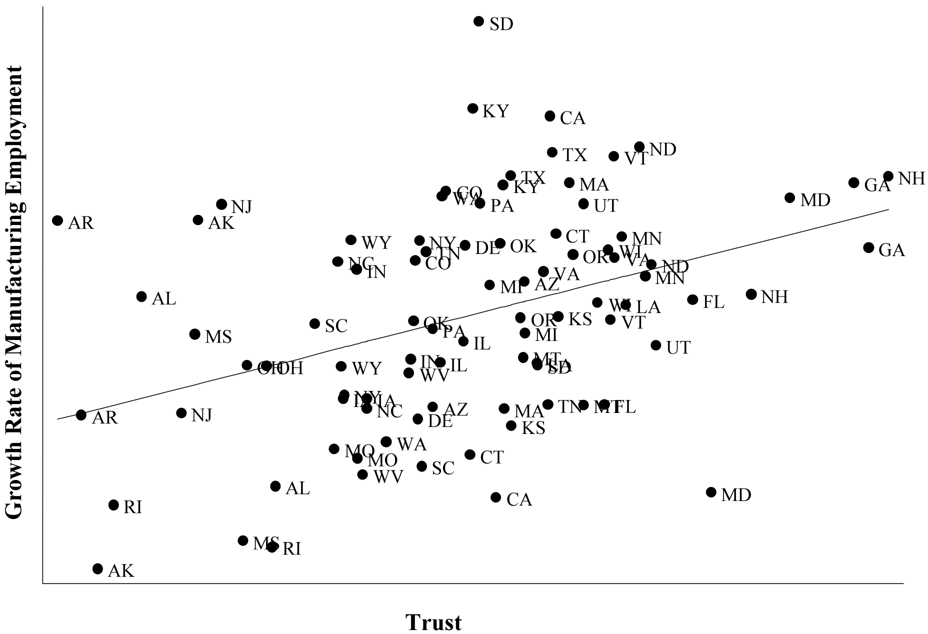

Fig. 2 Partial regression plot: Trust and growth rate of manufacturing employment

Table 3 Summary statistics of the instruments

Variable	*N*	Mean	Std. Dev.	Min	Max
British Americans	44	0.100	0.047	0.044	0.290
German Americans	44	0.166	0.104	0.045	0.439
Nordic Americans	44	0.068	0.120	0.005	0.621

Table 4 Pairwise correlations between the instruments and trust

	Trust	*British Americans*	*German Americans*	*Nordic Americans*
Trust	1.000			
British Americans	0.401	1.000		
German Americans	0.530	−0.179	1.000	
Nordic Americans	0.518	−0.097	0.759	1.000

4 Robustness of the results

The first robustness issue is the endogeneity of *Trust*. Knack and Keefer (1997) instrument for *Trust* with the share of a country's population belonging to the largest ethnic group while Zak and Knack (2001) instrument with Catholic, Muslim, and Orthodox shares of each country's population. According to WVS in the 1990s, the Nordics, the British, and the Germans are the most trusting people. Uslaner (2008b) finds that living in states with high Nordic, British, and German populations leads to higher levels of trust. Following Uslaner (2008b) we use the share of Nordic, British, and German populations in a state as our instruments for *Trust*. The summary statistics for our instruments and the pairwise correlations between our instruments and our measure of trust are given in Table 3 and Table 4, respectively. The results of the instrumental variables (IV) estimation for the basic model and the spatial autoregressive models are given in Columns 1 and 4, and Columns 2, 3, 5, and 6 of Table 5, respectively. As long as the population shares of Nordics, British, and Germans affect economic growth through *Trust*, the instruments are theoretically valid. According to the 1st Stage F and the Hansen J statistics given in Table 5, they are empirically valid as well.[4] The estimated coefficient on *Trust* is positive and highly significant in all specifications. The second robustness issue is the possible measurement error in *Trust*. However, IV estimation not only helps correct for the endogeneity but also measurement error. The third robustness issue is the presence of outliers. In Knack and Keefer (1997), for example, the results are somewhat sensitive to outliers. To identify the outliers, we use Hadi's and Grubbs' methodologies. Neither methodology identifies any outliers in our model.

[4]The Hansen J statistic is a version of the Sargan statistic that is robust to heteroscedasticity. It is used to test overidentifying restrictions for a regression estimated with instrumental variables in which the number of instruments is greater than the number of regressors. The null hypothesis is that the excluded instruments are uncorrelated with the error term. Under the null hypothesis the test statistic is distributed as χ^2 with degrees of freedom equal to the number of overidentifying restrictions. Rejection of the null hypothesis means that the instruments are not valid.

Table 5 Trust and growth: IV estimation instruments: Nordic Americans, German Americans, British Americans

	Growth Rate of GDP			Growth Rate of Manufacturing Employment		
	(1) Basic Model	(2) Spatial Lag Model	(3) Spatial Error Model	(4) Basic Model	(5) Spatial Lag Model	(6) Spatial Error Model
Trust	0.0995	0.1029	0.1028	0.1785	0.1583	0.1867
	(0.0482)**	(0.0475)**	(0.0498)**	(0.0491)***	(0.0540)***	(0.0547)***
Log *GDP*	−0.2285	−0.2252	−0.2256	−0.1795	−0.1565	−0.1619
	(0.0339)***	(0.0369)***	(0.0378)***	(0.0481)***	(0.0457)***	(0.0485)***
Log *Manufacturing*				−0.0137	−0.0115	−0.0119
Employment				(0.0060)**	(0.0060)**	(0.0064)**
Education	0.0009	0.0008	0.0009			
	(0.0009)	(0.0009)	(0.0010)			
Government	−0.4239	−0.4483	−0.4539	−0.3800	−0.3569	−0.3607
Spending	(0.1162)***	(0.1208)***	(0.1173)***	(0.1457)***	(0.1423)***	(0.1467)***
Urban	0.0003	0.0004	0.0003			
	(0.0002)*	(0.0002)*	(0.0002)*			
Right to Work				0.0232	0.0213	0.0231
				(0.0077)***	(0.0075)***	(0.0077)***
South	0.0152	0.0175	0.0168	0.0372	0.0287	0.0389
	(0.0096)*	(0.0092)**	(0.0097)*	(0.0139)***	(0.0147)**	(0.0144)***
Midwest	0.0040	0.0034	0.0058	0.0409	0.0282	0.0399
	(0.0064)	(0.0061)	(0.0069)	(0.0073)***	(0.0089)***	(0.0086)***
West	0.0073	0.0101	0.0067	0.0443	0.0316	0.0415
	(0.0108)	(0.0101)	(0.0111)	(0.0111)***	(0.0127)***	(0.0134)***
Hansen J						
χ^2	1.743			1.205		
P-value	0.418			0.547		
1st Stage F	31.69	31.69	31.69	22.66	22.66	22.66
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Wald Test of ρ/λ						
χ^2		3.082	4.133		6.441	2.289
P-value		0.079	0.042		0.011	0.130
LM Test of ρ						
χ^2		3.737	5.450		6.816	3.372
P-value		0.053	0.020		0.009	0.066
N	88	88	88	88	88	88

Robust standard errors in parentheses. All tests one tailed except constants. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$

5 Conclusion

The empirical evidence regarding the relationship between trust and growth is conflicting. The lack of consensus is partly the result of differences in the samples of countries selected for analysis. Helliwell (1996) uses data from a group of high income OECD countries and Beugelsdijk and van Schaik (2005) use data from regions of a group of high income European countries. On the other hand, the relationship between trust and economic growth is more likely to be observed in lower income countries due to the lack of protection of property and contractual rights. Using data from the U.S. states, we provide new evidence of a positive relationship between trust and economic growth and show that even in a high income country such as the United States, in which property and contractual rights are protected more than in the low income countries, high trust regions achieve faster economic growth.

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