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## Reassessing the Relationship between Trust and Growth

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# **Reassessing the Relationship between Trust and Growth**

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**Hamburg Discussion Paper in International Economics [No.14]**

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**Senior Lecturer in International Economics**

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# Reassessing the Relationship between Trust and Growth

By Felix Roth<sup>1</sup>

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## Abstract

This paper analyzes the intertemporal variation of trust on economic growth. Constructing a unique global country panel dataset and applying a system-generalized method of moments (SYSGMM) estimation approach to a sample of 75 market economies over a 40-year time span (1980-2019), this paper finds evidence of a causal curvilinear (inverted U-shape) relationship between trust and growth.<sup>2</sup> This relationship corroborates earlier panel data results but challenges findings that posit a general positive relationship between trust and growth. Only a minority of global economies can attain a position close to or above the optimum threshold for trust and growth. Most economies, in fact, fall well below that threshold, and for them, it is incumbent upon their policymakers to consider trust-building measures in order to achieve higher growth. In countries that are close to the optimum threshold, however, such policies can likely be neglected. In fact, in countries where trust levels exceed the optimum, an increase in trust might even hamper growth.

Keywords: Trust, Growth, Intertemporal Variation, Panel Analysis, Curvilinear (inverted U-shape) Relationship, Causality

JEL-Class.: C33, O43, O47, O50, Z13

## 1. Introduction

The empirical evidence concerning the impact of trust on economic growth at the country level remains mixed. Whereas the early cross-country investigations in the field found a positive linear relationship (Knack and Keefer 1997: 1261, Zak and Knack 2001: 308), two follow-up cross-country robustness studies showed either that the results of the paper by Knack and Keefer (1997) are robust, but only in a limited sense (Beugelsdijk et al. 2004: 118) or found a “*shaky*” relationship between trust and growth (Berggren et al. 2008: 251). In addition, the only existing panel data

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<sup>2</sup> A replication package, including all the files and directories that are needed to reproduce the results presented in this paper, is ready for submission upon acceptance of this paper for publication.

analysis in the field found a negative and curvilinear (inverted U-shape) relationship between trust and growth (Roth 2009: 128).

These findings have recently motivated scholars to question the empirical country-level findings of the relationship between trust and growth entirely (Nowrasteh and Forrester 2023: Abstract). Given that prominent scholars from economics and political science stress the theoretical importance of trust for economic performance at the country level (Arrow 1972: 345, Fukuyama 1996: 7, Putnam 1993: 176, Tabellini 2010: 684, c.f. Inglehart et al. 1997: 227-228, Olson 1982: 41-47), the current state of the art in this field is unsatisfactory and deserves more rigorous research to resolve the empirical ambivalence between trust and growth at the country level.

This paper builds upon the seminal panel study by Roth (2009) and supports the proposal by Algan and Cahuc (2010: 2061) to analyze the intertemporal variation between trust and growth to establish a causal relationship. In particular, it goes beyond earlier studies by Roth (2009) in four distinct aspects. First, it extends the country sample from 41 to 142 countries, including 75 market economies – thereby covering nearly three-quarters of all countries in the world today. Second, it extends its time-series evolution from the original 25 years to 40 years, covering the period 1980-2019. Third, it applies a tailor-fit matching procedure between trust and growth over time to address endogeneity through rigorous research design, thereby developing a unique “*small T, large N*” panel dataset with 392 overall country-time observations for trust and growth. Fourth, it estimates this unique panel dataset with a pronounced intertemporal variation in trust with the help of a system-generalized method-of-moments (SYSGMM) estimation approach to control for endogeneity and to obtain a causal effect of trust on growth (Roodman 2009a: 86).

This paper finds a causal curvilinear (inverted U-shape) relationship between trust and growth, with an optimum level of trust at 45.3 percent. This finding implies that an increase in trust appears to enhance economic growth in countries with initially low levels of trust below the threshold of 45.3 percent. However, this increase tends to retard economic growth in countries that have already achieved a substantial level of trust above the threshold. Given that most countries in the world are located well below the optimum level of trust for growth of 45.3 percent, prioritizing trust-building policies would be highly beneficial for enhancing growth in these countries. No immediate policy action is needed for the few countries that have already achieved a trust level close to the optimum threshold. The few countries that register above the optimum level should accept slightly lower economic growth in exchange for the multiple benefits stemming from high

levels of trust, including, amongst others, democratic stability (Inglehart 1990, 1999, Inglehart et al. 1997, Nannestad 2008: 429, Uslaner 1999).

The remainder of the paper is structured as follows. Section 2 elaborates upon the theoretical relationship between trust and growth. Section 3 presents previous empirical findings. Section 4 discusses the operationalization, data, research design, case selection, and model specification. Section 5 offers descriptive statistics. Section 6 depicts the econometric analysis. Section 7 discusses the findings vis-à-vis the state of the art. Section 8 discusses the policy implications, and section 9 concludes.

## **2. Relationship between Trust and Economic Growth**

### *2.1 Positive Relationship*

What are the direct channels for cultivating a positive relationship between trust and growth? According to the literature in this field, there are three direct channels through which trust might nurture growth. According to Whitely (2000: 451), trust facilitates economic growth by i) lowering transaction costs in economic exchange, ii) solving dilemmas posed by collective action, and iii) diminishing principal-agent problems.

First, concerning transaction costs, Arrow (1972: 345-346) argues that virtues such as trust play an essential role in the functioning of the economic system, as they tend to facilitate the process of exchange. Arrow's line of argument is substantiated by a theory of transaction costs, as developed by institutionalist economists, such as North (1990). For North (1990), transaction costs are a part of production costs, which evolve during the economic process of exchange and specialization, such as the costs associated with banking, insurance, finance, wholesale, and retail trade (p: 28). According to this logic, societies demonstrating high levels of trust should produce a higher output than low-trust societies, as the cost of transactions, such as monitoring, enforcing, and protecting contracts, is lower (see here also Fukuyama 1996: 26-27 and Knack and Keefer 1997: 1252-1253).

Second, concerning dilemmas of collective action, Putnam (1993) concludes that high stocks of social capital (and, respectively, trust) in an economic region “*bolster the performance of the polity and the economy, rather than the reverse*” (p. 176). Putnam (1995) introduces four arguments as to why social capital and trust have a positive effect on the economy: they i) promote coordination and cooperation for mutual benefit, ii) solve dilemmas of collective action, iii) weaken

the incentives for opportunism, and iv) reduce egoism (p. 76). Putnam's arguments are in line with Hardin (1982) and Ostrom (1990), who argue that in high-trust societies, it should theoretically be easier to cope with free-rider problems that arise over, for example, efforts to reduce CO<sub>2</sub> emissions (Hardin 1982, p. 9) or overfishing (Ostrom 1990, p. 3). Generally, in high-trust societies, people do not so easily take advantage of the public infrastructure.

Third, concerning principal-agent problems, Knack and Keefer (1997) argue that such problems are much less pronounced in high-trust societies (pp. 1252-1253). The authors mention two arguments in this context: i) if entrepreneurs devote more time to monitoring possible malfeasance by partners, employees, and suppliers, they will have less time to devote to innovation in new products and processes; and ii) employment contracts in which managers rely on employees to accomplish their assigned tasks can be difficult to monitor. In a similar vein, Fukuyama (1996) argues that high-trust communities do not rely as much on detailed contracts and legal regulations (p. 26) nor must they resort to coercive means to enforce cooperation (p. 27).

This raises the question whether trust is always positively related to economic growth? Or are there theoretical arguments for a negative and curvilinear relationship between too much – or excessive – trust and economic growth?

## *2.2 Negative and Curvilinear Relationship*

There are three channels by which excessive trust might hamper economic growth, thus implying a curvilinear relationship between trust and growth with an optimum point of trust for growth. Excessive trust might hamper economic growth by i) allowing excessive collective action over time, ii) fostering complacency within society, thereby inhibiting innovation and competition, and iii) hampering cooperation given the tendency of trust to act as a double-edge sword.

First, in the context of excessive collective action, a possible negative relationship between high levels of trust and economic growth can be found in the literature on collective action by Olson (1982). According to Olson, collective action can undermine the state's power to implement structural reforms or agendas to maintain high economic growth rates. He argues that stable societies are at risk of accumulating "*collusions*" and "*organizations of collective action*" over time (p. 41). If a society allows a plethora of organizations to function as special interest groups, economic growth is harmed by reduced efficiency, wealth is aggregated in the societies in which they operate, and political life becomes fraught with more divisiveness (p. 47). Hardin (1982) adopts a similar argument, stressing that social capital and trust are merely the means to an end,

and introduces the concept of blocking social capital (pp. 91-94). A theoretical synergy between the arguments advanced by Putnam (1993: 176) and Olson (1982: 41-47) is developed by Inglehart et al. (1997), who propose a curvilinear (inverted-U shape) relationship between social capital and economic performance (pp. 227-228).

Second, excessive trust might lead society to become complacent, which could have the effect of stifling innovation and the entrepreneurial spirit and ultimately hampering economic growth (Cowen 2017: 81-89). Cowen’s argument for the US is backed by microeconomic theory and supporting evidence reported in management and organizational literature. Two strands of this literature are worth noting in this context. The work by Gargiulo and Ertug (2006) highlights that excessive trust can turn commitment into complacency, which might lead to declining organizational performance (p. 175). The authors, therefore, explicitly model the relationship between trust and economic benefits from an organizational perspective in a curvilinear relationship (inverted U-shape) (p. 174). Moreover, empirical evidence on the relationship between trust and innovation points towards a curvilinear (inverted U-shape) relationship (Bidault and Castello 2009: 267, Bischoff et al. 2023: 13, and Echebarria and Barrutia 2013: 1013-1014).

Third, economic theory warns that too much trust can act as a double-edged sword. Cole et al. (2024:10) explicitly model the relationship between trust and welfare at the country level in curvilinear (inverted U-shape), arguing that higher trust does not necessarily imply greater social welfare. The authors argue that while the presence of trust in a society may incline its members to engage in socially beneficial arrangements, it may also induce them to “*circumvent*” such arrangements in cooperation with other like-minded individuals when it promises to be profitable. By hampering cooperation, such activities ultimately thwart the original intentions of the arrangement and thereby reduce the general welfare (p. 1).

### **3. Previous findings**

Table 1 displays the findings of previous empirical studies on the impact of trust on economic growth.<sup>3</sup> All studies in the list follow the same – or at least a very similar – model specification as

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<sup>3</sup> There are a substantial number of studies that investigate distinct aspects of the relationship between trust and economic performance, such as the analysis of the effect of trust on economic development (for an overview, see Algan and Cahuc 2013). Although these studies are certainly purposeful in their own right, they do not have a direct relevance for this paper, given that they do not use the original model specification as developed by the seminal paper by Knack and Keefer 1997. In addition, only 5 of the 14 studies use panel data, and only 2 of them use fixed-effects estimations (see here Table D1 in Appendix D in the supplementary material).



introduced in the seminal paper by Knack and Keefer (1997). Therefore, the displayed coefficients showing the impact of trust on economic growth are directly comparable across all papers. The papers differ on three accounts: i) the number of country-time observations reported, ii) the research design, and iii) the estimation approach adopted.

**Table 1.** Previous Empirical Findings between Trust and Economic Growth

Dependent Variable	Growth of GDP per Capita					
	1	2	3	4	5	6
Equation						
Authors	KK 1997	ZK 2001	BGS 2004	BEJ 2008	Roth 2009	This Paper
Growth of GDP per Capita	1980-92	1970-92	1970-92	1990-2000	1980-2005	1980-2019
Trust	0.086**	0.060***	0.061**	0.062***	0.18**	0.15***
Trust, squared	-	-	-	-	-0.003***	-0.002**
Income	yes	yes	yes	yes	yes	yes
Education	yes	yes	yes	yes	yes	yes
Price Level of Investment	yes	yes	yes	yes	yes	yes
Fixed-Effects	no	no	no	no	yes	yes
Time-Effects	no	no	no	no	no	yes
WVS Waves	1-2	1-3	1-3	1-4	1-4	1-7
Further Trust Sources	no	yes	yes	yes	yes	yes
Matching	no	no	no	no	yes	yes
Control for Endogeneity	2SLS	2SLS	-	-	FE	SYSGMM
Optimum Trust	63‡	61.2‡	61.2‡	66.1‡	30	45.3
Number of Countries	29	41	41	63	35	75
Number of Time-Periods	-	-	-	-	5	8
Number of Observations	29	41	41	63	115	392

*Notes:* KK=Knack and Keefer. ZK=Zak and Knack. BGS=Beugelsdijk et al. BEJ=Berggren et al. IV=Instrumental Variable. FE=Fixed-Effects. SYSGMM=System Generalized Method of Moments. Yes=Variable is included in the growth model. No=Variable is not included in the growth model. \*, \*\*, \*\*\* Significance at the 90, 95, and 99 percent level (one-tailed test). ‡ Maximum Value.

The first study is the seminal paper by Knack and Keefer (1997). The authors use a cross-sectional analysis with 29 market economies as units of observation. Trust is measured by taking 21 observations from the first wave (1981–84) of the World Value Survey (WVS) and eight observations from the second wave (1990–93) of the WVS. Thus, the authors utilize trust values from 1990 to 1993 to explain the economic growth rate from 1980 to 1992. The authors were aware of the endogeneity problem and argued that reverse causation is not problematic since the correlation coefficient of 0.91 between countries from the first and second waves of the WVS is very high (p. 1267). Knack and Keefer reported a positive linear relationship between trust and

economic growth with a coefficient of 0.082. When using an instrumental variable estimation approach with an “ethno-linguistic” group measure and the number of law students as instruments to control for potential endogeneity, trust remained robust with a coefficient of 0.086.

The second study, by Zak and Knack (2001), re-investigates the empirical results from Knack and Keefer (1997). They used a cross-sectional analysis and observations from 41 market economies, based on all three waves from the WVSs (1981 to 1984, 1990 to 1993, and 1995 to 1997), Eurobarometer data, and a government-sponsored survey for the case of New Zealand. Their dependent variables were investment share as a percentage of GDP from 1970 to 1992 and average annual growth of per capita income over the same period. Aware of the endogeneity problem of their research design – arising from having used a measure of trust from 1997 to analyze the growth rate from 1970-1992 – they stress the same argument as Knack and Keefer (1997: 1267), i.e. that the correlation coefficient of 0.91 between the first and second wave of the WVS is very high (p. 309). In their depiction of the relationship between trust and economic growth, the authors concluded that a positive relationship exists with a coefficient of 0.063. When using an instrumental variable estimation approach with Catholic, Muslim and Christian Orthodox population shares as instruments to control for potential endogeneity, trust remained robust with a coefficient of 0.060.

The third study, by Beugelsdijk et al. (2004), analyzes the statistical robustness of the results of Knack and Keefer (1997) and Zak and Knack (2001) along four dimensions. They concentrated on the statistical significance and explored the influence of changing sets of conditioning variables on the estimated effect of trust. Moreover, they analyzed the sensitivity of the results by using different proxies or specifications for basic variables, e.g. human capital. Finally, they investigated the effects on the significance and effect size when the 29-country sample of Knack and Keefer (1997) was extended by 12 countries in the Zak and Knack (2001) paper. They found that whereas the results of Zak and Knack (2001) are moderately to highly robust, those from Knack and Keefer (1997) are robust in only a very limited sense. In addition, Beugelsdijk et al. (2004) concluded that the empirical literature on trust and economic growth is more flawed by data limitations than by econometric problems, such as omitted variable biases. Moreover, the authors conclude that “*their extensive robustness analysis further adds to the empirical evidence that trust matters for explaining variation in economic performance*” (p. 132).

The fourth study, a paper by Berggren et al. (2008), conducted an extensive robustness analysis of the relationship between trust and growth by investigating a later period and a larger sample size. The authors worked with 63 countries using data on trust from the fourth version of

the World Value Survey and the Latinobarómetro as well as new data on growth to separate time and sample effects. They investigated whether previous results on the trust-growth relationship for 1970 to 1992, studied by Zak and Knack (2001) and Beugelsdijk et al. (2004), also hold for the 1990s. They found that when outliers are removed (specifically China), the trust-growth relationship is statistically significant at the 95 percent level in only 10 percent of their 1,140 regressions, and that on average the trust coefficient is only half as large as the results that had been previously reported. The authors emphasize, however, that their results do “*not necessarily mean that trust is unimportant for growth, but its importance seems to be more limited and uncertain than previously claimed*” (p. 1).

Whereas the first four studies mentioned above use a cross-country research design, the fifth study by Roth (2009) is the first paper to use a panel dataset with 41 countries over the 25-year period 1980-2005, with an overall number of 129 observations. The paper estimates the within- and between-variation of the relationship between trust and growth with the help of a pooled-panel, fixed-effects and random-effects estimation approach. Analyzing the intertemporal variation between trust and growth for a 41-country sample with 129 observations, the author finds a negative linear relationship between trust and economic growth. More importantly, when excluding the six transition countries from his country sample, Roth (2009) finds a curvilinear relationship when estimating the data with the help of a fixed-effects estimation approach. With a coefficient for the linear term of 0.18 and for the quadratic term of -0.003, the optimum point of trust for growth is 30 percent. The pooled panel and random effects estimation used in the paper produce larger optimum trust points for growth of 53 and 43 percent, respectively. Therefore, although Roth (2009) clearly identifies a curvilinear relationship between trust and growth, the precise optimum point of trust and growth still needs to be identified.

How does this paper contribute to the state of the art? The work builds upon the fifth study by Roth (2009) and is in line with the exercise proposed by Algan and Cahuc (2010: 2061) to analyze the intertemporal variation between trust and growth to establish a causal relationship. It extends its country sample from 41 to 142 countries and to 75 free-market economies and its time-series evolution from 25 years to 40 years, for the period 1980-2019. By applying a tailor-fit matching procedure between trust and growth over time to address endogeneity through rigorous research design, this paper develops a unique “*small T, large N*” panel dataset with 392 overall country-time observations. To control for endogeneity, econometrically, this paper estimates the unique panel data with a pronounced intertemporal variation in trust with the help of a system-

generalized method-of-moments (SYSGMM) estimation approach (Roodman 2009a: 86). This paper corroborates the curvilinear relationship between trust and growth as detected by Roth (2009: 115-118) and establishes a causal effect of trust on growth with an optimum point at 45.3 percent.

#### **4. Operationalization, Data, Research Design, Case Selection, and Model Specification**

##### *4.1 Operationalization*

Trust is measured by asking respondents the following survey question: “*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*”.<sup>4</sup> Possible responses to the question include: i) “*Most people can be trusted*”; ii) “*Can’t be too careful*”; iii) “*Don’t know*”; and iv) “*No answer*”. In line with the existing literature (e.g. Knack and Keefer 1997: 1256, Roth 2009: 109), the trust value for each country is calculated by dividing the number of participants responding “*Most people can be trusted*” by the total number of people answering “*Most people can be trusted*” and “*Can’t be too careful*”. The answers “*Don’t know*” and “*No answer*” are dropped.

##### *4.2 Data*

Data on trust are drawn from seven international surveys. Data from 1981 to 2020 are taken from the Integrated Value Study [IVS], which is an integrated dataset consisting of the merged data from: i) the first seven waves of the World Value Survey (1981-2020) (Haerpfer et al. 2021) and ii) the first five waves of the European Value Survey (1981-2017) (EVS 2021).<sup>5</sup> The data from the IVS were then appended onto the data from five international Barometer surveys, including: iii) the first 20 waves of the Latinobarómetro from 1996-2018 (Latinobarómetro Data 2018); iv) the first five waves of the Arab Barometer from 2006-2019 (Arabbarometer Data 2019); v) the first four waves of the Asianbarometer from 2001-2014 (Asianbarometer 2016); vi) the first, third, and fifth waves of the Afrobarometer from 1999-2013 (Afrobarometer Data 2015); and vii) the 25<sup>th</sup> wave of the Eurobarometer from 1986 (Rabier et al. 1986). Table A1 in Appendix A in the supplementary material provides an overview of the availability of each survey for each country. Data on Real Gross Domestic Product (GDP), population, education, and price levels of investment

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<sup>4</sup> The questionnaire slightly varies over the seven (i-vii) international survey programs used. A detailed overview of slight variations of all survey questions is provided in Appendix F in the supplementary information.

<sup>5</sup> The IVS data include an overall number of 450 surveys, 115 countries and 645,249 individual observations from 1981 until 2020.

are taken from the Penn World Table (PWT) 10.0 (Feenstra et al. 2015).<sup>6</sup> For a precise definition of each variable, see Table E1 in Appendix E. Data on economic freedom from 1995-2015 were taken from The Heritage Foundation (Heritage Foundation 2023). Data on political freedom from 1980 to 2015 were taken from the Freedom House Index (Gorokhovskaia et al. 2023).

### 4.3 Research Design

To address endogeneity via research design, the analysis uses a precise tailor-fit matching procedure between the dependent variable (economic growth) and the independent variables (trust, income, education, and price level of investment). Trust levels in 1980, 1985, 1990, 1995, 2000, 2005, 2010, and 2015 are matched with five-year growth rates of Real GDP per capita for the eight 5-year-intervals: 1981-1985, 1986-1990, 1991-1995, 1996-2000, 2001-2005, 2006-2010, 2011-2015, and 2016-2019.<sup>7,8</sup> Table 2 provides a visual overview of the matching methodology.

**Table 2.** Tailor-Fit Matching Procedure between Trust and Economic Growth

Panel Wave	Trust	→	Economic Growth
1	1980	→	1981-1985
2	1985	→	1986-1990
3	1990	→	1991-1995
4	1995	→	1996-2000
5	2000	→	2001-2005
6	2005	→	2006-2010
7	2010	→	2011-2015
8	2015	→	2016-2019

*Note:* Due to a lack of data, growth of GDP per capita in the Penn World Table 10.0 stops in 2019.

<sup>6</sup> The PWT10.0 covers 183 countries between 1950 and 2019.

<sup>7</sup> The year of the field work strongly differs in the seven waves of the WVS and the five waves of the EVS among the participating countries. For the aggregated IVS data this means that times series data on interpersonal trust data show highly heterogeneous patterns across countries. For this reason, existing panel studies face problems of endogeneity due to simultaneity (Dearmon and Grier 2009: 213; Peiró-Palomino and Tortosa-Ausina 2013: 381-383). To provide the precise matching procedure as highlighted in Table 2, this paper interpolates and extrapolates missing data, if necessary [see here Makrychoriti et al. (2021: 7) for a similar approach].

<sup>8</sup> The available trust data of the 75 countries were incorporated into a data matrix with a maximum of 2,700 (75x36) observations for the 36-year period between 1980 and 2015. For observations for the same year but for a different period of fieldwork, a mean value was calculated. To fill existing data gaps, an inverse distancing weighted (Cox 2015) inter- and extrapolation method was used. For conservative reasons, the extrapolation was applied to a maximum of 4 years. A range of manual and empirical robustness checks confirms the validity of the methodology. The empirical evidence can be retrieved from the authors upon request.

#### 4.4 Case and sample selection

Following the methodological approach adopted by Lijphart (1971), aimed at maximizing country and time observations, we generate the largest trust database produced to date, covering 142 countries from 1980-2015, with an overall number of 650 observations (see here Roth 2024a). Given that this analysis is based on time dimensions, only countries with at least two consecutive time observations are used. Therefore, 20 countries with only one time series observation are discarded from our sample in the first step. In the second step, 12 countries without information on human capital from the Penn World Table are excluded. Following the Mankiw et al. (1992) methodology, four oil-producing countries are also excluded from the sample in a third step. And finally, following the argumentation advanced in the seminal contribution of Knack and Keefer (1997: 1255), we exclude 31 countries characterized by a non-market economy and an undemocratic political system from our sample.<sup>9,10</sup> After applying these four steps, we are left with a sample of 75 countries over the 40-year period 1980-2019, with an overall number of 392 country-time observations. Table B1 in Appendix B in the supplementary information gives a complete overview of our case and sample selection along these four steps. Figure G1 in Appendix G gives an overview of the various sub-samples of our 75 market economies.

#### 4.5 Model Specification

The following regression model is used to describe the relationship between trust and economic growth. It is in line with the growth models used in the literature (Roth 2009: 110) and follows an original approach devised by Forbes (2000: 873).

$$Growth_{i,t} = \alpha_i + \beta_1 Trust_{i,t-1} + \beta_2 Income_{i,t-1} + \beta_3 Education_{i,t-1} + \beta_4 PI_{i,t-1} + \delta_t + \omega_{i,t} \quad (1)$$

where  $Growth_{i,t}$  is the five-year growth rate of Real GDP per capita for each country  $i$  in period  $t$ ;  $Trust_{i,t-1}$ ,  $Income_{i,t-1}$ ,  $Education_{i,t-1}$  and  $PI_{i,t-1}$  are trust, ln of Real GDP per capita, education, and price level of investment for country  $i$  in period  $t-1$ .  $\alpha_i$  represents the country-fixed effect,  $\delta_t$  the time-fixed effect, and  $\omega_{i,t}$  is the error term.

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<sup>9</sup> The 31 countries excluded from our sample were deemed to be both non-market economies and undemocratic in terms of the political rights and civil liberties extended to their citizens. These determinations were based on data collected and published by The Heritage Foundation (2023) and Freedom House (Gorokhovskaia et al. 2023).

<sup>10</sup> We assumed that our 17 transition economies established open markets from 2005 onwards.

## 5. Descriptive statistics

Table 3 displays the summary statistics for all variables utilized in the descriptive and econometric analysis. For the whole period (1980-2019), five-year economic growth rates have a mean value of 1.65 percent and range from -2.79 percent in 1986-1990 in Argentina to 7.56 percent in 2011-2015 in Benin. Trust has a mean value of 30.9, with a minimum value of 3.2 percent in Trinidad and Tobago in 2010 and a maximum value of 75.4 percent in Denmark in 2010. Income, Education, and Price Levels of Investment (PI) all show an adequate size in line with the existing literature (Roth 2009: 128). A larger version of Table 3 showing summary statistics for the eight individual panel waves can be found in Table E1 in Appendix E.

**Table 3.** Summary Statistics, 75 Countries with Market Economies, 1980-2019

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Economic Growth	392	1.65	1.59	-2.79	7.56
Trust	392	30.9	15.6	3.2	75.4
Trust, Squared	392	1200.6	1176.6	10.4	5678.2
Income	392	9.88	0.87	6.82	11.36
Education	392	2.78	0.57	1.14	3.74
PI	392	57.47	20.30	21.96	152.31

*Sources:* Unique dataset on trust compiled by the author using publicly available data and Penn World Tables (Feenstra et al. 2015).

Table 4 lists the 75-country sample included in the analysis of this paper. The displayed mean values ( $\mu$ ), standard deviations ( $\sigma$ ), and coefficients of variation ( $cv$ )<sup>11</sup> are derived from the countries' individual time series ( $n$ ), which range from 2 to 8 observations<sup>12</sup> for the period 1980-2015. The values of the changes ( $\Delta$ ) of trust were calculated by subtracting the first observation of the time series from the last one. The average  $\mu$ -value is 27.9, the average  $\sigma$ -value is 3.8, and the average  $cv$ -value is 15.6 percent. Positive and negative  $\Delta$ -values negate each other to an overall value of 0.7. Table 4 points to two critical findings.

<sup>11</sup> The values of the coefficients of variation are calculated by the following formula:  $[(\sigma/\mu)*100]$ . For Greece this yields a  $cv$ -value of 45.5 percent, according to the calculation:  $[(12.8/28.2)*100]$ . The higher the coefficients of variation, the higher the intertemporal variation in trust.

<sup>12</sup> Table C1 in Appendix C shows the available consecutive time-series information for each country.

**Table 4.** Levels and Changes of Trust in 75 Market Economies, 1980-2015

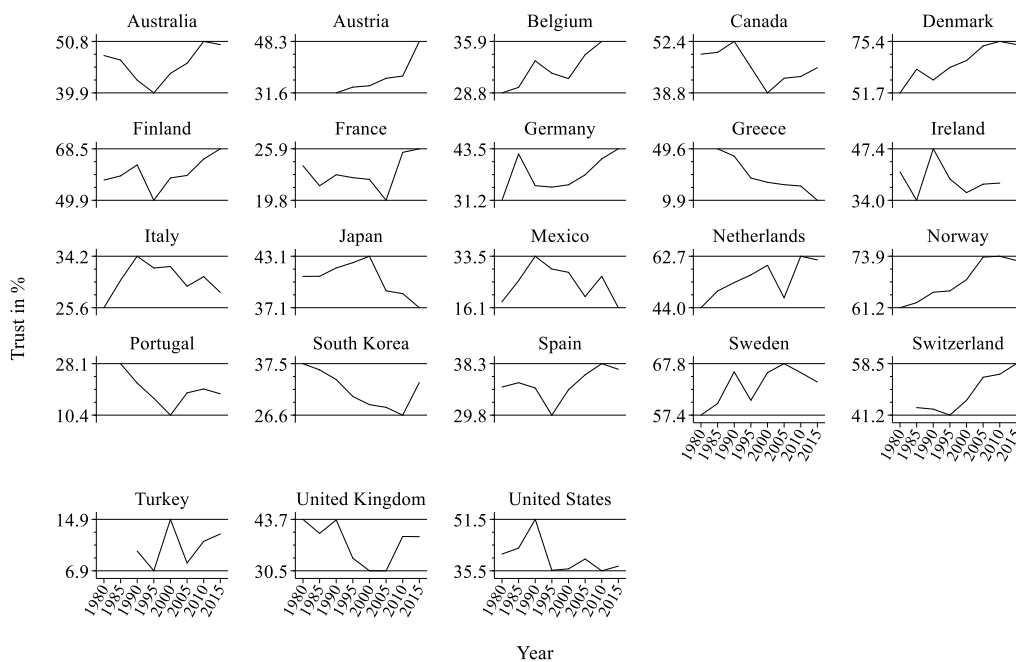
No.	Country	$\mu$	$\sigma$	cv	n	$\Delta$	No.	Country	$\mu$	$\sigma$	cv	n	$\Delta$	No.	Country	$\mu$	$\sigma$	cv	n	$\Delta$
1	Albania	11.4	5.1	44.3	3	-12.4	26	Greece	28.2	12.8	45.5	7	-39.7	51	Norway	67.9	4.8	7.0	8	11.7
2	Argentina	22.6	5.6	24.8	8	-1.4	27	Guatemala	20.6	4.4	21.3	5	-12.4	52	Panama	20.1	3.5	17.1	5	0.6
3	Armenia	17.6	3.1	17.8	3	0.5	28	Hong Kong	39.0	5.8	14.8	4	15.9	53	Paraguay	16.8	1.9	11.1	5	-1
4	Australia	46.0	3.5	7.5	8	2.3	29	Hungary	26.0	1.6	6.1	3	2.9	54	Peru	14.1	2.7	19.1	5	7.1
5	Austria	36.8	5.5	14.8	6	16.7	30	Iceland	46.4	6.5	14.1	8	19.6	55	Poland	22.6	2.6	11.4	3	5.2
6	Belgium	32.0	2.3	7.3	7	7.1	31	India	29.6	8.5	28.7	6	-15.7	56	Portugal	18.8	5.0	26.5	7	-10.4
7	Benin	30.2	2.0	6.6	3	4	32	Ireland	39.3	4.0	10.1	7	-2.9	57	Romania	14.9	3.9	26.1	3	-9.1
8	Botswana	11.0	3.0	27.0	5	-2.7	33	Italy	30.4	2.5	8.4	8	2.6	58	Senegal	28.7	1.4	4.9	3	3.3
9	Brazil	7.1	2.0	27.4	6	0.8	34	Japan	40.5	1.9	4.6	8	-3.6	59	Serbia	15.2	1.2	8.1	3	1.3
10	Bulgaria	19.8	1.6	8.3	3	-3.9	35	Jordan	25.3	5.9	23.2	4	-11.2	60	Singapore	28.1	5.6	19.8	4	15.2
11	Canada	45.9	4.1	8.9	8	-3.6	36	Kazakhstan	33.6	4.5	13.4	2	-9	61	Slovakia	16.9	3.0	17.5	3	5.2
12	Chile	18.0	2.6	14.3	6	-7.2	37	Kyrgyzstan	27.9	7.6	27.4	3	8.8	62	Slovenia	21.1	2.5	11.8	3	6.1
13	Colombia	18.2	2.5	13.5	5	-4.7	38	Latvia	24.6	0.8	3.1	2	1.5	63	South Africa	22.3	4.8	21.6	8	-6.7
14	Costa Rica	14.8	2.8	18.6	5	-5.6	39	Lithuania	30.0	1.5	5.1	3	3.7	64	South Korea	32.0	3.7	11.6	8	-4
15	Croatia	18.1	2.5	13.8	3	-5.4	40	Luxembourg	29.8	2.4	8.0	6	2	65	Spain	35.0	2.4	7.0	8	3
16	Cyprus	8.4	0.9	10.8	3	-2.1	41	Madagascar	29.7	2.2	7.3	3	-5.1	66	Sweden	63.4	3.5	5.6	8	6.6
17	Czech Rep.	27.2	3.0	10.8	3	-5.7	42	Malaysia	9.8	1.9	19.3	3	4.3	67	Switzerland	48.8	6.3	12.9	7	14.7
18	Denmark	65.6	7.9	12.0	8	22.2	43	Mali	20.1	4.0	19.9	4	9.4	68	Taiwan	37.2	3.9	10.5	5	4.8
19	Dom. Rep.	23.8	6.1	25.7	5	-13.6	44	Malta	19.1	4.9	25.5	7	11.1	69	Thailand	31.0	7.6	24.5	4	12.6
20	El Salvador	22.2	4.2	19.0	5	-6.2	45	Mexico	24.6	5.6	22.9	8	-2	70	T. and T.	3.5	0.3	8.6	2	-0.6
21	Estonia	35.0	2.9	8.2	3	4.2	46	Mongolia	15.1	4.2	28.0	3	9.8	71	Turkey	10.7	2.7	25.3	6	2.6
22	Finland	59.8	5.2	8.7	8	11.3	47	Morocco	17.0	4.1	24.1	4	-9.8	72	Uganda	15.7	0.6	4.1	4	0.0
23	France	23.0	1.9	8.2	8	2	48	Namibia	29.6	4.1	13.7	5	-8.6	73	UK	37.6	5.0	13.3	8	-4.4
24	Germany	37.4	4.1	11.0	8	12.3	49	Netherlands	54.3	6.3	11.6	8	17.3	74	US	39.8	5.0	12.7	8	-3.8
25	Ghana	11.1	3.3	29.3	3	-7	50	New Zealand	52.9	3.3	6.3	5	7.5	75	Uruguay	28.1	5.0	17.7	5	-6.9
World Average																27.9	3.8	15.6	5.2	0.7

Notes: T. and T.=Trinidad and Tobago. Source: Unique dataset on trust, compiled by the author from publicly available international data.



First, we find substantial variation in the  $\mu$ -values<sup>13</sup> of trust across countries, ranging from 3.5 percent in Trinidad and Tobago to 67.9 percent in Norway. This finding is in line with the empirical evidence of a 111-country analysis conducted by Algan and Cahuc (2013: 524) and a 122-country analysis by Roth (2024a). Evidence of substantial cross-country variation in trust has been a major factor driving the research design of the cross-country studies by Knack and Keefer (1997) and Zak and Knack (2001), as displayed in Table 1.

**Figure 1.** Trust over Time, 23 OECD Economies, 1980-2015



*Note:* The Y-axis uses individual scales and depicts minimum and maximum values. *Source:* Unique dataset on trust, compiled by the author from publicly available international data.

Second, with an average cv-value of 15.6 percent, we find a pronounced intertemporal variation in the level of trust over the 40 years among our 75 country cases.<sup>14</sup> More than two-thirds (52/75) of the country cases possess cv-values larger than 10.<sup>15</sup> More than one-quarter (20/75) display cv-

<sup>13</sup> The large cross-country ( $\mu$ -values) variation of interpersonal trust was also identified with the help of a bar chart (Figure E1 in Appendix E).

<sup>14</sup> The large intertemporal (cv-values) variation of interpersonal trust was also illustrated with the help of a bar chart (Figure E2 in Appendix E) and a world map (Figure E3 in Appendix E).

<sup>15</sup> As a rule of thumb, a coefficient of variation of larger than 10 should be considered a substantial intertemporal variation in trust.

values larger than 20.<sup>16</sup> The novel evidence presented in Table 4 – alongside the findings of a pronounced intertemporal variation in trust by the existing panel data literature (Roth 2007: 44-49, 2009: 111-114, 2022: 182, Paldam 2011: 336) and time series evidence for the US (Inglehart 1990: 428, 1999: 95, Uslaner 1999: 132, Putnam 1995: 73, 2000: 140-141, Paxton 1999: 122), Germany (Noelle-Neumann 2005: 5, Inglehart 1990: 438), Italy (Inglehart 1990: 438, Uslaner 2002: 253), Mexico (Inglehart 1990: 438, Uslaner 2002: 253) and Scandinavian countries (Sonderskov and Dinesen 2014: 784) and most previous work on the intertemporal variation of trust for a 122-country sample (Roth 2024a) together with the theoretical work on experiential trust (Glanville and Paxton 2007: 231-232, Sonderskov and Dinesen 2014: 783) – refute claims and previous evidence purporting to show that trust is very stable over a long period of time (Uslaner 2002: 160, 230, 2008: 729-730, Putnam 1993: 153, 180) and is approximate time-invariant (Bjornskov 2006: 3-5, 2012: 1349, 2022: 222).<sup>17,18</sup>

To further substantiate the evidence of an intertemporal variation of trust, Figure 1 displays time series evidence from 1980-2015 for an OECD-23 country sample.<sup>19</sup> Excellent examples of a substantial intertemporal variation of trust can be found in the cases of Greece, with a cv-value of 45.5 percent, and Denmark, with a cv-value of 12 percent. Whereas in Greece, we can trace a continuous decline in trust of 39.7 percentage points from 49.6 percent in 1985 to 9.9 percent in

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<sup>16</sup> Roth (2024a) analyzes a 122-country sample of both free-market & democratic and non-free-market & non-democratic economies with 724 overall country-time observations and retrieves an average cv-value of 20.8 percent. Next to the free-market economies of Greece and Albania, the study finds very high cv-values for the countries Iran, Indonesia, Saudi Arabia, Palestine, Kuwait, Tunisia, Malawi, Nicaragua and Bosnia and Herzegovina with cv-values of  $\geq 30$  percent and up to 75 percent for Iran.

<sup>17</sup> Interestingly, the claim that trust is generally stable over time is already questioned by the seminal work by Knack and Keefer (1997). The authors highlight that: “(...) *there are both theoretical and empirical reasons for caution regarding the assumption that trust (...) is stable over longer time periods.*” (p. 1267). Nevertheless, they treat trust as a “culture” variable that changes only slowly over time. As mentioned in section 3 above, they back their claim with empirical evidence of a high correlation of 0.91 between the first and second wave of the World Value Survey (p. 1267). This empirical evidence is problematic for two reasons. First, even if correlation coefficients among our OECD-23 economies are on average high ( $>0.79$ ), they are much lower among the countries in South and Central America, the Caribbean and Africa ( $>0.42$ ). Second, to assess the degree of intertemporal variation, correlation coefficients are inadequate. For example, a universal global increase/decline in trust among all economies would indicate high correlation coefficients, although cv-values have increased markedly. Table E2 in Appendix E displays the results for 144 correlation coefficients for the eight individual panel waves.

<sup>18</sup> The inaccurate claim that trust is approximate time-invariant is highly problematic given that it is used as a justification to exclude standard and dynamic panel data econometric estimation techniques to retrieve causal effects when estimating the relationship between trust and growth (see Bjornskov 2012: 1349 and Bjornskov 2022: 222).

<sup>19</sup> The use of an OECD-23 country sample is linked to previous empirical work by Roth (2009: 115, 117). Using an OECD-23 country sample, the author detected a curvilinear relationship between trust and growth. Trust over Time from 1980 to 2015 for the remaining countries are displayed in Figure E5 and Figure E6 in Appendix E.

2015, in Denmark we report a pronounced increase in trust by 22.2 percentage points from 51.7 percent in 1980 to 73.9 percent in 2015.<sup>20</sup>

Other countries with cv-values greater than 10 percent either follow the Greek pattern, such as Portugal (-10.4 percentage points), or the Danish pattern, such as the Netherlands (+17.3 percentage points), Switzerland (+14.7 percentage points), and Germany (+12.3 percentage points), or they show a significant intertemporal variation with down- and upswings, such as in the US, the UK, Ireland, Mexico, and South Korea. Nevertheless, even the country cases with cv-values below 10 percent exhibit an intertemporal variation of trust. In Norway and Finland, we detect significant increases in trust of 11.3 and 11.7 percentage points, respectively, over the period 1980-2015.<sup>21</sup> Only a few countries, such as Japan, follow very stable patterns of trust, with a cv-value as low as 4.6 percent.

## 6. Econometric analysis and results

### 6.1 *Econometric Estimation Approach*

With a lagged initial income term on the right-hand side of the equation, and the fact that the dataset at hand is one of small  $T$  (8) and large  $N$  (75) with a ratio of  $T/N = 0.11$ , the baseline model in equation (1) is estimated using a dynamic panel estimation approach. Standard methods of dynamic panel estimation are the difference (Arellano and Bond 1991) and the system (Arellano and Bover 1995, Blundell and Bond 1998, Bond et al. 2001) generalized method of moments (GMM). Both estimators have been designed for “*small T, large N*” panels to fit models with one dynamic dependent variable, additional controls, and fixed effects (Roodman 2009b). Whereas difference GMM transforms all regressors by differencing (Arellano and Bond 1991), the system GMM estimator augments the difference GMM estimator by building a system of two equations—the original equation and the transformed one (Arellano and Bover 1995, Blundell and Bond 1998, Bond et al. 2001). This allows the introduction of more instruments and substantially improves efficiency (Roodman 2009b: 86).

A practical test to evaluate whether to use difference or system GMM is provided by Bond et al. (2001). The authors argue that if the coefficients for the difference GMM estimation is below

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<sup>20</sup> The exceptional increase of interpersonal trust in Denmark is in line with the finding by Sonderskov and Dinesen (2014: 784).

<sup>21</sup> The exceptional increase of interpersonal trust in Norway and Finland is in line with the finding by Sonderskov and Dinesen (2014: 784).

or close to the fixed effects estimation, then the instruments of the difference GMM estimator should be considered weak, and the system GMM estimator should be used. Applying this test to our paper, we find that the optimum trust level for growth for our difference GMM estimations are either below or similar to the fixed effects estimations.<sup>22</sup> Following the reasoning by Bond et al. (2001), we decided to estimate equation (1) via a system GMM approach. When implementing the system GMM approach, we use the `xtabond2` command as introduced by Roodman (2009b: 121).

## 6.2 *Econometric Analysis*

Regression 1 in Table 5 estimates equation (1) with the help of a system GMM estimator and our full sample with 75 countries from 1980 until 2019, with an overall number of 392 observations. Estimating the relationship between trust and growth linearly delivers a weak (0.015) and insignificant relationship. Given this unsatisfactory result, we follow the approach by Roth (2009) and add a squared trust term to equation (1) in regression 2. Our curvilinear approach to trust and growth in regression 2 yields a highly significant (95-percent-level) relationship between trust and growth with coefficients of 0.076 for the linear term<sup>23</sup> and -0.00086 for the quadratic term. With this set of coefficients, the positive influence attenuates as the level of trust rises and reaches zero when the indicator takes on a mid-range of 44.2 percent. From 44.2 percent onwards, Trust has a negative impact on growth. For the other variables, we find a significant (95-percent-level) negative coefficient for Income (-1.23), a positive coefficient for Education (1.47) and a highly significant (99-percent-level) negative coefficient for our Price Level of Investment (PI) (-0.03).

Following the practical advice by Roodman (2009a: 129, 2009b: 152), however, we should not be satisfied with the results in regression 2. Our Hansen test of joint validity of instruments returns a perfect  $p$ -value of 1.00, which is a classic sign of instrument proliferation. To lower our

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<sup>22</sup>When estimating equation (1) via a fixed-effects robust estimation procedure, one obtains an insignificant linear relationship between trust and growth, but a highly significant (at least at a 95-per cent-level) curvilinear relationship with a coefficient for the linear and quadratic term of 0.080 and -0.00120 and an optimum point of trust of 33.5 per cent. This is in line with the finding by Roth (2009: 118, 121), who reports an optimum point of trust of 30 per cent (see Table 1). Estimation results via difference GMM estimations obtain optimum points which are  $\leq 25.8$  per cent, and thus well below the optimum point of trust of 33.5 per cent, as obtained from our fixed-effects robust estimation. Underlying econometric results can be obtained from the author upon demand.

The optimum trust value of 33.5 percent for our fixed-effects estimator is in line with the results by Roth (2009) who finds a slightly lower but rather similar optimum point of 30 percent when using a sample of 35 countries over the 25-year time period 1980-2005 with an overall 115 observations (see here also Table 1).

<sup>23</sup> This result for the linear term is strongly in line with the coefficient as reported by Knack and Keefer (1997: 1261).

instrument count, regressions 3 and 4 therefore uses only the first-lag instruments<sup>24</sup> to reduce the size of our instruments from 148 to 64 and respectively from 183 to 78 instruments. When modeling the relationship linearly in Regression 3, we still find an insignificant relationship between trust and economic growth. More importantly, in regression 4, the curvilinear relationship remains

**Table 5.** Trust and Economic Growth - System GMM Estimation

Dependent Variable	Growth	Growth	Growth	Growth	Growth	Growth
Estimation Method	SYSGMM	SYSGMM	SYSGMM	SYSGMM	SYSGMM	SYSGMM
Equation	1	2	3	4	5	6
<i>Trust</i>	0.015 (1.39)	0.076** (2.23)	0.015 (1.51)	0.079** (2.37)	0.030 (1.67)	0.136** (2.24)
<i>Trust, Squared</i>	- -	-0.00086** (-2.09)	- -	-0.00093** (-2.17)	- -	-0.00150** (-2.17)
<i>Income</i>	-1.23** (-2.56)	-1.23** (-2.34)	-1.35*** (-2.82)	-1.38** (-2.58)	-0.93 (-1.12)	-0.74 (-0.89)
<i>Education</i>	1.47** (2.09)	1.61** (2.18)	1.71** (2.59)	1.84*** (2.78)	-0.23 (-0.15)	-1.12 (-0.69)
<i>PI</i>	-0.03*** (-2.89)	-0.03*** (-2.82)	-0.03*** (-3.13)	-0.03*** (-2.92)	-0.02 (1.40)	-0.02 (-1.05)
<i>Constant</i>	10.31*** (3.26)	8.96** (2.54)	11.17*** (3.36)	10.05** (2.63)	11.02* (1.80)	9.33 (1.66)
<i>First-Lag Instruments</i>	-	-	Y	Y	Y	Y
<i>Collapsed</i>	-	-	-	-	Y	Y
<i>N° of Instruments</i>	148	183	64	78	16	18
<i>AB Test AR(1)</i>	0.00	0.00	0.00	0.00	0.00	0.00
<i>AB Test AR(2)</i>	0.07	0.07	0.09	0.08	0.07	0.06
<i>AB Test AR(3)</i>	0.13	0.15	0.15	0.15	0.14	0.16
<i>Hansen Test</i>	1.00	1.00	0.41	0.37	0.15	0.14
<i>Optimum Point</i>	-	44.2	-	42.5	-	45.3
<i>Countries</i>	75	75	75	75	75	75
<i>Waves</i>	8	8	8	8	8	8
<i>Observations</i>	392	392	392	392	392	392
<i>Period</i>	1980-2019	1980-2019	1980-2019	1980-2019	1980-2019	1980-2019

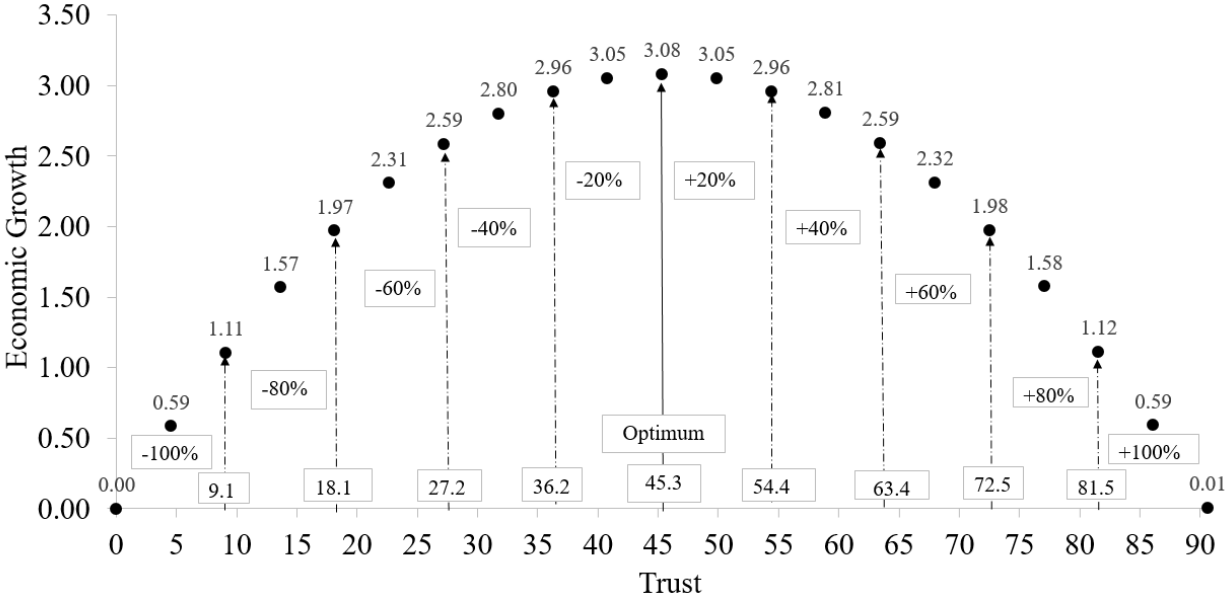
Notes: \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1. AB Test=Arellano-Bond test for autocorrelation in differences (*p*-value). Hansen Test=Hansen test of joint validity of instruments (*p*-value). SYSGMM=System Generalized Method of Moments. Numbers in parentheses are t-values. Time dummies are included in every specification. All specifications include orthogonal deviations, small-sample corrections, two-step estimation, and Windmeijr-corrected cluster-robust errors. Sources: Unique dataset on trust, compiled by the author from publicly available international data and Penn World Tables 10.0 (Feenstra et al. 2015).

<sup>24</sup> Using a benchmark *p*-value of 0.05, our Arellano-Bond test for autocorrelation in differences indicates the absence of a second- or third-order serial correlation. Alternative specifications in rows 19-22 and 29-36 in Table 6 reach average *P*-values as high as 0.63.

significant and finds an optimum point for trust and growth at a mid-range of 42.5 percent. All other variables are highly significant and show similar magnitudes and signs. Our Hansen test of joint validity of instruments is now much better with a  $p$ -value of 0.37. However, a  $p$ -value of 0.37 is still large enough to indicate some degree of overfitting of our instruments.

Therefore to further reduce the number of instruments, regressions 5-6 additionally collapse our instruments and reduce the number of instruments once more from 64 to 16 and from 78 to 18 instruments, respectively. With  $p$ -values of 0.15 in regression 5 and 0.14 in regression 6, our Hansen test of joint validity of instruments indicates the validity of our instruments (Roodman 2009a: 129). We obtain similar results as in regressions 1-4. The linear relationship in regression 5 is still insignificant. The curvilinear relationship between trust and growth in regression 6 remains highly significant (95-percent-level) and takes coefficients of 0.136 for the linear term and -0.00150 for the quadratic term. With our now much reduced and valid set of instruments, we receive an optimum point of trust for economic growth of 45.3 percent. The only drawback of regression 6 is the fact that other variables lose their significance.

**Figure 2.** Trust and Economic Growth, Predicted Values



Notes: The numbers arrayed along the y- and x-axis depict percentages. The optimum value is located at 45.3 percent. Source: Unique dataset on interpersonal trust, compiled by the author from publicly available international data.

To acquire a better understanding of the implications of our econometric results, see Figure 2, which illustrates the findings between trust and growth from Regression 6 in Table 5. In a country

with a low level of trust, an increase in trust is associated with an increase in economic growth if the increase in trust occurs on the left-hand side of the distribution (the optimum value of the graph is 45.3 percent). Once a threshold of 45.3 percent of trust is exceeded, the increase in trust will hamper economic growth. To further highlight the impact of trust on growth, Figure 2 matches five negative and five positive trust thresholds of consecutive  $\pm 20$  percent steps from the optimum point of 45.3 percent with their respective economic growth rates.<sup>25</sup> The figure clarifies that in a  $\pm 20$  percent trust radius ( $\geq 36.2$  percent and  $\leq 54.4$  percent), a decline in economic growth rates of 0.12 percentage points, from 3.08 percent to 2.96 percent of growth, is relatively modest. This loss in economic growth becomes more pronounced, however, the further the distance is from the optimum point of 45.3 percent. Therefore, with a  $\pm 40$  percent trust radius ( $< 36.2$  percent and  $> 54.4$  percent), we witness an acceleration of the decline in growth by 0.37 percentage points from 2.96 percent to 2.59 percent. Figure E4 in Appendix E shows the groups for all 75 market economies in their respective trust thresholds and distance to the optimum level of 45.3 percent.

### 6.3 Sensitivity Analysis

To test the sensitivity of the results, Table 6 shows specification tests, when analyzing: i) influential cases, ii) regional groups, iii) influential panel waves, and iv) applying country cases of existing studies. The first two rows (labeled “None”) report the regression coefficient and t-values taken from Regressions 6 (row 1) and 5 (row 2) in Table 5. Successive rows reflect the effects of trust on growth when the indicated change is made.

Rows 3, 5, and 7 clarify that neither the exclusion of either Norway (the country with the largest average level of trust) or Trinidad and Tobago (the country with the smallest average level of trust), nor both countries together, alters the significance of the curvilinear relationship between trust and growth.<sup>26</sup> Interestingly, the linear relationship attains significance at the 95-percent level when both influential cases are excluded (row 8). However, the significance of the curvilinear relationship remains stronger at the 99-percent level in row 7. Once trust values that exceed the threshold of trust for growth are excluded ( $> 45.3$  percent), we detect, as predicted, a reversal of results. The curvilinear relationship loses significance (row 9). The linear relationship becomes

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<sup>25</sup> With an optimum level of 45.3 percent, the lower bound level of the first  $\pm 20$  percent trust radius is thus 36.2 percent [ $45.3 - 9.1 (45.3 * 0.20)$ ] and the upper bound level is thus 54.4 percent [ $45.3 + 9.1 (45.3 * 0.20)$ ].

<sup>26</sup> We attain similar robust results when excluding Greece (the country with the highest cv-value of trust) or Latvia (the country with the lowest cv-value of trust), or both countries together.

significant (at the 95-percent level) and attains a coefficient of 0.05 (row 10) – which is close to the existing linear empirical evidence (see here Table 1).

**Table 6. Trust and Economic Growth – Sensitivity Analysis**

Row	S. Change	Trust C.	Trust-Sq C.	t-Value	Cs	Obs.	Instr.	H.	S.	OP
1	None	0.136**	-0.00150**	2.24/-2.17	75	392	18	0.14	c 1 1	45.3
2	None	0.03	-	1.67	75	392	16	0.15	c 1 1	-
<i>Influential Cases</i>										
3	NO	0.150**	-0.00171**	2.43/-2.33	74	384	18	0.12	c 1 1	43.9
4	NO	0.033*	-	1.76	74	384	16	0.13	c 1 1	-
5	TT	0.145**	-0.00160**	2.64/-2.39	74	390	18	0.21	c 1 1	45.3
6	TT	0.032*	-	1.99	74	390	16	0.16	c 1 1	-
7	NO+TT	0.159***	-0.00182**	2.80/-2.52	73	382	18	0.20	c 1 1	43.7
8	NO+TT	0.035**	-	2.12	73	382	16	0.15	c 1 1	-
9	HTVs	0.125	-0.00132	1.01/-0.59	70	326	18	0.09	c 1 1	47.3
10	HTVs	0.050**	-	2.31	70	326	16	0.14	c 1 1	-
<i>Regional Groups</i>										
11	Exc. Africa	0.134**	-0.00153**	2.28/-2.21	65	350	18	0.32	c 1 1	43.8
12	Exc. Africa	0.023	-	1.20	65	350	16	0.39	c 1 1	-
13	Exc. SA	0.125**	-0.00138**	2.13/-2.07	68	352	23	0.09	c 1 2	45.3
14	Exc. SA	0.023	-	1.19	68	352	20	0.05	c 1 2	-
15	Exc. CAA	0.170***	-0.00177**	2.71/-2.24	69	365	28	0.10	c 1 3	48.0
16	Exc. CAA	0.045**	-	2.11	69	365	24	0.07	c 1 3	-
17	Exc. Asian	0.112**	-0.00144**	2.03/-2.31	64	351	33	0.08	c 1 4	38.9
18	Exc. Asian	0.010	-	0.41	64	351	28	0.05	c 1 4	-
19	Exc. EE	0.118**	-0.00144**	2.19/-2.01	62	354	43	0.14	c 1 6	41.0
20	Exc. EE	0.018	-	0.94	62	354	36	0.03	c 1 6	-
21	OECD-23	0.205**	-0.00207**	2.34/-2.24	23	175	28	0.66	c 1 3	49.5
22	OECD-23	0.022	-	0.89	23	175	24	0.45	c 1 3	-
<i>Influential Panel Waves</i>										
23	1980-2015	0.108*	-0.00133**	1.85/-2.01	75	323	18	0.10	c 1 1	40.6
24	1980-2015	0.024	-	1.37	75	323	16	0.23	c 1 1	-
25	1985-2019	0.151***	-0.00161**	2.89/-2.49	75	370	17	0.19	c 1 1	46.9
26	1985-2019	0.038**	-	2.46	75	370	15	0.2	c 1 1	-
27	1985-2015	0.127**	-0.00149**	2.25/-2.26	75	301	17	0.05	c 1 1	42.6
28	1985-2015	0.031*	-	1.92	75	301	15	0.16	c 1 1	-
<i>Existing Studies</i>										
29	KF 1997	0.108	-0.00106	1.11/-0.96	29	216	23	0.10	c 1 2	50.9
30	KF 1997	0.035	-	1.03	29	216	20	0.10	c 1 2	-
31	ZK 2001	0.187**	-0.00180**	2.17/-2.10	40‡	272	43	0.22	c 1 6	51.9
32	ZK 2001	0.043	-	1.37	40‡	272	36	0.06	c 1 6	-
33	BEJ 2008	0.147**	-0.00182**	2.09/-2.43	63	390	23	0.21	c 1 2	40.4
34	BEJ 2008	0.006	-	0.18	63	390	20	0.09	c 1 2	-
35	Roth 2009	0.256**	-0.00276**	2.22/-2.36	35	248	28	0.14	c 1 3	46.4
36	Roth 2009	0.042	-	1.08	35	248	24	0.07	c 1 3	-

*Notes:* S.=Specification. C.=Coefficient. Sq.=Square. Cs.=Countries. Obs.=Observations. Instr.=Instruments H.=Hansen Test=Hansen test of joint validity of instruments (p-value). c11= collapse and first-lag instruments. OP=Optimum Point. NO=Norway. TT=Trinidad and Tobago. HTVs=High Trust Values. SA=South America. CAA=Central America and Caribbean. EE=Eastern-Europe. KF=Knack and Keefer, ZK=Zak and Knack, BEJ=Berggren et al. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1. ‡ Oman is missing in our unique dataset on interpersonal trust. Time dummies are included in every specification. System Generalized Method of Moments estimations include orthogonal deviations, small-sample corrections, two-step estimation, and Windmeijr-corrected cluster-robust errors. *Sources:* Unique dataset on interpersonal trust, compiled by the author from publicly available international data and PWT 10.0 (Feenstra et al. 2015).



Rows 11-22 show results when analyzing distinct regional groups. When excluding countries from Africa, South America, Central America and the Caribbean, Asia, and Eastern Europe in rows 11, 13, 15, 17, and 19, our curvilinear relationship remains significant at the 95-percent level. Four out five linear relationships (rows 12, 14, 18 and 20) remain insignificant. Rows 21-22 analyze our OECD-23 country sample. In line with the existing literature (Roth 2009), we find a significant curvilinear relationship in row 21. The linear relationship remains insignificant.

Rows 23-28 show results when excluding certain panel waves. As can be detected in row 23, the impact of the linear term of our curvilinear relationship becomes less significant (dropping from a 95- to a 90-percent level of significance) when excluding the last panel and analyzing the period 1980 to 2015. As expected, the linear term in row 24 is insignificant altogether. Even more interestingly, when excluding the first panel wave in row 25, the linear term of our curvilinear relationship becomes highly significant (99-percent level). When analyzing only the linear relationship in row 26, however, it slightly loses significance (95-percent level). When excluding both the first and the last panel in rows 27-28, the curvilinear relationship remains significant, whereas the linear is only slightly significant (90-percent level).

To further substantiate our curvilinear result between trust and growth, in rows 29-36, we analyze the robustness of our results by using the original country samples of the existing literature as displayed in Table 1. In three out of the four studies (rows 31, 33 and 35), we detect a significant (95-percent level) curvilinear relationship between trust and growth, with optimum points ranging from 40.4 to 51.9 percent.

## **7. Discussion in the light of the previous empirical results and theory**

How does the causal curvilinear relationship between trust and growth, presented in this present study, fit into previous research in this field? Concerning previous studies in this field, our findings corroborate earlier results, which found a curvilinear relationship between trust and growth (Roth 2009). When controlling for endogeneity with the help of a System GMM estimator, this paper finds that the optimum point of trust for growth is located at 45.3 percent, which is close to the random effects estimation, but higher than the fixed-effects and lower than the pooled panel estimate results, as reported in Roth (2009: 115, 118). Furthermore, the findings bring in line the positive findings by Knack and Keefer (1997: 1261) and Zak and Knack (2001: 308) with the negative finding by Roth (2009: 118, 120). The linear term of the curvilinear relationship is in line

with the positive findings by Knack and Keefer (1997: 1261) and Zak and Knack (2001: 308). The negative quadratic term is in line with the negative finding by Roth (2009: 118, 120).

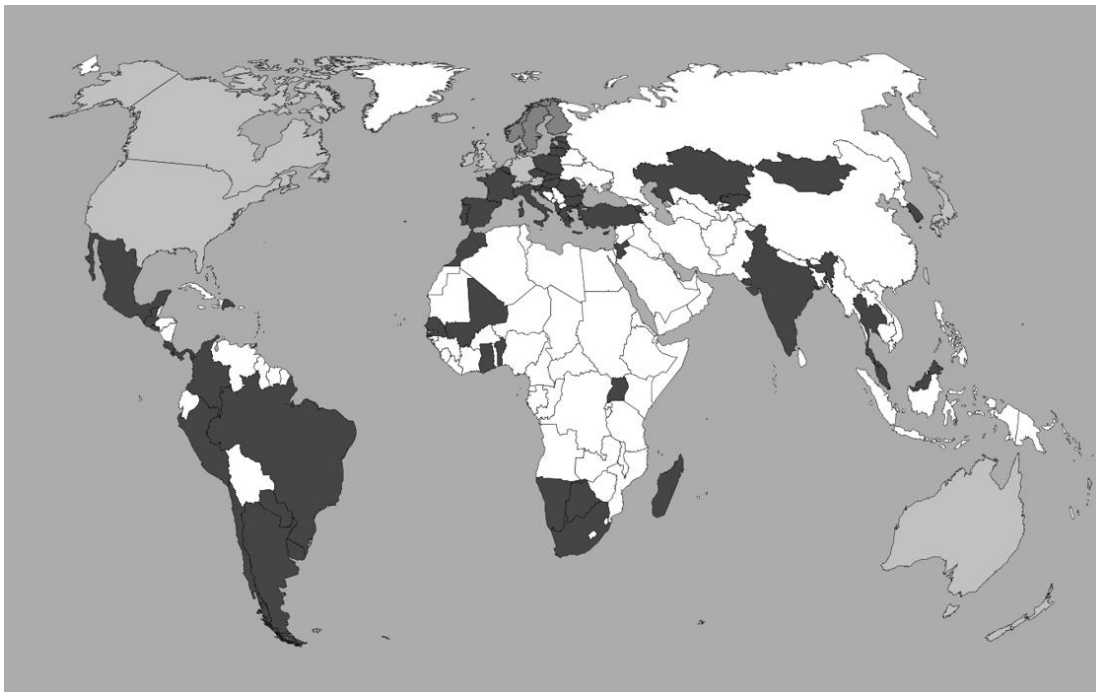
How does the causal relationship between trust and growth fit into the broader empirical and theoretical literature? Two points are worth mentioning here. First, the causal detected curvilinear relationship between trust and growth at the country level is in line with curvilinear findings regarding trust and economic performance at various levels of analysis. At the regional level, studies find a non-linear (Peiro-Palomino 2016: 15) and negative (Schneider et al. 2000: 313) relationship between trust and economic growth. At the organization level, studies find a curvilinear relationship between trust and innovation (Bidault and Castello 2009: 267; Bischoff et al. 2023: 13; Echebarria and Barrutia 2013: 1013-1014; and McFadyen and Cannella 2004: 743). In addition, our curvilinear relationship is in line with the finding of Inglehart et al. (1997: 227-228) that there exists a curvilinear relationship between social capital and economic performance. Furthermore, our finding is very similar to that of Barro and Sala-i-Martin (2004), who uncovered a curvilinear relationship between democracy and economic growth. Their estimates imply that democratization seems to foster growth in countries that had previously not been strongly democratic but to hamper growth in countries that had already achieved a high level of democracy (p. 529). Given the importance of trust for democracy (Inglehart 1990, 1999; Inglehart et al. 1997; Nannestad 2008: 429; and Uslaner 1999), this finding aligns strongly with our own.

Second, the finding suggests that the three theoretical channels that assert a curvilinear relationship between trust and growth appear to be correct. In this respect, both theoretical strands (Putnam 1993 and Olson 1982) on trust and growth are correct, but they pinpoint only one side of the coin. Trust exhibits a positive effect on growth, but at a certain threshold, it can also hamper economic growth. Moreover, the reflections by Cowen (2017), that excessive trust might lead society to become complacent, stifling innovation and the entrepreneurial spirit and ultimately hampering economic growth (pp. 81-89) seems to be accurate. Finally, the assertion that trust is a double-edged sword (Cole et al. 2024: 10) seems to approximate reality. Although the presence of trust in a society may incline its members to engage in beneficial arrangements, it may also induce them to “*circumvent*” such arrangements in cooperation with other like-minded individuals when it promises to be profitable. By hampering cooperation, such activities ultimately thwart the original intentions of the arrangement and thereby reduce the general welfare (Cole et al. 2024: 1).

## 8. Policy Implications

What are the policy implications of our causal curvilinear finding for trust and economic growth? Our finding implies that an increase in interpersonal trust in countries with low levels of trust (such as in Trinidad and Tobago, where the interpersonal trust value is on average, 3.5 percent, or 7.1 percent in Brazil) tends to significantly stimulate economic growth. However, that positive influence is diminished as the level of trust rises and reaches zero, when the indicator takes on a mid-range of 45.3 percent. Therefore, an increase in trust appears to enhance economic growth in countries with initially low levels of trust but inhibits economic growth in countries that already demonstrated a substantial level of trust.

**Figure 3.** Optimum levels of trust across 75 market economies, 1980-2015



*Notes:* Countries with optimum levels of trust for growth ( $\geq 36.2$  and  $\leq 54.4$  percent) are shown in light grey. Countries that exceed the optimum trust for growth threshold ( $> 54.4$  percent) appear in dark grey. And countries with average trust levels below the optimum threshold for growth ( $< 36.2$  percent) are shown in black. *Source:* Author's own dataset on trust, compiled from publicly available international data.

To better understand the global policymaking implications, Figure 3 shows a world map of the 75 countries examined in this study over a 40-year period. Countries that are close ( $\pm 20$ -percent trust radius with values ranging between  $\geq 36.2$  and  $\leq 54.4$  percent) to the optimum threshold of trust for growth are depicted in light grey. Countries exceeding the optimum trust threshold for growth (above 20 percent trust radius with values  $> 54.4$  percent) are displayed in dark grey. Finally,

countries with average trust levels below the optimum threshold (below the 20-percent trust radius with values of <36.2 percent) are depicted in black.

Figure 3 clarifies that 19 percent of the countries in our sample (14 out of the 75 – namely Austria, Australia, Canada, Germany, Hong Kong, Iceland, Ireland, Japan, the Netherlands, New Zealand, Switzerland, Taiwan, the UK and the US) are close to an optimum level of trust for growth, 5 percent of the countries have too much trust for growth (4 out of 75 – namely Denmark, Finland, Norway, and Sweden) and a large majority of 76 percent (57 out of the 75 countries) have a level of trust that are well below the optimum trust for growth threshold, including all countries from Africa, South America, Central America and the Caribbean, Central and South-East Asia and almost all from South- and Eastern Europe.

For a large majority of these countries, to be able to improve their prospects of achieving greater economic growth, it is crucial for them to implement trust-building public policies, including increased political freedoms, redistributive transfers of wealth and enhanced educational opportunities (Knack and Zak 2003: 91, Sonderskov and Dinesen 2014: 791-792). Countries close to the optimum levels of trust do not need to take further action. And countries with very high levels of trust should accept slightly lower economic growth in exchange for the multiple benefits stemming from high levels of trust, including amongst others democratic stability (Inglehart 1990, 1999, Inglehart et al. 1997, Nannestad 2008: 429, Uslaner 1999).

How do we account for the fact that the four Scandinavian economies Denmark, Finland, Norway, and Sweden exhibit too much trust for economic growth? Three conjectures are worth considering. First, it might be the fact that the dataset from the PWT 10.0 has not yet incorporated the full range of intangible capital investments that are characteristic of fully-fledged knowledge economies, such as the four Scandinavian economies (Roth 2024b). Given that countries such as Sweden and Finland frequently rank among the most intangible capital-intensive economies in the world, this might lead to a under-appreciation of Scandinavian growth rates in the PWT 10.0 data (Roth 2024c).

Second, the pure focus on GDP per capita growth rates might be highly problematic given their well-known weaknesses, as pointed out by the “beyond GDP approach” (Stiglitz et al. 2009). A wider reform of the national accounting framework that involves the inclusion of environmental, educational, health, and social capital would permit a more accurate signaling of real economic performance, to allow developed and emerging countries to strive for sustainable economic growth (Roth and Thum 2013: 506). Given that the four Scandinavian economies all score in the top

rankings on environmental, educational, health, and social capital might lead to an under-appreciation of Scandinavian growth rates by the PWT 10.0.

Third, even if the Scandinavian economies experience less-than-optimum growth rates, compared to the US and other liberal market economies, policymakers and citizens in these countries should willingly choose to sustain their high levels of trust, which grant them multiple advantages that attach to high-trust societies, including amongst others democratic stability (Inglehart 1990, 1999; Inglehart et al. 1997; Nannestad 2008: 429; and Uslaner 1999).

## **9. Conclusion**

This paper analyzes the intertemporal variation of trust on growth by taking a unique global country panel dataset and using a system-GMM estimation for a sample of 75 market economies over a 40-year period, 1980-2019. The paper finds evidence of a causal curvilinear (inverted U-shape) relationship between trust and growth, with an optimum level of trust for growth at 45.3 percent. The curvilinear relationship corroborates earlier panel data results, but it calls into question findings that posit a general positive relationship between trust and economic growth. Only a minority of countries worldwide can position themselves close to or above the optimum threshold for trust and growth. Most countries are located well below that threshold, and for them, the implementation of trust-building policies is imperative for growth. For the few countries already close to the optimum threshold for trust on growth, there is no need to take immediate policy action. And the handful of countries that register above the optimum level of trust should accept slightly lower economic growth in exchange for greater democratic stability.

These results call for a re-evaluation of the theoretical implications and empirical findings on the relationship between trust and economic growth. More theoretical and empirical research is needed in order to clarify the relationship. The conventional wisdom that has informed the character of social science and economics discussion over the past 25 years, namely, that trust is linearly positively related to economic performance, must be re-examined. The relationship depends on the level of trust that already exists in a country, thus determining whether it is imperative for policymakers to invest in trust-building exercises.

Overall, our research results open up two promising avenues for future research, which we have not covered in this paper due to space and data limitations. The first avenue would entail an in-depth analysis of the determinants of trust over time for our country sample of 75 market economies from 1980 to 2019. The second avenue is an extension of our country sample and time-

series evolution, using the data from the eight waves of the Integrated Value Survey, the upcoming waves from the five international Barometer survey programs and data from the future releases of the Penn World Tables.

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## **Appendices**

- Appendix A. Interpersonal Trust Data Resources
- Appendix B. Case Selection
- Appendix C. Country and Time Coverage for Trust
- Appendix D. Additional Literature
- Appendix E. Descriptive Statistics
- Appendix F. Survey Questions
- Appendix G. Overview of Country Sample

## Appendix A. Data Sources on Trust

**Table A1.** Raw Data on Trust in 75 Free-Market Economies

No.	Country	Study	No.	Country	Study	No.	Country	Study
1	Albania	IVS	26	Greece	IVS	51	Norway	IVS
2	Argentina	IVS, Latino	27	Guatemala	IVS, Latino	52	Panama	Latino
3	Armenia	IVS	28	Hong Kong	IVS, Asian	53	Paraguay	Latino
4	Australia	IVS	29	Hungary	IVS	54	Peru	IVS, Latino
5	Austria	IVS	30	Iceland	IVS	55	Poland	IVS
6	Belgium	IVS, EB	31	India	IVS	56	Portugal	IVS, EB
7	Benin	Afro	32	Ireland	IVS, EB	57	Romania	IVS
8	Botswana	Afro	33	Italy	IVS, EB	58	Senegal	Afro
9	Brazil	IVS, Latino	34	Japan	IVS, Asian	59	Serbia	IVS
10	Bulgaria	IVS	35	Jordan	IVS, Arab	60	Singapore	IVS, Asian
11	Canada	IVS	36	Kazakhstan	IVS	61	Slovakia	IVS
12	Chile	IVS, Latino	37	Kyrgyzstan	IVS	62	Slovenia	IVS
13	Colombia	IVS, Latino	38	Latvia	IVS	63	South Africa	IVS, Afro
14	Costa Rica	Latino	39	Lithuania	IVS	64	South Korea	IVS, Asian
15	Croatia	IVS	40	Luxembourg	IVS, EB	65	Spain	IVS, Latino, EB
16	Cyprus	IVS	41	Madagascar	Afro	66	Sweden	IVS
17	Czech Rep.	IVS	42	Malaysia	IVS, Asian	67	Switzerland	IVS
18	Denmark	IVS, EB	43	Mali	IVS, Afro	68	Taiwan	IVS, Asian
19	Dom. Rep.	IVS, Latino	44	Malta	IVS	69	Thailand	IVS, Asian
20	El Salvador	IVS, Latino	45	Mexico	IVS, Latino	70	T. and T.	IVS
21	Estonia	IVS	46	Mongolia	Asian	71	Turkey	IVS
22	Finland	IVS	47	Morocco	IVS, Arab, Afro	72	Uganda	IVS, Afro
23	France	IVS, EB	48	Namibia	Afro	73	UK	IVS, EB
24	Germany	IVS, EB	49	Netherlands	IVS, EB	74	US	IVS
25	Ghana	IVS, Afro	50	New Zealand	IVS	75	Uruguay	IVS, Latino

*Notes:* IVS=Integrated Value Survey. Arab=Arab Barometer. Afro=Afro Barometer. Latino=Latinobarómetro. Asian=Asian Barometer. EB=Eurobarometer. *Sources:* Unique dataset on trust, compiled by the author from publicly available international data.

## Appendix B. Case Selection

**Table B1.** Stepwise Case Selection for 142 Countries

No.	Country	NT	Missing	Oil	Democratic (A)	Free-Market (B)	(A+B)=0	Total
1	Albania	0	0	0	0	1	0	1
2	Algeria	0	0	0	0	0	1	0
3	Andorra	0	1	-	-	-	-	0
4	Argentina	0	0	0	1	0	0	1
5	Armenia	0	0	0	0	1	0	1
6	Australia	0	0	0	1	1	0	1
7	Azerbaijan	0	1	-	-	-	-	0
8	Bahrain	1	-	-	-	-	-	0
9	Austria	0	0	0	1	1	0	1
10	Bangladesh	0	0	0	0	0	1	0
11	Belarus	0	1	-	-	-	-	0
12	Belgium	0	0	0	1	1	0	1
13	Benin	0	0	0	1	0	0	1
14	Bolivia	0	0	0	0	0	1	0
15	Bosnia Herze.	0	1	-	-	-	-	0
16	Botswana	0	0	0	1	1	0	1
17	Brazil	0	0	0	1	0	0	1
18	Bulgaria	0	0	0	1	1	0	1
19	Burkina Faso	0	0	0	0	0	1	0
20	Burundi	1	-	-	-	-	-	0
21	Cambodia	0	0	0	0	0	1	0
22	Cameroon	1	-	-	-	-	-	0
23	Canada	0	0	0	1	1	0	1
24	Cape Verde	0	1	-	-	-	-	0
25	Chile	0	0	0	1	1	0	1
26	China	0	0	0	0	0	1	0
27	Colombia	0	0	0	0	1	0	1
28	Costa Rica	0	0	0	1	1	0	1
29	Cote d'Ivoire	1	-	-	-	-	-	0
30	Croatia	0	0	0	1	0	0	1
31	Cyprus	0	0	0	1	1	0	1
32	Czech Rep.	0	0	0	1	1	0	1
33	Denmark	0	0	0	1	1	0	1
34	Dom. Rep.	0	0	0	1	0	0	1
35	Ecuador	0	0	0	0	0	1	0
36	Egypt	0	0	0	0	0	1	0
37	El Salvador	0	0	0	1	1	0	1
38	Estonia	0	0	0	1	1	0	1
39	Ethiopia	0	0	0	0	0	1	0

40	Finland	0	0	0	1	1	0	1
41	France	0	0	0	1	1	0	1
42	Georgia	0	1	-	-	-	-	0
43	Germany	0	0	0	1	1	0	1
44	Ghana	0	0	0	1	1	0	1
45	Greece	0	0	0	1	1	0	1
46	Guatemala	0	0	0	0	1	0	1
47	Guinea	1	-	-	-	-	-	0
48	Haiti	1	-	-	-	-	-	0
49	Honduras	0	0	0	0	0	1	0
50	Hong Kong	0	0	0	0	1	0	1
51	Hungary	0	0	0	1	1	0	1
52	Iceland	0	0	0	1	1	0	1
53	India	0	0	0	1	0	0	1
54	Indonesia	0	0	0	0	0	1	0
55	Iran	0	0	1	-	-	-	0
56	Iraq	0	0	1	-	-	-	0
57	Ireland	0	0	0	1	1	0	1
58	Israel	1	-	-	-	-	-	0
59	Italy	0	0	0	1	1	0	1
60	Japan	0	0	0	1	1	0	1
61	Jordan	0	0	0	0	1	0	1
62	Kazakhstan	0	0	0	0	1	0	1
63	Kenya	0	0	0	0	0	1	0
64	Kosovo	1	-	-	-	-	-	0
65	Kuwait	0	0	1	-	-	-	0
66	Kyrgyzstan	0	0	0	0	1	0	1
67	Latvia	0	0	0	1	1	0	1
68	Lebanon	0	1	-	-	-	-	0
69	Lesotho	0	0	0	0	0	1	0
70	Liberia	1	-	-	-	-	-	0
71	Libya	0	1	-	-	-	-	0
72	Lithuania	0	0	0	1	1	0	1
73	Luxembourg	0	0	0	1	1	0	1
74	Macau	1	-	-	-	-	-	0
75	Madagascar	0	0	0	0	1	0	1
76	Malawi	0	0	0	0	0	1	0
77	Malaysia	0	0	0	0	1	0	1
78	Mali	0	0	0	1	0	0	1
79	Malta	0	0	0	1	1	0	1
80	Mauritius	1	-	-	-	-	-	0
81	Mexico	0	0	0	0	1	0	1
82	Moldova	0	0	0	0	0	1	0

83	Mongolia	0	0	0	1	0	0	1
84	Montenegro	0	1	-	-	-	-	0
85	Morocco	0	0	0	0	1	0	1
86	Mozambique	0	0	0	0	0	1	0
87	Myanmar	1	-	-	-	-	-	0
88	Namibia	0	0	0	1	1	0	1
89	Netherlands	0	0	0	1	1	0	1
90	New Zealand	0	0	0	1	1	0	1
91	Nicaragua	0	0	0	0	0	1	0
92	Niger	1	-	-	-	-	-	0
93	Nigeria	0	0	0	0	0	1	0
94	North Macedonia	0	1	-	-	-	-	0
95	North Cyprus	1	-	-	-	-	-	0
96	Norway	0	0	0	1	1	0	1
97	Pakistan	0	0	0	0	0	1	0
98	Palestine	0	1	-	-	-	-	0
99	Panama	0	0	0	1	1	0	1
100	Paraguay	0	0	0	0	1	0	1
101	Peru	0	0	0	1	1	0	1
102	Philippines	0	0	0	0	0	1	0
103	Poland	0	0	0	1	1	0	1
104	Portugal	0	0	0	1	1	0	1
105	Puerto Rico	0	1	-	-	-	-	0
106	Qatar	1	-	-	-	-	-	0
107	Romania	0	0	0	1	1	0	1
108	Russia	0	0	0	0	0	1	0
109	Rwanda	0	0	0	0	0	1	0
110	Saudi Arabia	0	0	1	-	-	-	0
111	Senegal	0	0	0	1	0	0	1
112	Serbia	0	0	0	1	1	0	1
113	Sierra Leone	1	-	-	-	-	-	0
114	Singapore	0	0	0	0	1	0	1
115	Slovakia	0	0	0	1	1	0	1
116	Slovenia	0	0	0	1	1	0	1
117	South Africa	0	0	0	1	1	0	1
118	South Korea	0	0	0	1	1	0	1
119	Spain	0	0	0	1	1	0	1
120	Sudan	0	0	0	0	0	1	0
121	Swaziland	1	-	-	-	-	-	0
122	Sweden	0	0	0	1	1	0	1
123	Switzerland	0	0	0	1	1	0	1
124	Taiwan	0	0	0	1	1	0	1
125	Tajikistan	1	-	-	-	-	-	0

126	Tanzania	0	0	0	0	0	1	0
127	Thailand	0	0	0	0	1	0	1
128	Togo	1	-	-	-	-	-	0
129	T. and T.	0	0	0	1	1	0	1
130	Tunisia	0	0	0	0	0	1	0
131	Turkey	0	0	0	0	1	0	1
132	Uganda	0	0	0	0	1	0	1
133	Ukraine	0	0	0	0	0	1	0
134	UK	0	0	0	1	1	0	1
135	US	0	0	0	1	1	0	1
136	Uruguay	0	0	0	1	1	0	1
137	Uzbekistan	1	-	-	-	-	-	0
138	Venezuela	0	0	0	0	0	1	0
139	Vietnam	0	0	0	0	0	1	0
140	Yemen	0	0	0	0	0	1	0
141	Zambia	0	0	0	0	0	1	0
142	Zimbabwe	0	0	0	0	0	1	0
-	-	20	12	4	-	-	31	-
-	142	122	110	106	-	-	75	75

*Notes:* Herze.=Herzegovina. T. and T.=Trinidad and Tobago. NT=No Times Series Observations. Oil=Oil-Exporting Countries. *Source:* Unique dataset on trust, compiled by the author from internationally available data.



## Appendix C. Country and Time Coverage for Trust

**Table C1.** Country and Time Coverage for Trust, 75 Market Economies, 1980-2015

No.	Country	1980	1985	1990	1995	2000	2005	2010	2015	$\mu$	$\sigma$	cv	n	$\Delta$
1	Albania						X	X	X	11.4	5.1	44.3	3	-12.4
2	Argentina	X	X	X	X	X	X	X	X	22.6	5.6	24.8	8	-1.4
3	Armenia						X	X	X	17.6	3.1	17.8	3	0.5
4	Australia	X	X	X	X	X	X	X	X	46.0	3.5	7.5	8	2.3
5	Austria			X	X	X	X	X	X	36.8	5.5	14.8	6	16.7
6	Belgium	X	X	X	X	X	X	X		32.0	2.3	7.3	7	7.1
7	Benin						X	X	X	30.2	2.0	6.6	3	4
8	Botswana				X	X	X	X	X	11.0	3.0	27.0	5	-2.7
9	Brazil			X	X	X	X	X	X	7.1	2.0	27.4	6	0.8
10	Bulgaria						X	X	X	19.8	1.6	8.3	3	-3.9
11	Canada	X	X	X	X	X	X	X	X	45.9	4.1	8.9	8	-3.6
12	Chile			X	X	X	X	X	X	18.0	2.6	14.3	6	-7.2
13	Colombia				X	X	X	X	X	18.2	2.5	13.5	5	-4.7
14	Costa Rica				X	X	X	X	X	14.8	2.8	18.6	5	-5.6
15	Croatia						X	X	X	18.1	2.5	13.8	3	-5.4
16	Cyprus						X	X	X	8.4	0.9	10.8	3	-2.1
17	Czech Rep.						X	X	X	27.2	3.0	10.8	3	-5.7
18	Denmark	X	X	X	X	X	X	X	X	65.6	7.9	12.0	8	22.2
19	Dom. Rep.				X	X	X	X	X	23.8	6.1	25.7	5	-13.6
20	El Salvador				X	X	X	X	X	22.2	4.2	19.0	5	-6.2
21	Estonia						X	X	X	35.0	2.9	8.2	3	4.2
22	Finland	X	X	X	X	X	X	X	X	59.8	5.2	8.7	8	11.3
23	France	X	X	X	X	X	X	X	X	23.0	1.9	8.2	8	2
24	Germany	X	X	X	X	X	X	X	X	37.4	4.1	11.0	8	12.3
25	Ghana						X	X	X	11.1	3.3	29.3	3	-7
26	Greece		X	X	X	X	X	X	X	28.2	12.8	45.5	7	-39.7
27	Guatemala				X	X	X	X	X	20.6	4.4	21.3	5	-12.4
28	Hong Kong					X	X	X	X	39.0	5.8	14.8	4	15.9
29	Hungary						X	X	X	26.0	1.6	6.1	3	2.9
30	Iceland	X	X	X	X	X	X	X	X	46.4	6.5	14.1	8	19.6
31	India			X	X	X	X	X	X	29.6	8.5	28.7	6	-15.7
32	Ireland	X	X	X	X	X	X	X		39.3	4.0	10.1	7	-2.9
33	Italy	X	X	X	X	X	X	X	X	30.4	2.5	8.4	8	2.6
34	Japan	X	X	X	X	X	X	X	X	40.5	1.9	4.6	8	-3.6
35	Jordan					X	X	X	X	25.3	5.9	23.2	4	-11.2
36	Kazakhstan							X	X	33.6	4.5	13.4	2	-9
37	Kyrgyzstan						X	X	X	27.9	7.6	27.4	3	8.8
38	Latvia						X	X		24.6	0.8	3.1	2	1.5
39	Lithuania						X	X	X	30.0	1.5	5.1	3	3.7
40	Luxembourg		X	X	X	X	X	X		29.8	2.4	8.0	6	2

41	Madagascar					X	X	X	29.7	2.2	7.3	3	-5.1	
42	Malaysia					X	X	X	9.8	1.9	19.3	3	4.3	
43	Mali				X	X	X	X	20.1	4.0	19.9	4	9.4	
44	Malta	X	X	X	X	X	X	X	19.1	4.9	25.5	7	11.1	
45	Mexico	X	X	X	X	X	X	X	24.6	5.6	22.9	8	-2	
46	Mongolia					X	X	X	15.1	4.2	28.0	3	9.8	
47	Morocco				X	X	X	X	17.0	4.1	24.1	4	-9.8	
48	Namibia			X	X	X	X	X	29.6	4.1	13.7	5	-8.6	
49	Netherlands	X	X	X	X	X	X	X	54.3	6.3	11.6	8	17.3	
50	New Zealand			X	X	X	X	X	52.9	3.3	6.3	5	7.5	
51	Norway	X	X	X	X	X	X	X	67.9	4.8	7.0	8	11.7	
52	Panama			X	X	X	X	X	20.1	3.5	17.1	5	0.6	
53	Paraguay			X	X	X	X	X	16.8	1.9	11.1	5	-1	
54	Peru			X	X	X	X	X	14.1	2.7	19.1	5	7.1	
55	Poland					X	X	X	22.6	2.6	11.4	3	5.2	
56	Portugal		X	X	X	X	X	X	18.8	5.0	26.5	7	-10.4	
57	Romania					X	X	X	14.9	3.9	26.1	3	-9.1	
58	Senegal					X	X	X	28.7	1.4	4.9	3	3.3	
59	Serbia					X	X	X	15.2	1.2	8.1	3	1.3	
60	Singapore				X	X	X	X	28.1	5.6	19.8	4	15.2	
61	Slovakia					X	X	X	16.9	3.0	17.5	3	5.2	
62	Slovenia					X	X	X	21.1	2.5	11.8	3	6.1	
63	South Africa	X	X	X	X	X	X	X	22.3	4.8	21.6	8	-6.7	
64	South Korea	X	X	X	X	X	X	X	32.0	3.7	11.6	8	-4	
65	Spain	X	X	X	X	X	X	X	35.0	2.4	7.0	8	3	
66	Sweden	X	X	X	X	X	X	X	63.4	3.5	5.6	8	6.6	
67	Switzerland		X	X	X	X	X	X	48.8	6.3	12.9	7	14.7	
68	Taiwan			X	X	X	X	X	37.2	3.9	10.5	5	4.8	
69	Thailand				X	X	X	X	31.0	7.6	24.5	4	12.6	
70	T. and T.					X	X		3.5	0.3	8.6	2	-0.6	
71	Turkey			X	X	X	X	X	10.7	2.7	25.3	6	2.6	
72	Uganda				X	X	X	X	15.7	0.6	4.1	4	0	
73	UK	X	X	X	X	X	X	X	37.6	5.0	13.3	8	-4.4	
74	US	X	X	X	X	X	X	X	39.8	5.0	12.7	8	-3.8	
75	Uruguay			X	X	X	X	X	28.1	5.0	17.7	5	-6.9	
-	Observations	22	26	31	44	51	74	75	69	392	392	392	392	392
-	Average	38.2	39.5	37.9	31.7	29.6	27.8	28.8	28.6	27.9	3.8	15.6	5.2	0.7

Notes: T. and T.=Trinidad and Tobago.

Source: Unique dataset on trust, compiled by the author from publicly available international data.

## Appendix D. Additional Literature on Trust and Economic Performance

**Table D1.** Additional Literature on Trust and Alternative Measures of Economic Performance

Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Authors	Heliwell	LLSV	Whitely	DG	AOY	AC	Horváth	PT	AC	BM	James	LMK	MPT	Bjornskov
Year	1996	1997	2000	2009	2009	2010	2013	2013	2013	2015	2015	2018	2021	2022
Model specification of KF1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Panel Data	-	-	-	<b>Y</b>	-	-	-	<b>Y</b>	-	-	-	<b>Y</b>	<b>Y</b>	<b>Y</b>
Fixed-Effects	-	-	-	-	-	<b>Y</b>	-	-	-	-	-	-	<b>Y</b>	-
Number of Countries	17	40	34	51	46	24	46	80	52	67	81	61	23	64
Number of Observations	17	40	34	119	46	24	46	208	52	67	81	152	1376	477

Abbreviations: KF=Knack and Keefer, LLSV=La Porta et al., DG=Dearmon and Grier, AOY=Ahlerup et al., AC=Algan and Cahuc, PT=Peiró-Palomino and Tortosa-Ausina, AC=Algan and Cahuc, BM=Bjornskov and Meon, LMK=Lim et al., and MPT=Makrychoriti et al.

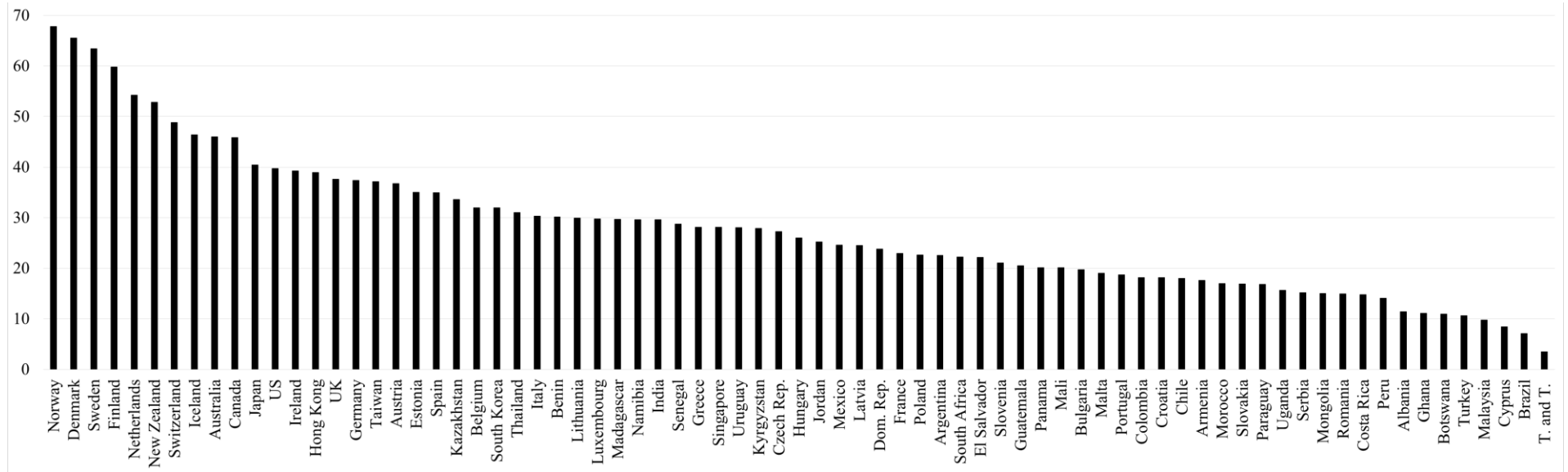
## Appendix E Descriptive Statistics

**Table E1.** Variable Definition, Source and Summary Statistics of Individual Waves, 1980-2019

Variable	Definition	Source	Year	Observations	Mean	Standard Dev.	Minimum	Maximum
Economic Growth	5 year growth rates of Real GDP per capita [Real GDP at constant 2017 national prices (in mil. 2017US\$) divided by population (in mil.)]	Penn World Table 10.0, Feenstra et al. (2015)	1981-1985	22	1.32	1.85	-2.14	6.74
			1986-1990	26	2.29	2.04	-2.79	7.38
			1991-1995	31	1.47	1.59	-0.81	5.68
			1996-2000	44	2.25	1.49	-1.96	6.91
			2001-2005	51	2.07	1.20	0.04	4.96
			2006-2010	74	1.23	1.77	-2.02	5.22
			2011-2015	75	1.62	1.69	-1.68	7.56
Trust	Dividing the number of participants who respond “Most people can be trusted” by the number of participants answering “Most people can be trusted” and “Can’t be too careful”	Integrated Value Survey, Latinobarómetro, Arabbarometer, Asianbarometer, Afrobarometer, Eurobarometer	1980	22	38.2	13.3	11.3	61.2
			1985	26	39.5	13.1	11.7	62.6
			1990	31	37.9	14.9	6.6	66.1
			1995	44	31.7	14.1	6.9	65.4
			2000	51	29.6	15.5	4.2	68.1
			2005	74	27.8	14.9	3.8	73.7
			2010	75	28.8	15.7	3.2	75.4
Trust, Squared	Squared Term of Trust	Integrated Value Survey, Latinobarómetro, Arabbarometer, Asianbarometer, Afrobarometer, Eurobarometer	1980	22	1626.8	1009.4	128.8	3750.5
			1985	26	1724.9	1073.2	136.4	3917.0
			1990	31	1648.3	1169.9	43.6	4369.4
			1995	44	1198.0	1030.7	47.8	4274.9
			2000	51	1111.8	1154.1	17.7	4644.3
			2005	74	990.0	1116.2	14.5	5432.0
			2010	75	1070.4	1206.9	10.4	5678.2
Income	Ln of Real GDP per capita	Penn World Table 10.0, Feenstra et al. (2015)	1980	22	9.99	0.45	8.60	10.52
			1985	26	10.10	0.45	8.99	10.90
			1990	31	10.07	0.70	7.50	11.01
			1995	44	9.86	0.77	7.65	11.03
			2000	51	9.83	1.00	6.82	11.25
			2005	74	9.74	0.99	7.04	11.35
			2010	75	9.85	0.94	7.38	11.36
Education	Denotes a measure based on years of schooling and returns to education	Penn World Table 10.0, Feenstra et al. (2015), Barro and Lee (2013)	1980	22	2.66	0.43	1.87	3.35
			1985	26	2.74	0.45	1.80	3.39
			1990	31	2.73	0.54	1.49	3.46
			1995	44	2.65	0.56	1.58	3.52
			2000	51	2.66	0.60	1.14	3.58
			2005	74	2.77	0.59	1.17	3.63
			2010	75	2.87	0.58	1.22	3.70
Price Level of Investment	Price level of capital formation (price level of USA GDP in 2017=1)	Penn World Table 10.0, Feenstra et al. (2015)	1980	22	44.14	13.67	28.07	89.31
			1985	26	38.25	13.91	21.96	98.22
			1990	31	63.00	17.28	30.28	111.87
			1995	44	61.67	22.81	31.35	152.31
			2000	51	51.38	18.13	24.61	128.42
			2005	74	57.56	20.29	28.08	100.41
			2010	75	64.25	20.56	33.90	125.31
2015	69	60.84	17.95	33.68	104.59			

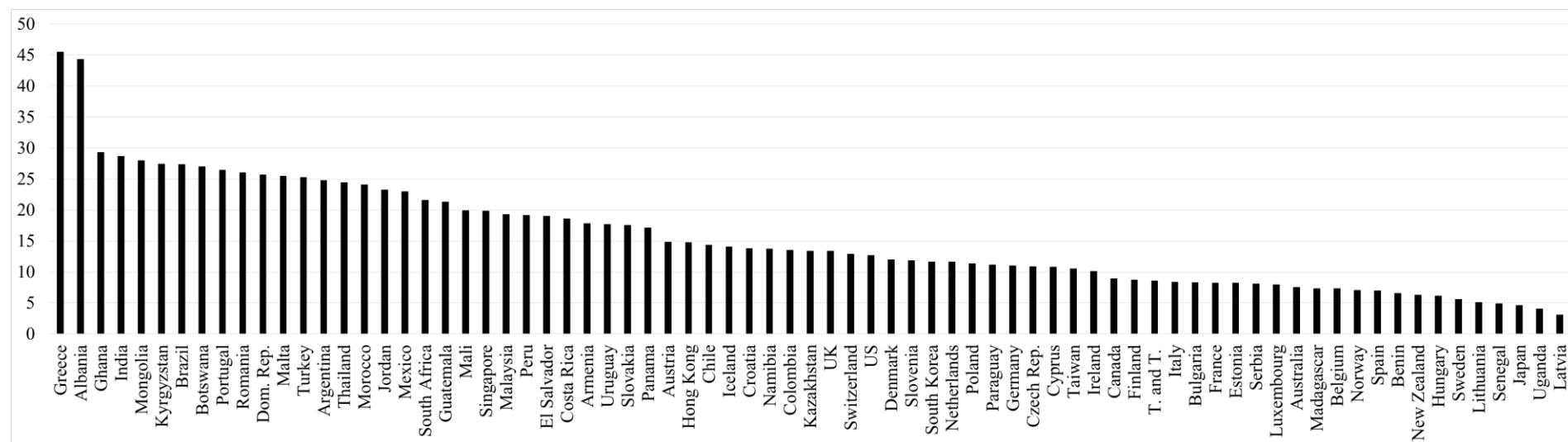
Notes: Dev. = Deviation. Sources: Unique dataset on trust, compiled by the author from publicly available international data and Penn World Tables (Feenstra et al., 2015).

**Figure E1.** Average Levels of Trust across 75 Market Economies, 1980 to 2015



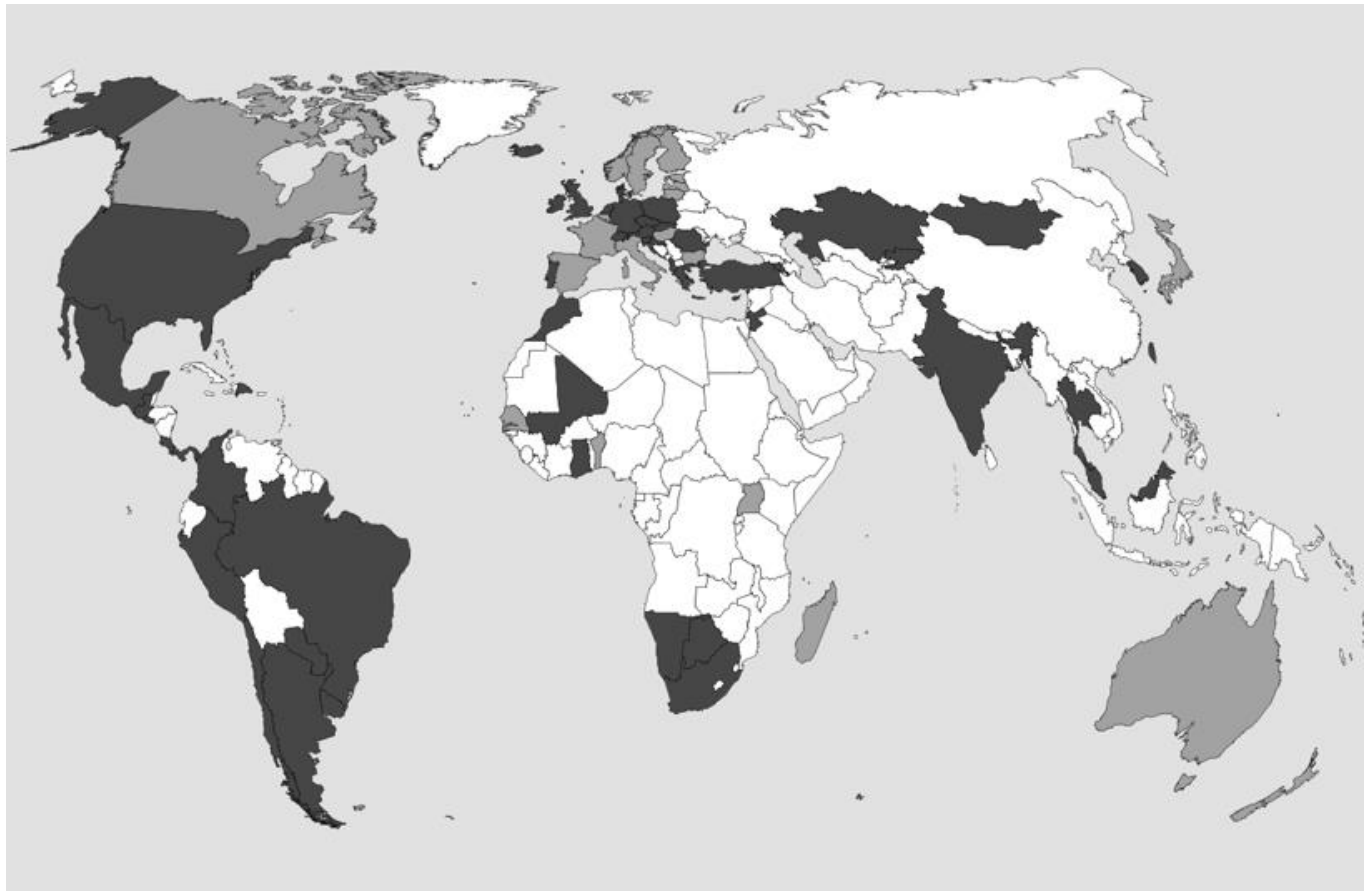
*Notes:* Trust values are given in percent. Average levels of trust range from 3.5 percent in Trinidad and Tobago to 68 percent in Norway. *Source:* Unique dataset on trust, compiled by the author from publicly available international data.

**Figure E2.** Coefficients of Variation for Trust in 75 Market Economies, 1980-2015



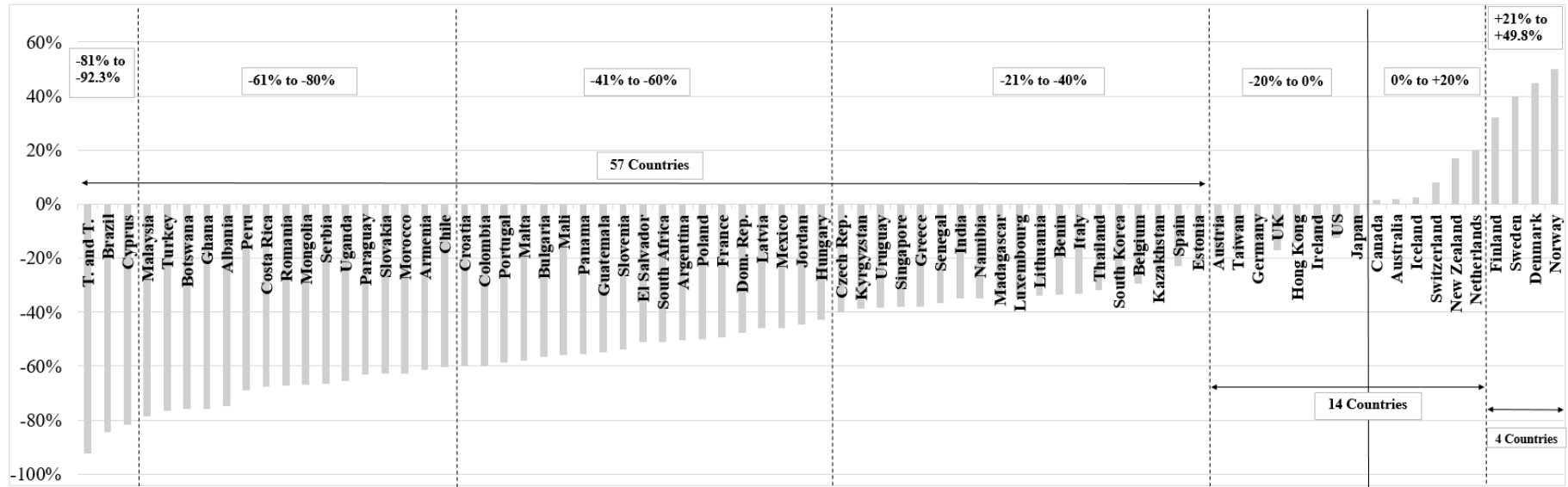
Notes: Cv-values of trust range from 3.1 percent in Latvia to 45.5 percent in Greece. Source: Unique dataset on trust, compiled by the author from publicly available international data.

**Figure E3.** Coefficients of Variation for Trust in 75 Market Economies, 1980-2015



*Notes:* Cv-values from 0 to 10 are depicted in light grey, and cv-values of larger than 10 are depicted in dark grey. *Source:* Unique dataset on trust, compiled by the author from publicly available international data.

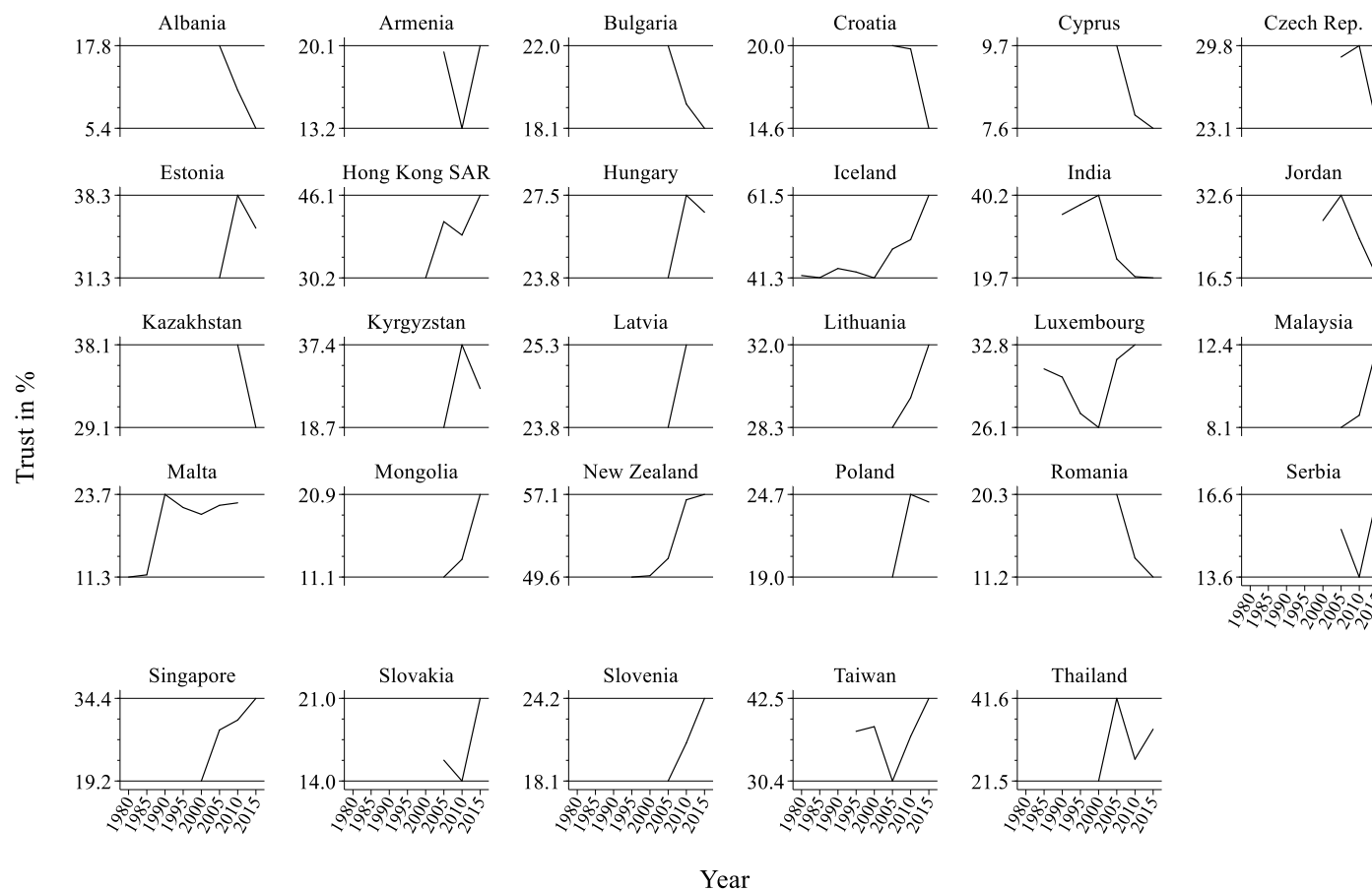
**Figure E4.** Trust Thresholds and Distance to the Optimum Levels of Trust in 75 Market Economies, 1980-2015



Notes: The solid line depicts the optimum trust value of 45.3 percent. The dashed lines represent trust thresholds of consecutive  $\pm 20$ -percent steps from the optimum trust value of 45.3 percent. Source: Unique dataset on trust, compiled by the author from publicly available international data.

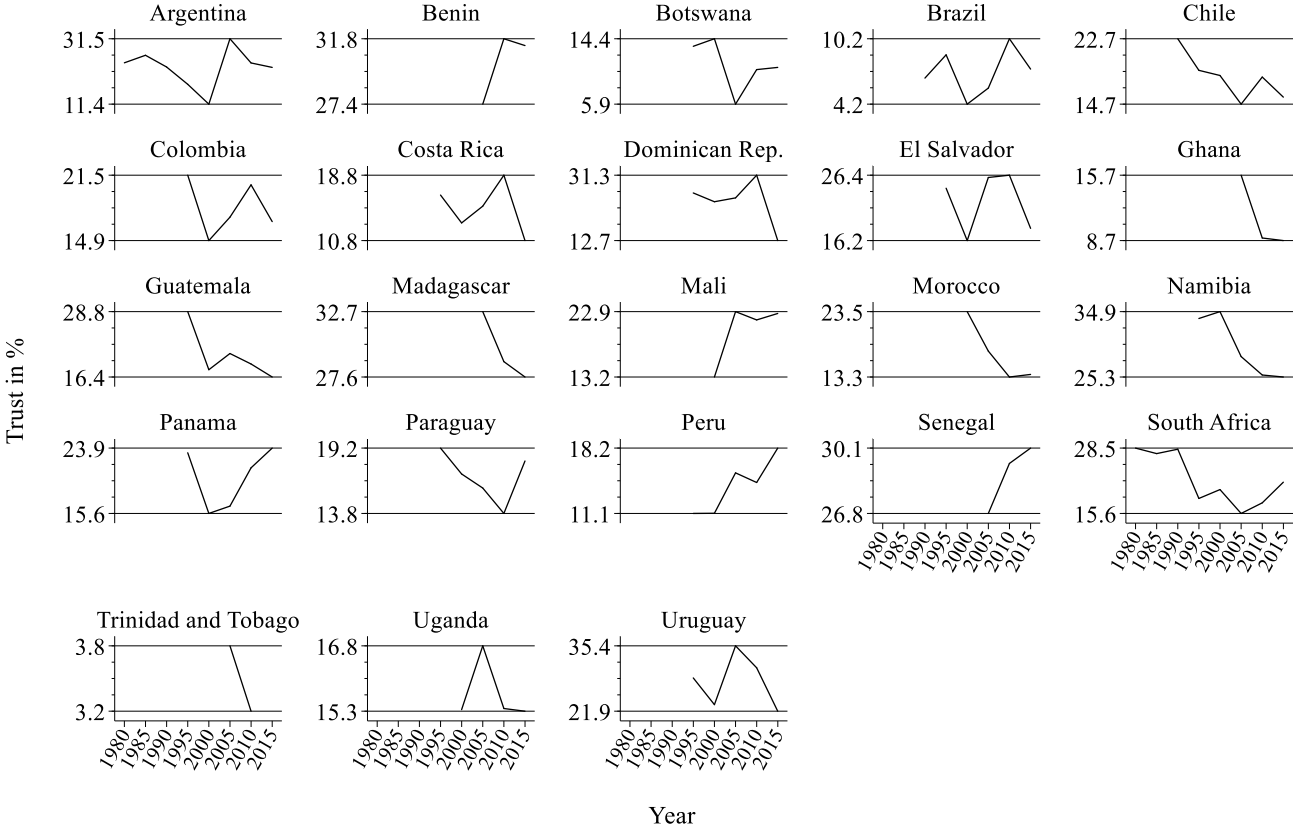


**Figure E5. Trust over Time by Country, in Europe, Asia, and Oceania, 1980-2015**



*Notes:* The Y-axis uses individual scales and depicts minimum and maximum values. *Source:* Unique dataset on trust, compiled by the author from publicly available international data.

**Figure E6.** Trust over Time in Countries across South and Central America, the Caribbean and Africa, 1980-2015



Notes: Y-axis uses individual scales and depicts minimum and maximum values. Source: Unique dataset on trust, compiled by the author from publicly available international data.

**Table E2.** Correlation Coefficients of Trust across Eight Individual Panel Waves

75 Countries with 392 Observations								
Year	1980	1985	1990	1995	2000	2005	2010	2015
1980	1.00 (22)	0.95 (22)	0.92 (22)	0.86 (22)	0.85 (22)	0.87 (22)	0.86 (22)	0.90 (19)
1985		1.00 (26)	0.92 (26)	0.87 (26)	0.86 (26)	0.85 (26)	0.85 (26)	0.82 (22)
1990			1.00 (31)	0.94 (31)	0.91 (31)	0.88 (31)	0.87 (31)	0.82 (27)
1995				1.00 (44)	0.97 (44)	0.94 (44)	0.94 (44)	0.90 (40)
2000					1.00 (51)	0.90 (51)	0.93 (51)	0.89 (47)
2005						1.00 (74)	0.95 (74)	0.92 (68)
2010							1.00 (75)	0.95 (69)
2015								1.00 (69)

29 European and Asian Countries with 108 Observations								
Year	1980	1985	1990	1995	2000	2005	2010	2015
1980	1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	i
1985		1.00 (3)	0.93 (3)	0.91 (3)	0.91 (3)	0.95 (3)	0.95 (3)	i
1990			1.00 (4)	0.98 (4)	0.93 (4)	0.83 (4)	0.73 (4)	1.00 (2)
1995				1.00 (6)	0.99 (6)	0.80 (6)	0.76 (6)	0.69 (4)
2000					1.00 (10)	0.52 (10)	0.67 (10)	0.49 (8)
2005						1.00 (28)	0.86 (28)	0.85 (25)
2010							1.00 (29)	0.91 (26)
2015								1.00 (26)

23 OECD Countries with 175 Observations								
Year	1980	1985	1990	1995	2000	2005	2010	2015
1980	1.00 (18)	0.93 (18)	0.91 (18)	0.85 (18)	0.83 (18)	0.88 (18)	0.85 (18)	0.90 (16)
1985		1.00 (21)	0.91 (21)	0.86 (21)	0.85 (21)	0.87 (21)	0.84 (21)	0.81 (19)
1990			1.00 (23)	0.92 (23)	0.88 (23)	0.87 (23)	0.85 (23)	0.79 (21)
1995				1.00 (23)	0.97 (23)	0.95 (23)	0.95 (23)	0.90 (21)
2000					1.00 (23)	0.96 (23)	0.97 (23)	0.93 (21)
2005						1.00 (23)	0.97 (23)	0.95 (21)
2010							1.00 (23)	0.97 (21)
2015								1.00 (21)

23 Central and South American and African countries with 109 Observations								
Year	1980	1985	1990	1995	2000	2005	2010	2015
1980	1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	-1.00 (2)	-1.00 (2)	-1.00 (2)
1985		1.00 (2)	1.00 (2)	1.00 (2)	1.00 (2)	-1.00 (2)	-1.00 (2)	-1.00 (2)
1990			1.00 (4)	0.96 (4)	0.92 (4)	0.58 (4)	0.75 (4)	0.91 (4)
1995				1.00 (15)	0.85 (15)	0.73 (15)	0.77 (15)	0.56 (15)
2000					1.00 (18)	0.51 (18)	0.50 (18)	0.42 (18)
2005						1.00 (23)	0.89 (23)	0.70 (22)
2010							1.00 (23)	0.72 (22)
2015								1.00 (22)

Notes: i = insufficient observations (only 1 observation). Source: Unique dataset on trust, compiled by the author from publicly available international data.

## Appendix F. Survey Questions on Trust

The precise wording used in the questionnaires on interpersonal trust varies slightly over the seven (i-v) international surveys examined in this study. The questions posed are reproduced below:

i+ii) Integrated Value Study (IVS) (Haerpfer et al. 2021 and EVS 2021) reads: “*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*”.

iii) Latinobarómetro (Latinobarómetro Data 2018) reads: “*Generally speaking, would you say that you can trust most people, or that you can never be too careful when dealing with others?*” from 1998 until 2018 and “*Generally speaking, would you say that people can be trusted or that you can't be too careful in dealing with people?*” from 1996 until 1997.

iv) Arabbarometer (Arabbarometer Data 2019) reads: “*Generally speaking, would you say that most people can be trusted?*” in wave 1 and “*Generally speaking, do you think most people are trustworthy or not?*” from wave 2 to 4. In wave 5, the question reads: “*Generally speaking, would you say that “Most people can be trusted” or “that you must be very careful in dealing with people”?*”.

v) Asianbarometer (Asianbarometer 2016) reads: “*General speaking, would you say that “Most people can be trusted” or “you can't be too careful in dealing with them”?*” in wave 1 and “*General speaking, would you say that “Most people can be trusted” or “that you must be very careful in dealing with people”?*” from waves 2 to 4.

vi) Afrobarometer (Afrobarometer Data 2015) reads: “*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?” in wave 1 and “*Generally speaking, would you say that most people can be trusted or that you must be very careful in dealing with people?*” in waves 3 and 5.*

vii) Eurobarometer (Rabier et al. 1986) reads: “*Generally speaking, would you say that most people could be trusted or that one could not be too careful in dealing with people?*” in wave 25.

Although the trust questions differ slightly across the various surveys, their content and meaning remain essentially the same.

## Appendix G. Overview of Country Sample

**Figure G1:** Overview of Country Sample for 75 Market Economies

75 Market Economies	
<b>23 OECD Economies</b>	
Australia	Austria
Belgium	Canada
Denmark	Finland
France	Germany
Greece	Ireland
Italy	Japan
Mexico	Netherlands
Norway	Portugal
South Korea	Spain
Sweden	Switzerland
Turkey	United Kingdom
United States	
<b>29 European, and Asian Economies and Oceania</b>	
<u>Europe</u>	
Cyprus	Iceland
Luxembourg	Malta
<u>Eastern Europe</u>	
Albania	Bulgaria
Croatia	Czech R.
Estonia	Hungary
Latvia	Lithuania
Poland	Romania
Serbia	Slovakia
Slovenia	
<u>Asia</u>	
Armenia	HongKong
India	Kazakhstan
Kyrgyzstan	Malaysia
Mongolia	Singapore
Taiwan	Thailand
Jordan	
<u>Oceania</u>	
New Zealand	
<b>23 South and Central American and African Economies</b>	
<u>Central America and the Caribbean</u>	
Costa Rica	Dominican Rep.
El Salvador	Guatemala
Panama	Trinidad & Tobago
<u>South America</u>	
Argentina	Brazil
Chile	Colombia
Paraguay	Peru
Uruguay	
<u>Africa</u>	
Benin	Botswana
Ghana	Madagascar
Mali	Morocco
Namibia	Senegal
South Africa	Uganda

Source: Unique dataset on trust, compiled by the author from publicly available international data.