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Can democracy and religiosity explain corruption?

An empirical study of cross-country data

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Abstract

The democracy-corruption and the religiosity-corruption relations are analyzed on cross country data. Both univariate relations are strong. Democracies are less corrupt, while religious countries are more corrupt. The relations are parts of a complex pattern, with long soft lags and much spuriousness due to the underlying long-run transitions in the three variables that explain most of the correlation. However, a even when controlled for the transitions a specific element with the said sign remains in both relations. The between-countries religiosity relation has a micro-macro problem, as the strong positive sign in the between-countries result is contradicted by the negative within-countries result from the literature. The paper explains these complications.

Jel: E26, K42, Z12

Keywords: Corruption, democracy indices, religiosity, transitions

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1. Introduction: Two relations between institutions

This paper studies two *key* relations: *Corruption-democracy* and *corruption-religiosity*. Both univariate relations are strong in cross county data. Democracies are less corrupt while religious countries are more corrupt.

Section 2 discusses theory and the large literature. Both relations have a *specific* and a *spurious* part, caused by the parallel transitions in the three variables. The transitions are analyzed in prior work taken for granted. The purpose of the paper is to isolate and analyze the specific parts of the strong univariate relations. Only the specific part may be causal. The paper studies the *macro between-countries* evidence that is dominated by the long run. A micro literature exists for the religiosity-corruption relation. It finds that the *micro within-countries* relation is negative. Sections 2.6 and 6.4 deal with this micro-macro contradiction.

Section 3 surveys the variables for corruption, democracy and religiosity. They are institutional indices, where measurement is debated and uncertain. The present take the indices for granted.

Economists like sharp and clear relations, but relations between institutions are different. Section 4.1 shows that the political system barely affects corruption in the perspective of a couple of decades.[2] Regime changes typically replace only a few hundred people. Everybody else keeps doing the same jobs in the same way. Deeper socio-economic changes that influence corruption take time. In the same way changes in religiosity are unlikely to have short-run effects on corruption. Thus, it is not surprising that both relations work with *long soft lags*.

Two data samples are used. The T-sample is large and representative, but it has no religiosity data. However, the corruption data are at most 24 years long, so the analysis assumes *equivalence*: Wide cross-country data tell the same story as long time series. Herby ample data are available for the study of the democracy-corruption relation. The W-sample has fine religiosity data, but it is much smaller and skewed; see Appendix B. This sample gives little power in the analysis of lags. The paper estimates as many relations as possible on both samples. Whenever results are available for both samples, they are similar. Thus, the skewness of the W-sample is not so bad as to give unreliable results.

To make sure that the results replicate a three-tier empirical strategy is used.[3] The descriptive analysis in section 4.2 and 3 shows the strength of the univariate relations, and that

[2] There may be a short run 'blip' due to changes of expectations, but it does not appear in the polls.

the series has a strong common factor giving the spuriousness of the relations. Section 5 reports kernel regressions yielding the functional forms of the univariate relations. Section 6 uses linear approximations. Finally, section 7 summarizes the sizes of the effects. It concludes that the specific elements in the relations are quite modest.

For easy reference Table 1 lists the variables and samples. Two democracy indices *P polity* and *V polyarchy* are used.[3] As the results for the two indices are similar the paper mostly reports results for *V* only. Religiosity is *R*, and corruption is *T*. The variable names are also used also for the relations: Thus, the two key relations are the (*T*, *P&V*) relation and the (*T*, *R*) relation. The transitions are *T*(*y*), *P&V*(*y*), and *R*(*y*), where *y* is income. Prior research shows that the main causal direction in the transitions is from *y* to the three institutional variables.

Appendix A reports the distributions of the first differences to the *T, P*, *V* and *R* indices, demonstrating the statistical problems when the relations are estimated, while Appendix B considers the representativity of the samples.

Table 1. Variables and samples

Variables	Definition (see references for the net sources)	Scale
T	***Corruption***, (10 – TI), where TI is Transparency International's index	[0, 10]
P&V	***Democracy***, two indices are used – given in percent of the original range [a)]	
P	Polity2 index, endpoints are frequently used, especially top	[0, 100]
V	Polyarchy from V-Dem project, endpoints are ideals, which are never reached	]0, 100[
R	***Religiosity***, average of 14 polled items in the WVS; see Paldam (2021a)	[0, 100]
	Church is the institution of a religion, *church* is a 'cult' building of the religion	
	gdp is the real GDP per capita in 2011 US $ from the Maddison project	
y	***Income,*** $y = \ln(gdp)$, where ln is the natural logarithm	[6, 11.5]
g	***Growth***, $g = gdp/gdp_{-1} - 1$	[-22.1, 34.5]
Samples	Divided in 4-5 periods following the World Values Surveys	*N*
T-sample	All observations for *T*, which has data for *P*, *V*, *y*, and *g*. 136 countries	2,610
W-sample	All polls from the WVS, which has data for *T*, *P*, *V*, *R*, *y*, and *g*. 90 countries	221
Periods	w3 1995-98, w4 1999-04, w5 2005-09, w6 2010-14, and w7 2015-18 incomplete	

The W-sample has one *R* observation for each country. The other variables are averages for as many observations as are available for the period of the wave. The observations of the T-sample are annual. Present and past OPEC countries plus Bahrain and Oman are excluded in the kernel regressions.

(a) The original scales for *Po* polity and *Vo* polyarchy are [-10, 10] and]0, 1[respectively. Thus, in percent polity becomes $P = 5(Po + 10)$ and polyarchy becomes $V = 100Vo$.

[3] Most calculations have also been made with the Freedom House democracy index. The results are typically between the ones reached with the *P* and *V* indices, so they are not reported.

2. Theory, methodology, and literature

Institutional variables as *T, P&V*, and *R* move slowly, and in different ways, see Appendix. Corruption data moves less than religiosity data. Democracy indices are constant most years, but then they jump. Still the long-run paths of the variables in the average country give neat transition curves as a function of income, see Paldam (2021a) and section 4.2.

2.1 Transition theory. The underlying skeleton of development

A transition is defined as the change from one steady state to another. The analysis of long run growth has identified two basic steady states: The traditional and the modern; see Maddison (2001) and Galor (2011). Development is the confluent transition of all(?) socio-economic variables – including institutional indices – between these steady states, and the best measure for the aggregate is income, $y = \ln gdp$, recall Table 1. Prior work has analyzed the transitions of corruption, democracy and religiosity, $T(y)$, $P\&V(y)$, and $R(y)$.[4]

Thus, transitions are the underlying skeleton of development. They have a distinct functional form  or  depending on the scale of the variables, where the horizontal axis is income. The form of the relations is non-linear, but still monotonous, so linear approximations tell most of the story. Transitions are overlaid with a great deal of other movement that in our perspective are specific. It is often a problem if it is the underlying transition or the specific overlaid movements that drives a relation.

The full transition takes 1-2 centuries, so it should be studied in *long* time series. Such series do not exist for corruption and religiosity. Instead, equivalence is assumed so that transitions are analyzed on *wide* cross-country samples that cover countries over a range of development. For variables where both long and wide data samples exist – such as the main democracy indices – equivalence holds. Thus, it is taken as the default.

2.2 Three mechanisms in the relations

Mechanisms (i) and (ii) are already mentioned, but (iii) is new:

(i) The *T*-, *P&V*-, and *R*-indices, for corruption, political regime, and religiosity all have

[4] Transition theory predicts that institutional indices have two topped distributions, with a low-income top for the traditional steady state and a high-income top for the modern steady state. All countries were in the traditional steady state before 1750, with very low growth. Then first a few and gradually more countries started to grow. Today about 45 countries have converged to about the same high-income level growing at 1½-2%. The gulf separating the two steady states has grown wide.

transitions that is a function of income. Consequently, a substantial part of the (*T*, *P&V*) and the (*T*, *R*) relations are spurious. Section 5 uses income to control for the transition.

(ii) Religions and political ideologies stresses ideals that always include honesty. This gives a micro, within-country, relation that will be discussed in sections 2.4 and 6.4.

(iii) Both political regimes and religions are run by organizations that demand loyalty and close ranks when criticized. It taints the whole organization if a loyal member is criticized for corruption. Hence, there is a strong urge within the organization to deal with such critique internally and in secret.[5] In addition, organizations have hierarchies, where the lower ranks should not criticize those above. If the top has become rich, many further down in the ranks may keep quiet, but perhaps they may also want to cash in. The higher degree of monopoly an organization has, the more it controls the flow of information and the easier it becomes for an insider to hide corruption. This model applies to both relations.

The (*T*, *P&V*) relation between corruption and democracy: An authoritarian regime is a power monopoly that tries to control its environment and demands loyalty. Thus, it is more likely that a whistleblower will be punished than the corrupt member of the organization. Conversely, democracies have a flatter power structure, with competing parties that love whistleblowers in other parties, and a free press that loves whistleblowers in general.

The (*T*, *R*) relation between corruption and religiosity: Here the mechanisms are much the same. The most religious countries typically have a strong monopoly Church that is integrated in the political regime. Churches often claim some holiness, and they surely close ranks when one member is criticized. Whistleblowers might even be seen as enemies of God.[6] Thus, secularization and the permission of competing religions increase honesty.

Both the democratization and the religious freedom is partly the result of a transition, but it is likely that the specific variation around the transition paths also matter for these mechanisms.

2.3 The size of the literature and the (T, P&V) relation between democracy and corruption

Table 2 reports the size of the literature. The size of the literature makes it necessary to limit the literature survey. The older literature on corruption is covered by large books of readings Heidenheimer et al. (1999) and Dutta and Aidt (2016). The 1,810 pages of the two books often

[5] The urge is strong to close ranks and deal with such problem behind closed doors. However, if the doors break open, it is a much larger problem than the original problem. But there is also the outside option of the system of police and courts. Thus, there is a game to be played. It will not be discussed at present.

[6] Gutmann (2015) studies corruption within Churches and confirm that monopoly increases corruption.

mention the effect of democracy and a few times the effect of religion but contains no paper that concentrates on the two key relations.

Table 2. Hits in millions from searches in Google and Google Scholar

Search term	Google Hits	Scholar Hits
Corruption and democracy (*T*, *P&V*)	84	2
Corruption and religion	59	1.6
Corruption and religiosity (*T*, *R*)	59	0.2

The searches took place in July 2024.

The *(T, P&V)* literature is macro cross-country as countries (normally) have only one political system. Thus, within-country analyses require a special perspective to make sense. The papers on democracy and corruption all agree that there is a clear negative connection.[7] The research has proceeded to study three main subjects:

(i) The strength of the relation. Here the spectrum of findings is quite wide, as it depends upon the mediating variables. Compare here Kolstad and Wiig (2016) finding a large effect, even in poor countries, and Rock (2009) finding a more moderate one depending on the consolidation of democracy.

(ii) Is it possible to find an extra factor that makes democracy more powerful in reducing corruption. One such factor is freedom of the press, see e.g., Kalenborn and Lessmann (2013). Another is strong competition as was already proposed by Ades and Di Tella (1999). However, these variables are strongly correlated. Both extra factors are measures of the possibility of critique of corrupt practices. This surely matters for the reduction of corruption.

(iii) Is the relation linear? This is analyzed using a quadratic functional form since Montinola and Jackman (2002). Sung (2004) even found that a cubic form works the best. However, most latter work has used the quadratic form; see e.g., Jetter, et al (2015), McMann et al. (2020). The analysis below shows the relation is indeed non-linear but not quadratic.

As far as I have read the literature nobody uses the transition framework to separate the spurious long-run part of the relation and the specific part though many papers control for income.

[7] The first cross country studies were independent Treisman (2002), Montinola and Jackman (2002), and Paldam (2003). Two earlier cross-country studies concentrated on the effect of corruption on development; see Mauro (1995) and Ades and Di Tello (1999). One of the key factors in the large expansion of the literature has been the appearance of Transparency International's index that started publication in 1996, covering 1995 for 41 countries.

2.4 The (T, R) relation between religiosity and corruption and the micro-macro problem

Due to the poor availability of cross-country religiosity data most studies are within-country micro studies. The few macro studies use the World Values Study data, which are also used below. The studies typically use one or two items from one wave of the WVS as their measure of religiosity, see e.g., Gokcekus and Ecki (2020). They find positive results like the present.

The micro-studies analyze if religiosity influences peoples' norms when they are in *morally gray* situations, such as when giving a bribe may give an economic gain. A fine survey of the theory and findings about norm formation is Voigt (2023, 2024), It point to religion as an important factor.[8] The classical papers are Guiso et al (2003), Atkinson and Bourrat (2011), Shariff and Nerenzavan (2011), and Shariff and Remtulla (2012). A couple of later studies such as Flavin and Ledet (2013) and Gouda et al (2015) find no effect or a modest one.

Thus, strong religion may increase peoples' propensity to act morally, especially when they believe that they may otherwise go to hell. The evidence is of two kinds. (i) Studies of polls asking people about their behavior in such situations, and (ii) lab experiments where the players are put in hypothetical gray situations where they may choose to behave morally. However, it is cheap to be moral in polls and lab experiments so maybe the results exaggerate.

The *R*-measure used below gives the fraction of people that claim to be strongly religious, and thus countries with a high R-score should be less corrupt, i.e., the correlation should be negative. But it is positive, even when the relation is controlled for income. The micro-macro problem is analyzed in section 6.6.

2.5 Methodology and likely priors

All social sciences are increasingly aware that they/we have a replication problem. Researchers are human with priors and interests like everybody else. The classical research strategy (theory/model/regression) is so flexible that it permits a wide range of results. Research projects require choices, notably about the inclusions of ad hoc control variables. The choices affect results, and it is often doable for researchers to confirm their priors. When such results are due to overfitting, they do not replicate.[9]

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[8] The same applies to political ideologies such as communism and nazism. Both claimed that the true member was a very moral person. They may do terrible things for the party/country, but not for personal gain. Though, of course, the power monopoly the ideologies created when they ruled served as a fine cover for corruption.

[9] In November 2023 Google scholar gave 600,000 hits to *replication crisis* in the social sciences. Two studies summarize 159 meta-studies in different fields in economics. They show that publication biases in the form of exaggeration are common, see Ioannidis et al. (2017) and Doucouliagos et al. (2018). Paldam (2018, 2021b) demonstrates that if researchers behave as predicted by economic theory, this is precisely as expected.

The development of computers, analytical programs and net sources of data has made the classical method more common as experiments with model variants has become easier. Consequently datamining/overfitting has become more common in economics, and replications often produce smaller results than the original paper. The priors expected are:

(*T, P&V*) relation: A large majority in the west that dominates research believes that democracy is the best political system. In many LDCs people have few experiences with democracy, and perhaps it makes little sense for people in a village far from the capital. To convince people that democracy is good for them, it has often been claimed that it comes with a premium. The literature discusses two premiums: A growth premium and a corruption (reduction) premium. The growth premium is at most marginal and appears with a long lag, see Paldam (2024a). The analysis below does find a corruption premium, but it is small and occurs in high end of middle-income countries. Thus, democracy should be preferred because it is good in itself.

(*T*, *R*) relation: The discussion deals with the sign of the relation. Think of two discussants: He is religious, and she is irreligious. He claims that religion is a force for the good, so increasing religiosity should lead to less corruption, i.e., the (*T*, *R*) correlation is negative. She claims that there is no connection, or she may even suspect that the connection goes the other way, so that the correlation is zero or positive. The claims can be expressed as a disagreement about hypocrisy. Both agree that hypocrisy exists, but he claims that even when the motives why people behave well may be impure, the key point is that they do. She claims that religiosity may serve as an excuse for behaving badly.[10] It is nice that his priors are confirmed by the micro within-country results, while hers are confirmed by the macro between-country results, which however are stronger in the long run.

This paper is about replicable results. Datasets are as large as possible, and control variables are limited and strongly justified, so that ad hoc controls do not appear.

[10] She may recall Blaise Pascal's words: "Men never do evil so completely and cheerfully as when they do it from religious conviction." Pascal (1623-62) was a French mathematician and writer. He was deeply religious, but he lived most of his life during the Thirty Years' War, so he knew that the relation of moral and religion is complex.

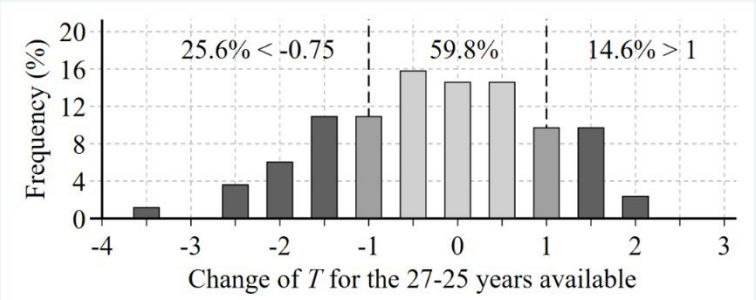
3. Variables and samples

This section explains Table 1 in more detail.

T is corruption $T = 10 - TI$, where TI is Transparency International's corruption index, which is an honesty index. The index started in 1995, with data for 41 countries. The number of countries has grown over time, and 188 countries are covered for at least one year.

Transparency International's index aggregate of a dozen indies after a calibration to the same scale, and thus the changes are difficult to interpretate.[11] In addition, the index changes little as seen in Figure 1. In 59.8% of the countries the change is by less than one T unit for the quarter century. See also Figure A1 (Appendix) for the annual changes.

Figure 1. Changes in corruption, T, over 25-27 years



The changes over the full period for the 82 countries, where the index exists for 25-27 consecutive years. The bins are 0.5 wide, and thus the bin for 0 is [-0.25, 0.25]. Recall that the T-index has a range of [0, 10]. Thus, the first difference has a potential range of [-10, 10], but it only uses [-3.3, 2.1].

P and ***V*** are democracy indices. It is often discussed which one is the best. Fortunately, they give similar results, and most relations will be illustrated with just one index. The two democracy indices are converted into a percentage scale, relative to their ranges. The indices are available for 155 countries. Figures A2 and A3 (Appendix) show that in about 90% of the years, they are constant. And, when the spell distribution is calculated they are about 10 years on average. All political regimes try to consolidate, and thus, the indices are in a status quo equilibrium. At the two ends they are in steady state equilibrium. The difference is that if an equilibrium is broken by a triggering event, the index does not return to its old value if it is a status quo equilibrium, but it does return if it a steady state equilibrium.

[11] The way the index is compiled changed (a little?) in 2012. How important the change is discussed by Grinder and Potrafke (2019) and Paldam (2020). At present the change is disregarded.

R is religiosity. It is a measure of the *intensity* of (any) religion. It is defined as the importance of religion in all aspects of life. It is a subjective variable that must be polled. To get as close to the definition as possible, *R* is based on a factor analysis of 14 items that cover different aspects of religiosity in the World Values Survey. The WVS comes in 5-year waves, where four are available since the *T* data started in 1995.

y is income, and ***g*** is growth. Both are calculated from the *gdp*, which is real GDP per capita in PPP prices, from the Maddison Project.

Transparency International's Corruption perception TI-data starts in 1995, and in the beginning only 41 countries were covered. The data measure the absence of corruption. Hence the paper uses $T = 10 - TI$. Thus, both samples are limited to start in 1995.

The ***T-sample*** covers six variables, for $N = 2{,}610$ from 137 countries – it misses religiosity. The T-sample is divided into periods corresponding to the waves of the W-sample. The periods are used to test the stability/robustness of relations, by reporting Av(w) and Std(w) that are the average results and standard deviations for the pour waves/periods.

The ***W-sample*** is further limited by the available polls of the WVS, which come in waves. Only four waves are available after 1995 (w3, w4, w5, and w6). The W-sample covers all seven variables for $N = 240$ polls. When the OPEC group is excluded, N becomes 221.

Table B1 in Appendix B shows the distribution of the country groups and the number of observations in the periods/waves. Both samples start with too many DCs (developed countries). While the T-sample quickly grows to 180 countries, the W-sample stays with a changing sample of about 60 countries.[12] The T-sample is 11 times larger and representative except for period (1). The W-sample should ideally replicate the results from the T-sample. The replication is good but not perfect. This suggests that the W-sample can be used with some care. When possible, the T-sample is used for calibration.

The WVS waves vary, and are never representative, not even in the *All* column. This gives a problem and an opportunity: One should be worried if the results reached fail to generalize, but when results are similar across the waves, it is a strong sign that the results are general! For both samples the first two periods/waves are the narrowest, making it difficult to catch the transition.

[12] It is difficult to finance large cross-country polls, so the VWS is selective, and each wave concentrates on country groups that are especially interesting in the period of the wave.

4. Correlations within and between countries

The data for variable x comes as a panel (x, t, i), where t is (at most) 24 years, and i is 136 countries. Section 4.1 shows that twenty-four years is too short to give strong relations. To catch the long run the data are unified by stacking so that the panel for the x variable becomes the (j, x) vector, where $j = ti$. The vector has no natural order, but it is ordered by the analyses made. Given that the panel includes a wide selection of countries and equivalence holds unified data represents the long run. Sections 4.2 shows that the relations are strong in the long run.

4.1 Within countries: averages of correlations for the individual countries

Table 3 show averages of correlation for the individual countries for the corruption democracy relation, where the cross-country relation is large and negative as shown in section 4.2. The averages are small and have variable signs. When they are sorted by the number of observations in the country there are no significant trends. The P observations are constant for many countries – notably western – where P is 100. In these countries the V index have small oscillations that may be random, but the average correlation falls when it is made for the countries where P is constant. This suggests that 24 years are too few to obtain a relation between the variables.

Figure 2 analyze if the is a relation with a lag. For 71 countries more than 20 consecutive annual observations are available for V and T.[13] For these countries the correlograms with 10 lags to either side is calculated. Figure 2 shows the average of the 71 correlograms calculated for both the levels and the first differences of the variables. The figure shows that none of these correlations are significant. Thus, a political system change has little effect in the short run. The large correlations reported in Tables 4 and 5 are due to the long run.

Table 3. Averages for (T, $P\&V$) correlations within countries

Correlation	(1) All countries	(2) T and V Same as for P	(3) Non western	(4) T and P All where P is not constant
N	136	78	113	78
Average	0.019	0.005	-0.006	-0.054
2 se	0.003	0.001	0.001	-0.012

[13] Seven missing observations are interpolated are to get the data set used. The P index is constant for more than half of the countries, so only the (T, V) correlogram is presented. The data does not allow a calculation for the religiosity-corruption relation.

Figure 2. Average correlogram for 71 countries of the (*T*, *V*) democracy-corruption relation

Figure 2a. Level variables *T*, *V*.

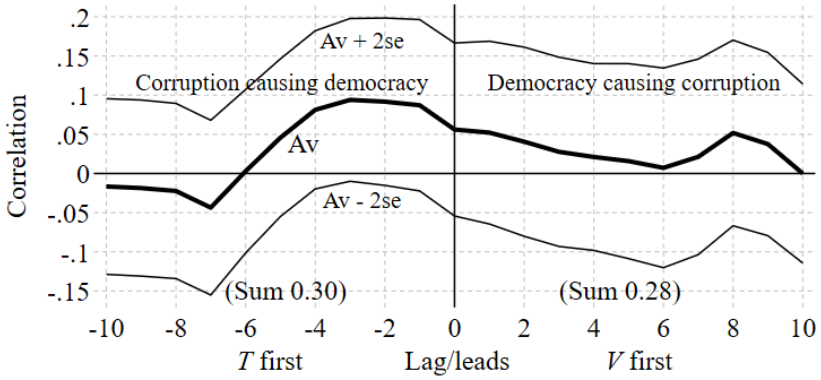
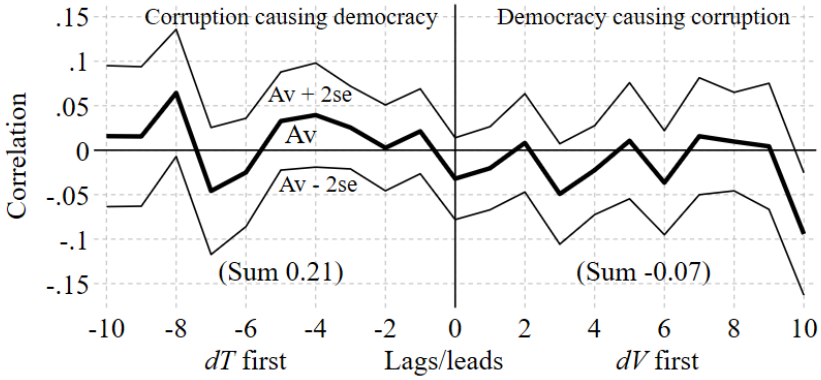


Figure 2b. First difference variables *dT*, *dV*



4.2 Between countries: The unified data

Table 4 reports the basic correlations for the two key relations are calculated for the unified data with both the normal Pearson's r and Spearman's rank correlation ρ.[14] In Table 4a for the (*T*, *P&V*) relation Spearman's ρ is larger, especially for *P* reflecting the two topped distribution of the *P&V* indices. In Table 4b for the (*T, R*) relation the two correlations give similar results, so the distributions of the variables are of minor importance.

Table 4. Univariate correlations. Key relations

Table 4a. Democracy and corruption

	T-sample, *N* = 2,610			W-sample, *N* = 221		
	All	Av(w)	Std(w)	All	Av(w)	Std(w)
r(*T*, *P*)	-0.49	-0.48	0.04	-0.47	-0.47	0.03
ρ(*T*, *P*)	-0.69	-0.69	0.02	-0.72	-0.1	0.06
r(*T*, *V*)	-0.68	-0.67	0.06	-0.64	-0.65	0.01
ρ(*T*, *V*)	-0.74	-0.73	0.04	-0.75	-0.74	0.05

[14] If the distributions are normal, ρ → r as *N* rises, so if ρ ≠ r even when *N* is large, it is a sign that the distributions are non-normal and then ρ is preferable. None of the four variables are normally distributed: The most non-normal are the democracy indices that are two-topped. The probit diagrams for the variables are available from the author.

Table 4b. Religiosity and corruption

	W-sample, $N = 221$		
	All	Av(w)	Std(w)
r(T, R)	0.50	0.50	0.06
ρ(T, R)	0.49	0.48	0.04

P is polity, *V* is polyarchy, *T* is corruption, *R* is religiosity, Av(w) is the average and Std(w) is the standard deviation of the correlations for 4 waves. Pearson's correlation is r(), while Spearman's is ρ().

The Av(w) columns in the table are almost the same as the All columns, indicating that the correlations are stable across periods/waves. The Std(w) columns (with gray shading) show that the four waves give approximately the same results in nearly all cases. This robustness result carries over to Table 5, that shows the correlations that contain the transitions.[15] This shows that sample skewness is a minor problem for the two key relations.

The largest of the seven correlations in the two tables are for the (T, y) transition, while the (T, P) relations are much like the (T, y) transition, and so are the (T, P) relations and the (T, y) transition. In the two tables the sum of the numerical values of the correlations to T from $P\&V$, R, and y is about two, indicating a great deal of double counting.

Table 5. Univariate correlations. Transition relations

Table 5a. Democracy, corruption, and income

	T-sample, $N = 2{,}610$			W-sample, $N = 221$		
	All	Av(w)	Std(w)	All	Av(w)	Std(w)
r(T, y)	-0.77	-0.77	0.02	-0.78	-0.78	0.06
ρ(T, y)	-0.80	-0.80	0.03	-0.84	-0.83	0.06
r(P, y)	0.45	0.46	0.06	0.51	0.51	**0.13**
ρ(P, y)	0.66	0.67	0.04	0.71	0.71	**0.11**
r(V, y)	0.62	0.63	0.03	0.63	0.65	**0.10**
ρ(V, y)	0.68	0.68	0.03	0.70	0.71	**0.10**

Table 5b. Religiosity and income

	W-sample, $N = 221$		
	All	Av(w)	Std(w)
r(R, y)	-0.57	-0.58	0.04
ρ(R, y)	-0.59	-0.60	0.06

See note to Table 4. The bolded Std(w) are larger than 0.1.

[15] The largest Std(w) are found for the (P, y) and (V, y) correlation for the W sample, but the *all* correlations are the same even in this case for the two samples. Table 5 has also been made replacing y income with g, growth. It is available from the author. It finds a small positive correlation from growth to religiosity contrary to Wiseman and Young (2014). In addition, it should be mentioned that the corruption data has strong autocorrelation. The AR(1) is about 0.8, and AR(n) ≈ AR(1)^n for the first seven ns. Some of this autocorrelation is an artefact due to the calibration used in the compilation of the index. Thus, the true autocorrelation is hard to know.

4.3 Factor analysis: The unified samples

The factor analysis in Table 6 adds a crucial point to the correlation analysis. Both samples have one and only one common factor, and it is the same factor. All variables except the growth rate load strongly to factor1. Factor2 has a low eigenvalue and should be disregarded. Note that the cumulative explanation from factor1 is 0.9 in both samples.

Table 6. Factor analyses of the two samples

	T-sample $N = 2{,}610$		W-sample $N = 221$	
	Factor1	Factor2	Factor1	Factor2
Eigenvalue	2.70	0.44	3.02	0.64
Cumulative	0.92	1.07	0.88	1.06
	Factor loadings		Factor loadings	
T, Corruption	-0.79	0.33	-0.80	0.28
P, Polity	0.80	0.41	0.78	0.49
V, Polyarchy	0.93	0.21	0.90	0.31
R, religiosity	Not available		-0.51	0.38
y, income	0.74	-0.35	0.82	-0.30
g, growth	-0.11	-0.04	-0.22	0.01

It follows from the table that the two *P&V*-variables (democracy) tell the same story, and that the growth rate does not matter for factor1. The variables that matter for factor1 (*T*, *P*, *V*, and *y*) have almost the same loadings for the two samples. Thus, it is likely that if the *R*-variable had been available for the T-sample it would have been close to -0.51, and that it would have increased the eigenvalue. As mentioned, the common factor is the transition in the four first variables, *T*(*y*), *P*(*y*), *V*(*y*), and *R*(*y*). Section 6.4 shows that the sum of the common contribution of the variables is about two thirds of the total one. This is a major reason why overfitting generates non-replicable results.

4.4 Income dimension: For T corruption, P&V democracy, and R religiosity

Until now the samples over an income span of 5 logarithmic points. This is an income difference of 148 times. The tables showed that the results are robust to time periods/waves.

In contrast Table 7 shows that results are sensitive to the income span when it is divided into 2, 5, 10 and 20 parts.

Table 7. Variations in the income span

Table 7a. Key relations: Corruption-democracy and corruption-religiosity

	For Table 6a and b			(*T*, *P&V*) correlation				(*T*, *R*) corr.	
	Parted	Income span		T-sample		W-sample		W-sample	
Row	into	Lp	Times	r	ρ	r	ρ	r	ρ
1	1	5	148	-0.54	-0.72	-0.57	-0.71	0.50	0.49
2	2	2.5	12	-0.40	-0.49	-0.44	-0.44	0.19	0.17
3	5	1	2.7	-0.29	-0.36	-0.25	-0.32	0.04	-0.03
4	10	0.5	1.6	-0.26	-0.33	-0.17	-0.30	0.03	-0.01
5	20	0.25	1.3	-0.26	-0.33	-0.26	-0.31	0.00	-0.01

Table 7b. Transition relations

	(*T, y*) correlation				(*P&V, y*) correlation				(*R, y*) cor.	
	T-sample		W-sample		T-sample		W-sample		W-sample	
Row	r	ρ	r	ρ	r	ρ	r	ρ	r	ρ
1	-0.77	-0.80	-0.78	-0.84	0.54	0.67	0.57	0.70	-0.57	-0.58
2	-0.58	-0.59	-0.59	-0.63	0.26	0.38	0.32	0.41	-0.31	-0.33
3	-0.31	-0.31	-0.23	-0.21	0.12	0.20	0.02	0.04	-0.18	-0.14
4	-0.15	-0.14	-0.11	-0.04	0.06	0.11	-0.08	-0.05	-0.04	-0.04
5	-0.11	-0.10	0.04	0.04	0.04	0.05	-0.01	-0.02	0.01	0.00

As before r is Pearson's coefficient of correlation, while ρ is Spearman's rank correlation. First row, starting with 1, are the same as in Tables 4 and 5 for all $N = 2{,}610$ and 221 for the two samples. Here the difference between the poorest and richest country is 5 Lp, logarithmic points, which is 148 times. Second row, starting with 2, divide the samples by two, so Part 1 is the data with the smallest 1,305 incomes for T or 110 for W, and Part 2 are the data with the largest income. In the third row starting by 5 the sorted samples are divided into 5 parts etc. Each row gives the average correlation for the parts.

Row 1 in the table is the same results as in Tables 4 and 5, but in the following rows, when shorter and shorter income spans are considered, the average correlations fall. Table 6a show the fall for the two key relations. Half of the corruption-democracy relation disappears, while all of the corruption-religiosity relations vanish, and so do the four transitions in Table 7b. To analyze transitions, require wide samples.

5. Kernel regressions: The functional form of the relations

A fine way to find general patterns – such as transitions – in the data, is to estimate kernel regressions on large unifying datasets. The kernel $x = x(y)$ is written $x = K^x(y, bw)$.[16] It is a smoothed moving average of the x-data sorted by y with a fixed bandwidth *bw.* The kernel moves in a predictable way to variations of the *bw*, so that it is easy to see when the *bw* is too small or too large. There is often a substantial *bw*-range where the kernel-curve is stable. It is surrounded with 95% confidence intervals. When they are narrow, the unification of the data is justified as there is a common pattern.

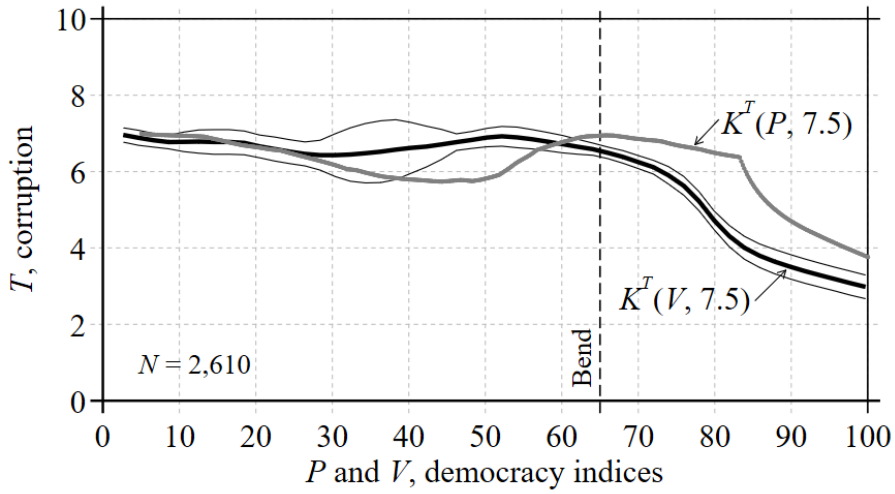
The scatter is shown as hollow gray circles. For the western countries the middle of the circle has a black dot. Some outliers are indicated by filled in gray circles. OPEC countries are the grey diamonds on Figures 3b, 4, 5b, and 7. They are not used in the estimate of the kernels. Thus, the kernel-curves estimated on the W-sample uses only 221 observations.

5.1 The univariate relations: (T, P&V) and (T, R)

Figure 3 reports the path of the (*T*, *P&V*) relation from democracy to corruption. It is flat from 0 to 65 and then the three curves bend down quite fast. At the end it starts flattening once again. This is like how Figure 5 looks – suggesting a spurious part of the (*T*, *P&V*) relation.

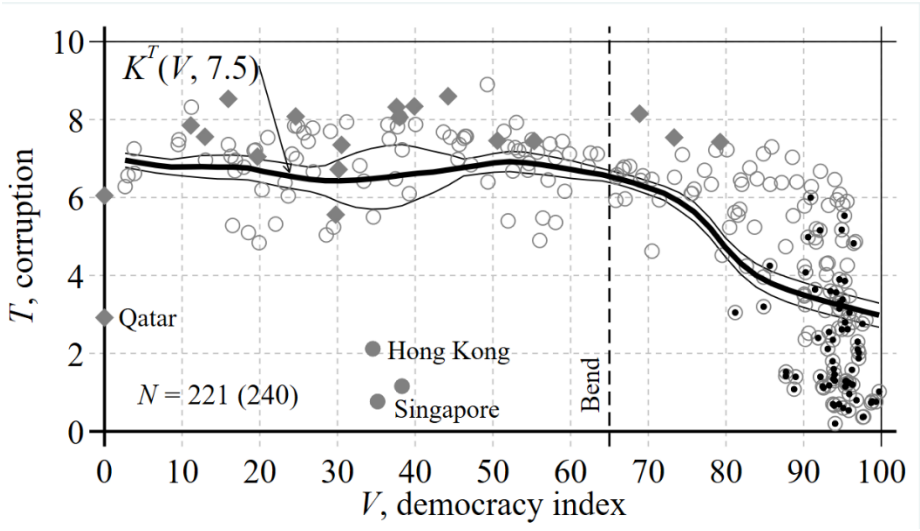
Figure 3. (*T*, *P&V*) corruption-democracy relation

Figure 3a. T-sample. (*T*, *P*) and (*T*, *V*) relations



[16] The technique of using kernel regressions on unified data is discussed in Paldam (2021a, 2024a). The unification of the (2, n) panel generate a (2n) vector. The elements in the vector has no natural order, but they are ordered by the explanatory variable in the kernel regression, i.e., $x = K^x(y, bw)$ order the data by y.

Figure 3b. W-sample. (*T*, *V*) relation, like the black curve in Figure 3a



The 95% confidence intervals are given for the $K^V(y, 0.4)$ curves. They are similar for the $K^P(y, 0.4)$ curves.

The graphs for (*T*, *P&V*) on the two samples are similar so once again the two samples tell the same story. Democracy has no connection to corruption in low- and middle-income countries, but at high levels of democracy there is a strong connection, which may be largely spurious.

Figures 3b, 4, 5b and 7 singles out two country groups. They give a consistent pattern: (i) Western countries have both low corruption, low religiosity, and high democracy. On closer inspection the most extreme countries in these respects are from NW-Europe, i.e., the 5 Nordic countries, Germany, and the Netherlands. From all we know, these countries had both high corruption, high religiosity and no democracy two centuries ago, and the countries in the group are one of the first country groups that went through the grand transition and became high income countries. Australia, Canada, New Zealand, and the UK stick out in the same way, and so do Singapore.

(ii) OPEC countries deviate by combining high corruption, high religiosity, and little democracy. They have acquired substantial wealth without all the deep changes in society normally associated with development, and in addition they have a strong Muslim culture that does not see democracy as an ideal.[17] As the high level of authoritarianism does increase corruption, the OPEC countries are relatively corrupt.

[17] Paldam (2024c) tries to sort out the importance of oil wealth and Muslim culture in the missing democratic transition in the OPEC countries. Both factors are shown to count, but while it is easy to explain why oil wealth in an authoritarian kingdom strengthen the king, it is not so easy to explain why the Muslim culture, especially in the core Arab countries do create resistance to democracy.

Figure 4. (*T, R*) corruption-religiosity relation

Figure 4a. W-sample. (*T*, *R*) relation

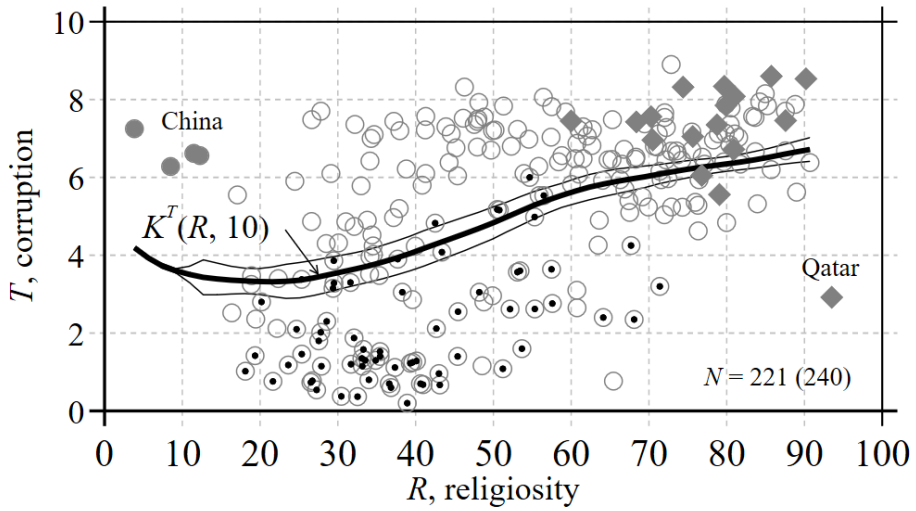


Figure 4 turns to the univariate (*T*, *R*) relation between religiosity and corruption. It is almost a straight line with a positive slope. It is obvious that most of the positive slope is due to the western countries. In addition, it looks a great deal like the transition curve on Figure 7 below, given the slopes of the relations.

5.2 The transitions in corruption, democracy, and religiosity

The three transition curves are analyzed in more detail elsewhere.[18] At present the key point is if the two samples give the same picture, and how they may affect the two institutional relations on Figures 3 and 4.

The estimates for the periods behind Table 5 revealed that the W-sample is thin for the poorest countries which is $y < 8$, so with a $bw = 0.4$ the Kernel-curve is only reliable from $y =$ 8.2-8.4. Still, the curves are virtually the same for the two samples. On Figure 5a the 95% confidence intervals are so narrow that they are difficult to see.

Two observations from Figure 5 add to the discussion of the effects of democracy and religiosity: (1) The transition of corruption is late. The strong fall in the corruption index happens in the income interval [9.7, 10.75]. (2) The countries of the west that have been relatively wealthy for more than a century have low corruption.

[18] The three transitions are analyzed in chapters 10, 4 and 11 of Paldam (2021a), which shows the great robustness of the curves, and that the main causal direction is from income to the three institutional variables.

Figure 5. The transition of corruption

Figure 5a. T-sample. $T(y)$ transition

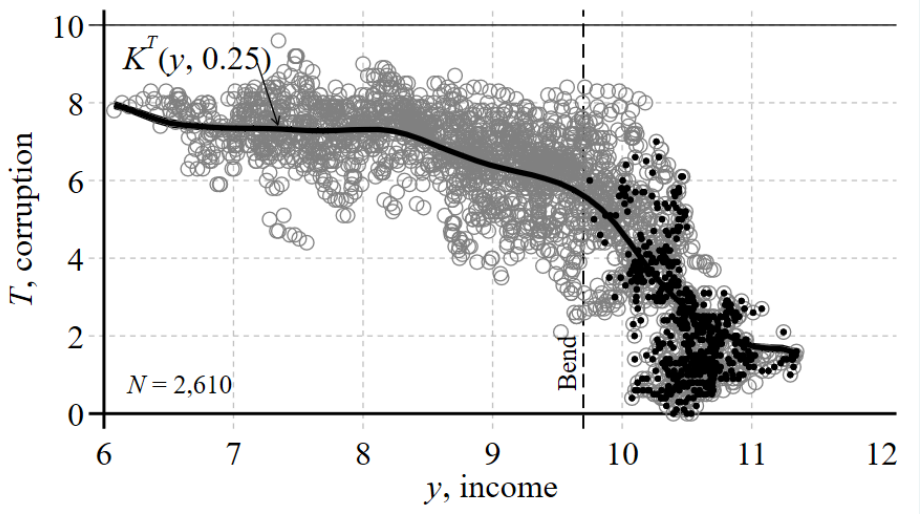
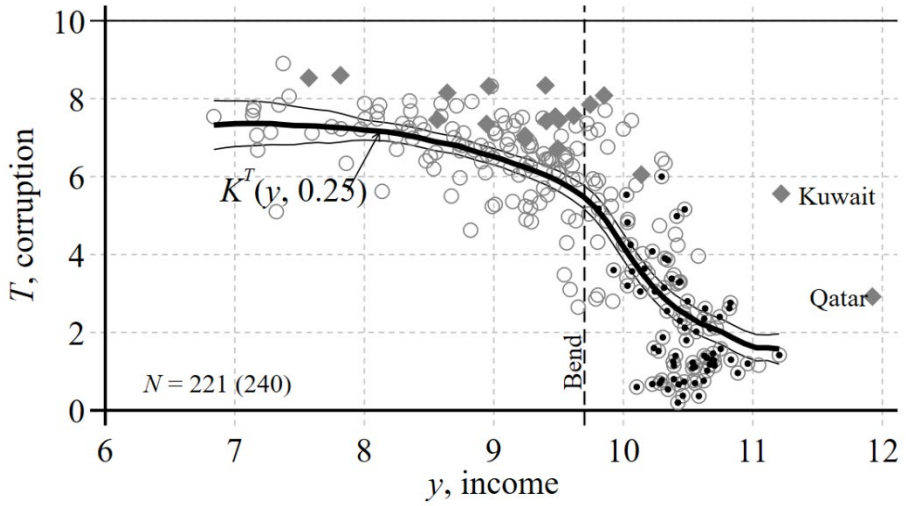


Figure 5b. W-sample. $T(y)$ transition



The curves in Figures 6 show the democratic transition – they do not contain the scatter and the confidence intervals, as each figure shows three curves. The 221 observations used for Figure 6b are rather few to estimate the kernels, and for the thin data below $y = 8.2$ the confidence intervals are so wide that it cannot be rejected that the curves are horizontal. Once the curves are supported by more observations, they look like the curves on Figure 6a, showing perfect transition curves. And the curves for the T-sample are always within the 95% confidence intervals of the curves for the W-sample. The six kernels in Figure 3 are estimated without the OPEC countries that have no transition, but rather turn more authoritarian at high income.

Figure 6. The democratic transition

Figure 6a. T-sample. *P* and *V* transition

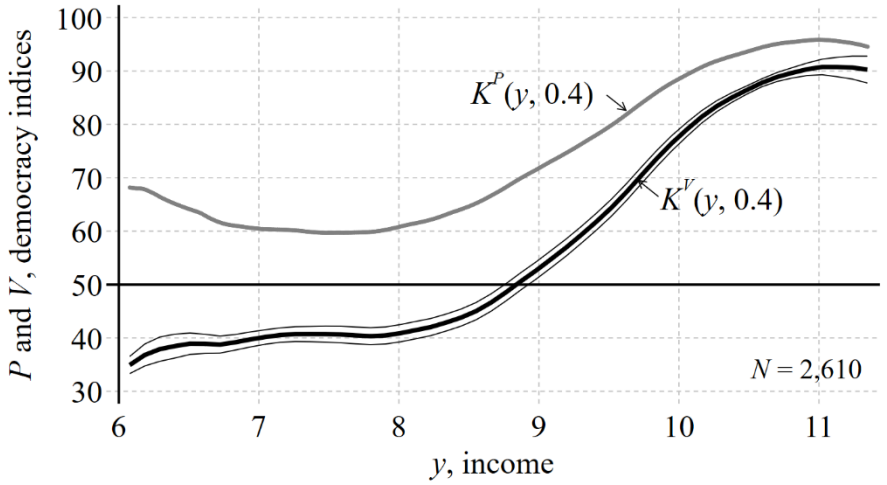
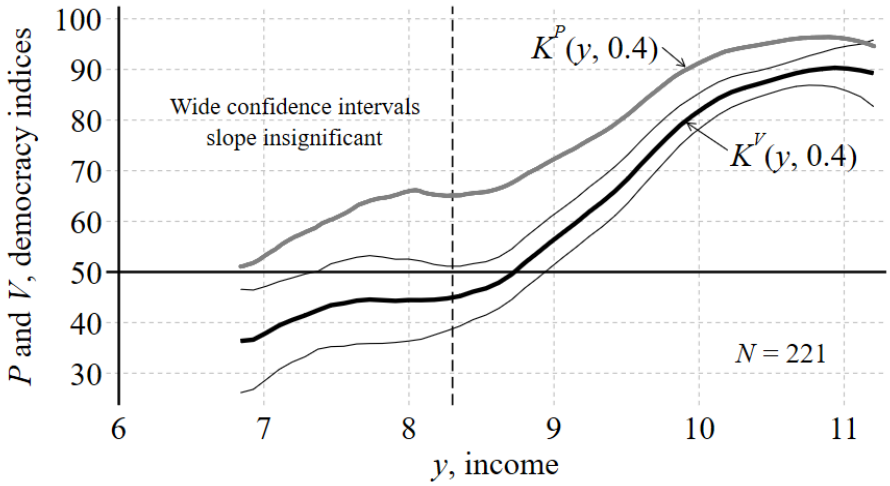


Figure 6b. W-sample. *P* and *V* transition

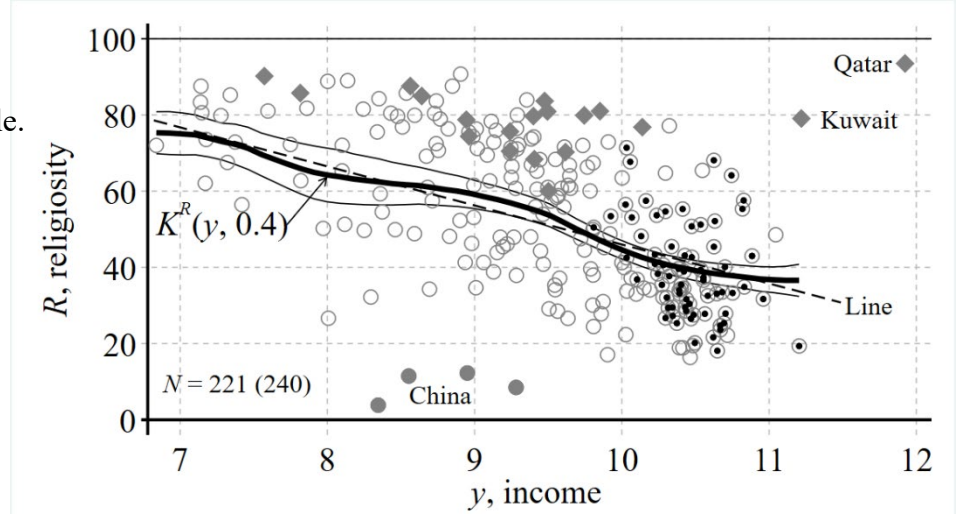


The 95% confidence intervals are given for the $K^V(y, 0.4)$ curves. They are similar for the $K^P(y, 0.4)$ curves.

Finally, Figure 7 shows the religious transition that can only be estimated on the W-sample. Here the transition curve is less perfect. It looks like a linear curve, but religiosity cannot keep falling and becomes negative. Thus, it must be interpreted as an incomplete transition. The transition will continue for some time and then it will flatten out at a new lower level. When all 332 observations are considered, the weak bend on Figure 7 becomes clearer. The level of religiosity may stabilize at 30%. The stories of the OPEC and the western countries in Figures 3b, 4 and 5b are the same as in Figure 7. The OPEC countries are above, and most Western countries are below the transition curve.

Figure 7. The religious transition

Figure 7a. W-sample. $R(y)$ transition



The transitions tell a story of long lags. Democracy indices have an almost linear increase in democracy in the income interval [8.25, 10.25], but they only turn honest after a further increase in income of a bit more than one logarithmic point, which is 2.7 times in the *gdp*. This is likely to take half a century. The religious transition is late too.

6. OLS regressions: Linear approximations, using the *V*-variable

The models in this section explain corruption, *T*, by OLS regressions. The *P&V*-variable used is *V* except in Table 8b. As before the Std(w) gives the stability of the estimates for the four or five waves. Parentheses hold t-ratios, aR^2 is the R^2 adjusted for degrees of freedom.

6.1 (T, V) and (T, V, y) models explaining corruption by democracy and income

The three models in Table 8 all show that all three models are stable, but *T* and *y* have strong multicollinearity. Model (1) for the (*T, V*) relation gives results, with large t-ratios and small Std(w). Much like the correlations in the (*T*, *V*) row in Table 5. Model (2) is the univariate (*T*, *y*) relation for *y* income it is even better than model (1) the aR^2 is about 30% higher. The t-ratio is similarly larger. Model (3) is the (*T, V, y,*) relation include both *V* and *y*. It has three effects: (i) The aR^2-score increases substantially. (ii) The coefficient on both *V* and *y* decreases, and (iii) becomes less stable. Table 8b shows that the results for the *V*-index generalize neatly to the *P*-democracy indices as expected.

Table 8. The (*T*, *V*) relation explaining corruption by democracy and income

Table 8a. Two (*T*, *V*) models and the (*T*, *y*) model

	T-sample, *N* = 2,610				W-sample, *N* = 221			
	Constant	*V*	*y*	aR^2	*Constant*	*V*	*y*	aR^2
	Model (1) $T = constant + \alpha V$							
	8.625 (120	-0.050 (-47)		0.462	8.601 (27)	-0.053 (-12)		0.412
Av(w)	8.568 (53)	-0.050 (-21)		0.447	8.808 (13)	-0.055 (-6)		0.407
Std(w)	0.127 (18)	0.002 (6)		0.078	0.729 (1.6)	0.009 (0.3)		0.018
	Model (2) $T = constant + \gamma y$							
All	18.75 (86)		-1.446 (61)	0.586	23.19 (23)		-1.918 (-18)	0.606
Av(w)	19.54 (38)		-1.536 (27)	0.599	23.44 (12)		-1.945 (-10)	0.608
Std(w)	2.63 (8)		0.308 (5)	0.040	2.88 (2.7)		0.326 (2.4)	0.101
	Model (3) $T = constant + \alpha V + \gamma y$							
All	16.69 (76)	-0.024 (-23)	-1.056 (-38)	0.654	20.90 (20)	-0.021 (5)	-1.526 (-12)	0.642
Av(w)	17.82 (35)	-0.021 (-10)	-1.208 (-18)		21.86 (19)	-0.016 (1.8)	-1.667 (6)	0.645
Std(w)	3.14 (7)	0.008 (5)	0.414 (3)	0.013	3.60 (1.9)	0.011 (1.4)	0.459 (1.6)	0.060

Table 8b. T-sample. (*T*, *P&V*) model (3) for the two democracy indices *P* and *V*

Model (3) $T = + \alpha P\&V + \gamma_1 y + constant$, for *P* and *V*, for *N* = 2,610					
	Constant	*P*	*V*	*y*	aR^2
P	18.40 (86)	-0.014 (-14)		-1.289 (-50)	0.613
V	16.69 (76)	-	-0.024 (-23)	-1.056 (-38)	0.654

The regression for *V* in Table 8b is the same as the *All* row for model (2) in Table 8a.

6.2 (T, R), (T, R, y), and (T, R, V, y) models

The two first models in Table 9 are parallel to Table 8, but *V* is now replaced with *R*. Model (4) corresponds to Model (1) in Table 8, while Model (5) corresponds to Model (3). The interpretation of the two parallel tables is much the same as before. The coefficients on *V* and *R* in Tables 8 and 9 have the reverse sign, and in addition the effects of *R* are a bit smaller numerically. When income *y* is included, the average estimate of the effect of religiosity drops to one third, even when the aR^2 increases.

Table 9. W-sample. Explaining corruption by religiosity, democracy, and income

	Constant	*R*	*V*	*y*	aR^2
	Model (4) $T = constant + \beta R$				
All	1.906 (5)	0.059 (9)			0.247
Av(w)	1.940 (2.6)	0.058 (4)			0.240
Std(w)	0.330 (0.6)	0.006 (0.7)			0.067
	Model (5) $T = constant + \beta R + \gamma y$				
All	21.58 (15)	0.010 (1.6)		-1.803 (-14)	0.608
Av(w)	21.96 (8)	0.008 (0.7)		-1.835(-8)	0.612
Std(w)	4.78 (2.5)	0.011 (0.9)		0.466 (2.6)	0.095
	Model (6) $T = constant + \beta R + \alpha V + \gamma y$				
All	19.18 (13)	0.010 (1.8)	-0.021 (-5)	-1.400 (-10)	0.646
Av(w)	20.00 (7)	0.010 (0.9)	-0.016 (-1.9)	-1.526 (-5)	0.651
Std(w)	5.52 (2.3)	0.011 (0.9)	0.011 (1.5)	0.603 (2.1)	0.050

Model 6 is the full model where *T* is explained by *R, V,* and *y*. The effect of *R* ceases to fall, and the sign of the effect stays the same. Even when the average Av(w) in the All row becomes unstable. The estimates of the two effects give the specific effects of the two variables. Thus, the specific effects of democracy and religiosity are -0.021 and 0.010, respectively. Recall Figures 5 and 6 for the long run.

The democracy indices move a great deal in this perspective. Let us imagine that the democracy indices jump by 40 pp and remain at the new level. This should give a decrease of almost one point on the T-scale. It will be a nice improvement in the level of honesty, but the change will come gradually over several decades. The biggest changes in religiosity since 1995 have been in Catholic countries with rapid economic growth. In some of these countries, there has been a fall in R of 20% over a decade. That will give a fall in the corruption of 0.2 points, so the corruption effect is surely small.

(i) When the three pairs of univariate regressions are compared it confirms that the strongest variable explaining corruption is income. (ii) The *y*-variable explains about 58% of

the variation in both samples even the T-sample is more representative. (iii) The coefficient on variation on the aR^2 is a little lower for the T-sample than for the W-sample as expected.

6.3 The marginal effects of the three variables

The analysis above has considered the effect on corruption of two institutions: religiosity and democracy. Though the two institutions are different, the analysis shows a parallel pattern except for the sign. In addition, the regression analysis has replicated the results for *T*, *V*, *R*, and *y* from the T-sample to the W-sample. Even when the W-sample is much smaller and skewed, the replications went rather well. This suggests that if the *R*-variable had been available for all observations, the results for religiosity may also have replicated.

Table 10. Marginal effects (ΔaR^2) of variables explaining corruption

Sample	Contribution		Effects	*All*
T-sample	(1) Total effect	Model (3) Table 8a	aR^2	0.65
	(2) *V* marginal	Deleting *V*	$-\Delta aR^2$	0.07
	(3) *y* marginal	Deleting *y*	$-\Delta aR^2$	0.19
	(4) Sum of the two marginal effects			0.26
	(5) Fraction explained by the marginal effects			39%
W-sample	(6) Total effect	Model (6) Table 9	aR^2	0.65
	(7) *V* marginal	Deleting *V*	$-\Delta aR^2$	0.04
	(8) R marginal	Deleting *R*	$-\Delta aR^2$	0.01
	(9) *y* marginal	Deleting *y*	$-\Delta aR^2$	0.15
	(10) Sum of the three marginal effects			0.20
	(11) Fraction explained by the marginal effects			31%

The marginal effect on the aR^2 of the two/three variables are reported by Table 10. The interpretation of the table will refer to the *All*-column to the right.

The upper half of the table (rows 1-5) covers the T-sample. As the *R*-variable is missing, there are only two marginal effects. Row (1) repeats the adjusted R^2s of Model (3) from Table 8a. Row (2) shows the effect of deleting the *V*-variable. Row (3) is the effect of deleting *y*. Rows (4) reports the sum of the two marginal effects – i.e. the sum of the specific effects. It is much smaller than the total effect in row (1). In the *All*-column it is 39%, indicating that the remaining 61% is the common effect.

The lower half of the table (rows 6-11) covers the W-sample. Here row (6) repeats the aR^2s (the adjusted R^2) of Model (5). Row (7) shows the fall in aR^2 when the *V*-variable is omitted. In the *All*-column aR^2 falls by 0.04, i.e., from 0.65 to 0.61. Row (8) is the same exercise for the *R*-variable. In the *All* column it is only 0.01, but as it is zero in two waves where the W-

sample is heavily skewed toward western countries is likely that it would have been 0.02 if data had been better. Finally, row (9) gives the effect of deleting the *y*-variable, which once again is the largest fall.

Row (10) brings the sum of the three marginal effects, which is 0.20 in the *All* column. The total results in rows (1) and (6) is larger for the T-sample than for the W-sample, even when the T-sample misses the *R*-variable. However, what is missing in the estimates of the models for the T-sample is only the specific effect of the *R*-variable that was found to be quite small in the W-sample, while the common effect is included – it is likely that a little of the increase in the effect of *V* and *y* in the T-sample is due to the missing R-variable.

6.4 The micro-macro problem: Fixed effects for countries

As mentioned, the literature shows that the micro *within countries* effect of religiosity on corruption is negative. The macro pattern should not influence the micro pattern, but the micro should influence the macro. The *R*-variable measures the fraction of highly religious people in the poll. It should give the fraction of people with a low propensity to be corrupt. Hence the macro effect of *R* on *T* should be negative, but it is positive. This is the micro-macro problem. As the macro pattern dominates it must be stronger than the micro effect.

The standard way to remove the between-countries effect is to include fixed effects for countries in the model. Table 11 reports what happens to the coefficients on democracy, *V*, and religiosity, *R*, with and without fixed effect for countries.

Table 11. The coefficients on *V* and *R* without and with fixed effects for countries

Table 11a. Coefficient on *V* in the (*T*, *V*) relation

T-sample, *N* = 2,610				W-sample, *N* = 221			
Table	Model	Old	With FE	Table	Model	Old	With FE
8a	(1)	-0.050 (-47)	-0.001 (-0.9)	8a	(1)	-0.053 (-12)	-0.015 (-3)
8a	(3)	-0.024 (-22)	-0.000 (-0.1)	8a	(3)	-0.021 (-5)	-0.005 (-0.9)
				9	(6)	-0.021 (5)	-0.004 (-0.7)

Table 11b. Coefficient on *R* in the (*T*, *R*) relation

W-sample, *N* = 221			
Table	Model	Old	With FE
9	(4)	0.059 (9)	-0.002 (0.3)
9	(5)	0.010 (1.6)	-0.013 (1.9)
9	(6)	0.010 (1.8)	-0.013 (1.7)

Old is the coefficient already estimated as the model indicated. The FE is the effect of adding fixed effects

(*T*, *V*) A political regime is the same for the whole country. Thus, the fixed effects for countries should account for the full effect of *V*. Table 11a confirm that as predicted, the estimates on *V* vanish when fixed effects are included.

(*T, R*) The fixed effects should turn the macro coefficient on *R* to reveal the micro effect. Table 11b confirm that as expected, fixed effects change the coefficient on *R* from positive to negative. It becomes a bit smaller, and it is only borderline significant. Thus, the within-countries effect of religiosity is positive and causes a reduction of the macro effect, so that the pure macro effect would have been 0.013 larger without the micro effect, i.e., from model 6 it becomes 0.023.

6.5 (T, R) relation: The deviations from the transition path $T^D = T - T(y)$

Model 5 in Table 9 shows the effect of controlling the (*T*, *R)* relation (the religiosity-corruption) for income *y*. This is a rough approximation that assumes linearity. The non-linear *T*(*y*) transition curve is estimated in Figure 3. The best estimate of *T*(*y*) in Figure 3a, from this estimate the deviation from the transition curve $T^D = T - T(y)$ can be calculated. While the correlation r(*T, R*) = 0.50 the correlation r(T^D, *R*) = 0.25. The T^D-series allows us to identify the relatively corrupt countries, which are the two groups mentioned in section 4.

The OPEC countries are in average +1.6 T-points too corrupt, and they have an average R-score of 79%, which is above the average, which for middle-income countries is about 60%. If the OPEC-countries are deleted r(*T, R*) = 0.50 the correlation r(T^D, *R*) = 0.14.

The NW-European group (the 5 Nordic, Germany, and the Netherlands) are on average –1.6 T points too honest, and they have an average *R*-score of 30%, which for high income countries should be 40%. If the NW-European countries are deleted r(*T, R*) = 0.44 the correlation r(T^D, *R*) = 0.15.

Thus, both groups deviate from the micro-pattern. The OPEC group has high corruption and high religiosity, while the NW-countries has low corruption and low religiosity. If both groups are deleted the r(*T, R*,) = 0.40 the correlation r(T^D, *R*) = 0.02.

6.6 A look at all 4,239 observations for the T-index

The full T-set as of February 2024 has reached *N* = 4,239 observations. This is 62% more than in the T-sample. The correlation between the average *T* in the T-sample and the average for 2019-2023 is 0.96.

Table 12. The 15 least corrupt countries. Average, and frequency in the top 3 and top 10 list

Country	Av	T3	T10	Country	Av	T3	T10	Country	Av	T3	T10
Denmark	0.71	27	29	Switzerland	1.32	3	26	Luxembourg	1.66		13
Finland	0.82	25	29	Norway	1.36	1	26	Australia	1.68		13
New Zealand	0.80	27	29	Netherlands	1.41		28	UK	1.91	5	5
Singapore	1.03	10	29	Iceland	1.52	4	12	Germany	2.07	6	6
Sweden	1.11	5	29	Canada	1.53		20	Hong Kong	2.21		

This table uses all 4,239 observations of T from 1995 to 2023. *Av* is the average corruption for the 29 years covered for the 15 lowest countries. Countries where the averages differ by 0.2 are significantly different. The two T scores say how many years out of the 29 years a certain country has been on the top 3 and the top 10 list. The top 3 list holds 3*x*29 +15 = 102 countries where the 15 are due to ties. The top 10 list numbers 10*x*29 + 7 = 297, where the 7 are due to ties. Austria and Ireland are both on the top 10 list for some years.

Table 12 lists the high end of the 15 countries with the lowest average corruption in the full T-set. It is almost the same countries as in the T-sample. The table reports three numbers: The average, and the frequency by which a country is on the top 3 and top 10 list. The three lists are similar. The low corruption countries are known to be highly secular.[19]

[19] A sociologist of religion has even, after one year of fieldwork, characterized the least corrupt country, Denmark, as a "country without God", see Zuckerman (2008).

7. Conclusion: An assessment of the cross-country effects

The T-sample is larger and more representative, so the results based on the T-sample should be better, but they miss the effect of *R*. The summary uses the effect on the adjusted R^2, written aR^2, as the amount of the variation in corruption *T* explained. The result of the analysis is:

The total effect on corruption, *T*, of the three variables: democracy, *P&V*, religiosity, *R*, and income, *y*, is about 0.65. If the R-variable had been available for the T-sample, the total aR^2-score may have increased a little – probably to 0.67. This all means that the analysis accounts for about 2/3 of the cross-country variation in corruption.

For both institutional variables there is a large difference between the total (univariate) effect and the specific effect. This means that the common transitions make most of the total univariate effects spurious.

The univariate effect of the democracy indices, *P&V*, is 0.45 so potentially democracy can explain almost half the variation. However, the specific effect is only 0.07 in the T-sample. Thus, we conclude that the specific effect is moderate with 0.07 as the best estimate. It also appeared from the figures that the effect was highly non-linear, only working at the high end of the income scale. In addition, the effect come with a considerable lag.

The univariate effect of religiosity, *R*, is 0.25 on the W-sample, where the specific effect was 0.01. As it is zero in the least representative subsamples, it may be a little higher. The univariate effect is only 2/3 of the univariate effect of the *P&V*-variable. As the common element is relatively large, the specific effect is about 0.02.

The best variable explaining corruption is income *y*, as it is the best aggregate variable proxying development. Thus, it is the total effect 0.67 minus the two specific effects that sum to 0.09. Thus, the effect of *y* is 0.58. This tallies with the univariate effect of *y* for the T-sample.

Sources:

Maddison project, source of *gdp, y,* and *g*. https://www ggdc.net/maddison/maddison-project/home.htm

Paldam, M., Gundlach, E., 2013. The religious transition. A long run perspective. *Public Choice* 156, 105-23 Source of *R.* Updated in chapter 11 of Paldam (2021a)

Polity project, Source of *P*. https://www.systemicpeace.org/polityproject.html V-Dem

home page, source of *V*. https://www.v-dem.net/en/login

References:

Ades, A., Di Tella, R., 1999. Rents, Competition, and Corruption, *American Economic Review* 89, 982-93

Atkinson, Q.D., Bourrat, P., 2011. Beliefs about God, the afterlife and morality support the role of supernatural policing in human cooperation. *Evolution and Human Behavior* 32, 41-49

Doucouliagos, H., Paldam, M., Stanley, T.D., 2018. Skating on thin evidence: Implication for public policy. *European Journal of Political Economy* 54, 16-25

Dutta, J., Aidt, T.S., eds., 2016. *Corruption and Economic Development*. Edward Elgar's Library of Critical Writings in Economics vol 324. Cheltenham UK

Fisman, R., Gatti, R., 2002. Decentralization and corruption: evidence across countries. *Journal of Public Economics* 83, 325–45

Flavin, P., Ledet, R., 2013. Religion and government corruption in the American states. *Public Integrity* 15, 329-43

Galor, O., 2011. *Unified Growth Theory.* Princeton UP., Princeton

Gokcekus, O., Ecki, T., 2020. Religion, religiosity, and corruption. *Review of Religious Research* 63, 563-81

Gouda, M., Park, S.-M. Religious Loyalty and Acceptance of Corruption. *Jahrbücher für Nationalökonomie und Statistik*, vol. 235, 2015, 184-206

Gründler, K., Potrafke, N., 2019. Corruption and economic growth: New empirical evidence. *European Journal of Political Economy* 60, 101810

Guiso, L., Sapienza, P., Zingales, L., 2003. People's opium? Religion and economic attitudes. *Journal of Monetary Economics* 50, 225–282

Gutmann, J., 2015. Believe, but verify? The effect of market structure on corruption in religious organizations. *Kyklos* 68, 153-64

Heidenheimer, A.J., Johnson, M., LeVine, V.T., eds., 1999. *Political Corruption. A Handbook*. Transaction Publishers, New Brunswick USA

Ioannidis, J.P.A., Stanley, T.D., Doucouliagos, H(C), 2017. The Power of Bias in Economics Research. *Economic Journal* 127, 236-65

Jetter, M., Agudelo, A.M., Hassan, A.R., 2015. The effect of Democracy on Corruption: Income is the key. *World Development* 74, 286-304

Kalenborn, C., Christian Lessmann, C., 2013. The impact of democracy and press freedom on corruption: Conditionality matters. *Journal of Policy Modeling* 35, 857-86

Kolstad, I., Wiig, A., 2016. Does democracy reduce corruption? *Democratization* 23, 1098-1215

Maddison, A., 2001. The World Economy: A Millennial Perspective. OECD, Paris

Mauro, P., 1995. Corruption and Growth. *The Quarterly Journal of Economics* 110, 681–712

McMann, K.M., Seim, B., Teorell, J., Lindberg, S., 2020. Why Low Levels of Democracy Promote Corruption and High Levels Diminish It. *Political Research Quarterly* 73, 893-907

Montinola, G.R., Jackman, R., W., 2002. Sources of Corruption: A Cross-Country Study. *British Journal of Political Science* 32, 140-70

Paldam, M., 2001. Corruption and religion. Adding to the economic model. *Kyklos* 54, 383-414

Paldam, M., 2002. The cross-country pattern of corruption: Economics, culture and the seesaw dynamics. *European Journal of Political Economy* 18, 215-40. Also, chpt. 25 in Dutta and Aidt (2016)

Paldam, M., 2018. A model of the representative economist, as researcher and policy advisor. *European Journal of Political Economy* 54, 1-15

Paldam, M., 2021a. *The Grand Pattern of Development and the Transition of Institutions*. Cambridge UP, New York and Cambridge UK

Paldam, M., 2021b. Methods Used in Economic Research: An Empirical Study of Trends and Levels. *Economics* 15, 28-42

Paldam, M., 2024a. Income, Growth, and Democracy. Looking for the main causal directions in the nexus. *European Journal of Political Economy*, 83, 102532

Paldam, M., 2024b. The long-run path of the democratic transition. The inevitable collapse of three pillars model. Forthcoming in *Kyklos*

Paldam, M., 2024c. The OPEC/MENA/Arab nexus and the missing democratic transition. P.t. working paper

Rock, M.T., 2008. Corruption and democracy. *Journal of Development Studies* 45, 55-75

Rose-Ackerman, S., 1999. Political corruption and democracy. *Connecticut Journal of International Law* 14, 363-78

Shariff, A.F., Norenzayan, A., 2011. Mean Gods Make Good People: Different Views of God Predict Cheating Behavior. *The International Journal for the Psychology of Religion* 21, 85-96

Shariff, A.F., Rhemtulla, M., 2012. Divergent Effects of Beliefs in Heaven and Hell on National Crime Rates. *PloS ONE* 7(6), e39048

Sung, H.-E., 2004 Democracy and political corruption: A cross-national comparison *Crime, Law & Social Change* 41, 179–194

Treisman, D., 2000. The causes of corruption: a cross-national study. *Journal of Public Economics* 76, 399-457

Voigt, S., 2023. Determinants of social norms I – the role of geography. *Journal of Institutional Economics* 20. Doi: 10.1017/S1744137423000310

Voigt, S., 2024. Determinants of social norms II – religion and family as mediators. *Journal of Institutional Economics* 20. Doi: 10.1017/ S174413742300036X

Wiseman, T., Young, A., 2014. Religion: productive or unproductive? *Journal of Institutional Economics* 10, 21-45

Zuckerman, P., 2008. *Society without God: What the Least Religious Nations Can Tell Us About Contentment*. NY UP, New York

Appendix A. The distributions of the four series

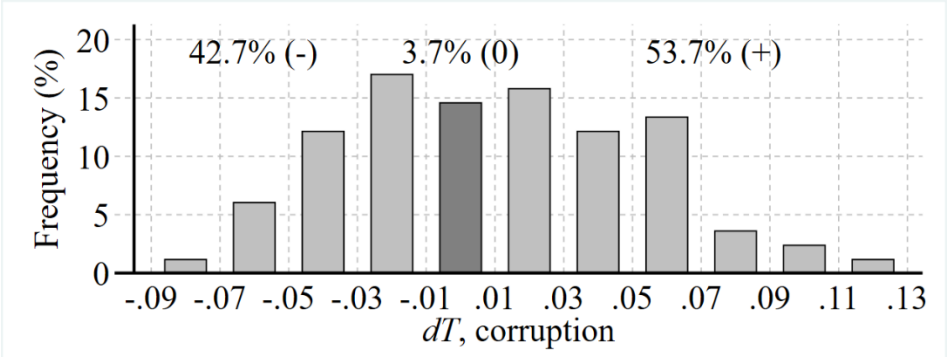


Figure A1. Annual changes in corruption index. Bin 0.02

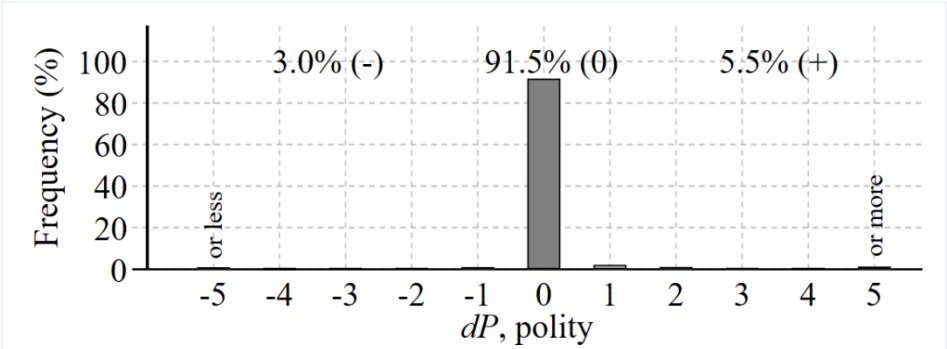


Figure A2. Annual changes in polity index. Bin 1

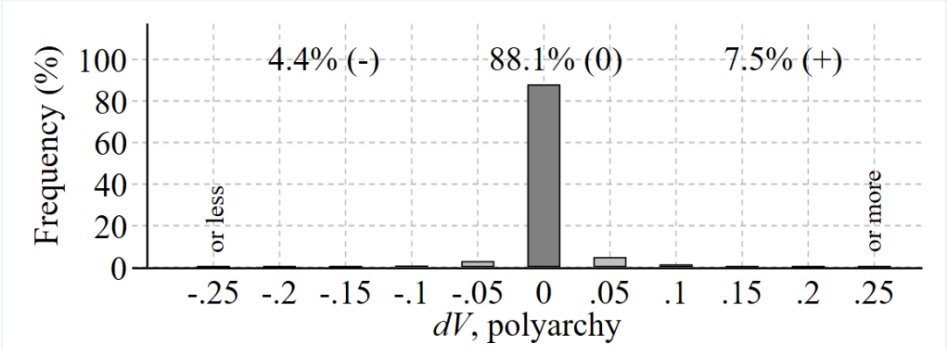


Figure A3. Annual changes in polyarchy index. Bin 0.05

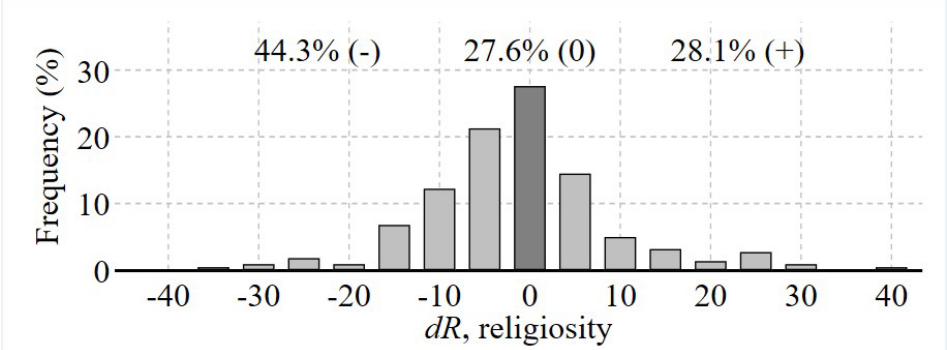


Figure A4. Between-waves changes in religiosity index Bin 5

The four graphs use as many observations as are available. Figures A2 and A3 are annual N = 11,099. The polyarchy index has many small changes within one bin. Figure A4 changes between waves. App 5 years apart, see note to Table 1, N = 221.

Appendix B. The coverage and representativity of the two samples

Table B1 lists the number of countries in the 6 standard country groups. The MENA group is for the Middle East and North African countries. All groups are counted without the OPEC+ countries. They are the present and former members of the Organization of Oil Exporting countries + Bahrain and Oman. This explains the small number of countries in the MENA group.

Table B1. Number of countries in groups for the samples and waves

	The T-sample of 136 countries						The W-sample of 90 countries				
Period	W3	W4	W5	W6	W7	*All*	W3	W4	W5	W6	*All*
WVS wave	95-98	99	05-09	10-15	15-18	95-18	95-98	99	05-09	10-15	95-94
Africa, Sub Saharan	13	25	34	35	37	37	1	4	7	4	10
Asia (+ Oceania)	13	16	18	20	20	20	8	9	8	11	13
Latin America	15	20	20	19	20	20	8	4	9	9	11
MENA (net of OPEC+)	5	7	8	8	7	8	1	4	4	7	7
Post socialist	12	27	28	28	28	28	12	21	10	13	24
West	22	23	23	23	23	23	21	23	15	6	25
Number of countries	80	118	131	133	135	136	51	65	53	52	90
OPEC+	4	17	18	18	18	18	2	7	3	7	8
χ^2-test for country groups	The *All* column is the norm						The *All* column is the norm				
(a) *All* in T-sample	5.0	72.4	99.8	99.8	99.9	Na	0.0	0.0	13.5	1.2	0.00
(b) *All* in W-sample							4.9	24.8	47.1	0.9	-

The χ^2-test gives the p-value (%) for the representativity of the countries in six country groups. Row (a) compares the distribution in groups with all 136 countries in T-sample. Row (b) compares the same distribution with all 90 countries in W-sample. The W-sample has one observation per country included in each wave, while the T-sample has the annual observations. The TI corruption data covers 188 countries, but some misses one or the other democracy index, and the OPEC countries are excluded. Hence, the T-sample 'only' holds 136 countries.

Table B2 gives the number of observations. Compared with the hypothetical number of observations if there had been 24 observations per country, the first two periods and the All-column are very skew. The number of observations for the W-sample is the same as the number of countries.

Table B2. Number of observations in groups for the samples and waves

	The T-sample of 136 countries						If 24 observations per country	
Period	W3	W4	W5	W6	W7	*All*		
WVS wave	95-98	99	05-09	10-15	15-18	95-18	*N*	in %
Africa, Sub Saharan	19	98	158	170	144	589	888	66.3
Asia (+ Oceania)	44	81	90	94	76	385	480	80.2
Latin America	34	97	99	95	78	403	480	84.0
MENA (net of OPEC+)	10	33	38	39	28	148	192	77.1
Post socialist	22	134	137	140	111	544	672	81.0
West	85	134	115	115	92	541	542	98.0
Number of observations	214	577	637	653	529	2,610	3,264	80.0
χ^2-test for group obs.	0.0	0.0	76.8	97.6	99.3	0.0	-	-