March 20th – 2024

Can democracy and religiosity explain corruption?

An empirical study of cross-country data

Martin Paldam, Aarhus University, Denmark[1]

Abstract

The democracy-corruption and the religiosity-corruption relations are analyzed on cross-country data. The relations are formally similar, but the signs differ. Democracies are less corrupt, while religious countries are more corrupt. The two cross-country relations have a large common component due to the underlying transitions that explain about two thirds of the correlation, but a specific element remains in the relations. The between-countries religiosity relation has a micro-macro problem, as the (weak) within-countries pattern gives the reverse signs, which offset some of the cross-country relation. Two data samples are used: The T-sample has N = 2,619 observations, but no religiosity data. The W-sample with N = 240 observations allows an analysis of both relations. The democracy-corruption relation from the two samples has a similar pattern. Thus, the W-sample is more representative than it appears at first, and the religiosity-corruption results may also generalize.

Jel: E26, K42, Z12

Keywords: Corruption, democracy indices, religiosity, transitions

[1] Department of Economics and Business, Fuglesangs Allé 4, DK-8210 Aarhus V.
Phone: 45-87175545, email: mpaldam@econ.au.dk, home page: http://www.martin.paldam.dk.
The paper has been presented at the Danish Public Choice workshop. I am grateful to the discussants notably Stefan Voigt.

1. Introduction

It is well known that income, y, is the strongest explanation of corruption, T. High-income countries are less corrupt. However, two institutional variables also have strong univariate cross-country relations to corruption, T:

XT: Democracy, X, and T are negatively correlated. Democracies are less corrupt.
RT: Religiosity, R, and T are positively correlated. Religious countries are more corrupt.

Section 2 provides a few observations on the vast literature. The paper studies the macro between-countries evidence, but for the RT-relation the micro within-countries literature finds a negative RT relation. It should generalize to the macro level, but it does not.

The variables analyzed are listed in Table 1 and discussed in section 3. Section 4 reports the correlations and a factor analysis showing both the strength of the univariate XT and RT relations, and that the series has a strong common factor. In other words, both relations contain a large spurious element. It is the parallel transitions in T, corruption, X, democracy, and R, religiosity; see section 5. They are explained by the theory of *the grand transition*, whereby societies change from the traditional steady state to the modern one; see Paldam (2021b). It consists of highly confluent changes in most socio-economic and institutional variables, as T, X, and R, which explains much of their variation. The paper tries to separate the large *common* and the small *specific* elements in the two relations.

Transitions normally take 1-2 centuries, so they should be studied in *long* time series. Such series do not exist for neither T nor R. Instead, transitions are analyzed on *wide* cross-country samples, covering countries over the full range of development. For transitions – such as the democratic transition $X(y)$ – where both long and wide data samples exist, the results in the two dimensions are always equivalent. Thus, equivalence is taken as the default.

Consequently, the estimation models corresponding to the correlations are non-linear and unstable to the inclusion of control variables, notably income – or any other variable that has a transition. When working with these relations, the results quickly splinter into a broad range allowing researchers to find results they like.

Section 6 analyzes the effects of the two institutional variables on corruption by a set of descriptive regressions showing the range of results, where the common (transition) explains about 2/3 of the total effect. To study robustness the estimates are done separately for four rather different subsamples.

Table 1. Variables used in the two samples. The *R* variable is missing in the T-sample

Variable	Definition (see references for the net sources)	Scale
T	***Corruption***, (10 – TI), where TI is the Transparency International index	[0, 10]
X	***Democracy*** index, where three are used *X = F, P, V*	[0, 100]
F	Freedom House, average of political rights and civil liberties	
P	Polity2 index	
V	Polyarchy from V-Dem project	
R	***Religiosity***, average of 14 polled items in the WVS; see Paldam (2021b)	[0, 100]
	gdp is the real GDP per capita in 2011 US $ from the Maddison project	
y	***Income,*** natural logarithm ln(*gdp*)	[6, 11.5]
g	***Growth***, of *gdp*	[-22.1, 34.5]
	Data: The two samples – *R* is only covered by the W-sample	*N*
T-sample	All observations for *T*, which has data for *X*, *y*, and *g*	2,610
W-sample	All polls from the World Values Survey, which has data for *T*, *X*, *R*, y, and *g*	240

The W-sample covers four WVS waves: w3, 1995-98, w4, 1999-04, w5, 2005-09, and w6, 2010-14. Each wave has one *R* observation for each country covered. 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. Countries that are or have been OPEC countries and Bahrain and Oman are excluded. The three democracy indices are converted to a percentage scale from 0 to 100 relative to the range between the largest and smallest observation.

Section 7 confirms the reverse sign on the micro relation for the RT-relation and shows that the macro-pattern is stronger. Finally, section 8 summarizes the consistent macro-pattern.

While ample data are available for the study of XT (democracy-corruption), the discussion of RT (religiosity-corruption) rests on a small empirical basis. Table 1 gives the variables and data samples used for easy references. The paper works with two samples: The T-sample is large (*N* = 2,610) and representative but misses religiosity data. The W-sample is small (*N* = 240) and skewed, but covers the data needed to give estimates for both XT and RT. The results for XT on the two samples are similar. This suggests that the results for RT may also generalize.

2. Some observations on the large literature

Table 2 reports the size of the literature. It is truly enormous because these relations are both politically important and emotional. They are also quite unstable especially as regard the RT-relation with its modest empirical basis.

Table 2. Searches in Google and Google Scholar

Hits in millions Search term	Google Hits	Scholar Hits
XT Corruption and democracy	110	2
Corruption and religion	72	1.6
RT Corruption and religiosity	83	0.2

The searches took place in November 2023.

2.1 Likely priors in the two relations

XT (democracy-corruption): A large majority in the secularized west think 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 (2024). The analysis below finds that the corruption premium is small and occurs in high-income countries only. Thus, democracy should be preferred because it is good in itself!

RT (religiosity-corruption): The discussion deals with the sign of the relation $T = T(R)$. 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 RT 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. She may recall Blaise Pascal's words:[2] "Men never do evil so completely and cheerfully as when they do it from religious conviction." In this way the two claims have been elaborated into many versions, hence the 83 million hits in Google.

It is nice that his priors are confirmed by the micro within-country results, while hers are confirmed by the macro between-country results. However, they prove to be stronger.

2.2 The literature on the XT-relation

The literature on corruption is summarized in a couple of large books of readings. Heidenheimer et al. (1999) look at political corruption, while Dutta and Aidt (2016) cover economic studies. The 1,810 pages of the two books contain much on the XT-relation but little on the RT-relation. This corresponds to the numbers reported in Table 2. The XT-literature search for 'corruption and democracy' gave two million hits. The RT-literature search gave 'only' 190,000 hits. A search for 'corruption, democracy, and religiosity' gave 86,600 hits. This literature is mostly studies of the RT-literature, where democracy comes in as an institution that may

[2] Blaise 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. Hence, he knew that the relation of moral and religion is complex.

enforce accountability. This idea raises a complex legal discussion, as pointed out by Rose-Ackerman (1999).

This paper always finds that democracy has a negative effect on corruption – in the end the effect is moderate, and it occurs with a substantial lag, but it is still negative. Newer empirical literature, on the XT-relation such as Rock (2008) and Jetter et al (2015) confirms that income is the strongest factor explaining corruption, and that democracy is important too.

2.3 The RT-relation: The micro-macro problem

The paper looks at the macro between-countries evidence that always says that religiosity has a positive effect on corruption.[3] At the end of section 6 the effect is small, but it is still positive.

This contrasts to the micro within-country evidence that finds a negative effect of religiosity on a set of *morally gray* situations, including bribing. A handful of studies finds that strong religion increases peoples' propensity to act morally, especially when they believe that they may otherwise go to hell.[4] The evidence is of two kinds. (i) Studies of individual answers at 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. The evidence may have the problem that it is cheap to be moral in polls and lab experiments.

The *R*-measure 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 discussed in section 7.

3. Variables and methodology

3.1 Variables: *T, X, R, y, and g*

The variables were already defined in Table 1, but some descriptive notes may be needed.

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

[3] It appears that all macro studies work with smaller and poorer data-samples than the present paper. A dozen papers use one or two items from one wave of the WVS as their measure of religiosity, see e.g., Gokcekus and Ecki (2020) that reaches results like the present ones. Some papers have found a dataset that allows a study of one aspect of the problem in one country; see e.g., Flavin and Ledet (2013) that find no effect. A few papers study the corruption within church organizations and confirm the suspicion of the economist that monopoly of Churches increases corruption; see e.g., Gutmann (2015).

[4] See e.g., Atkinson and Bourrat (2011), Shariff and Nerenzavan (2011), and Shariff and Remtulla (2012).

of countries has grown over time, and 188 countries are covered for at least one year. This is a fine coverage of the app. 200 countries of the world.

$\boldsymbol{X} = F, P, V$ is a democracy index. Three leading democracy indices are used. 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 three democracy indices are converted into a percentage scale, relative to their ranges. All three indices are available for 155 countries.

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 1995.

y is income, and ***g*** is growth. Both are calculated from the *gdp*, which is real GDP per capita in PP prices. They are calculated as $y = \ln(gdp)$ and $g = 100(\Delta gdp/gdp)$.

Table 3. Country groups in the samples and waves

	The T-sample of 188 countries					The W-sample of 101 countries				
	(1)	(2)	(3)	(4)	*All*	(1)	(2)	(3)	(4)	*All*
Group	95-98	99-04	05-09	10-14	95-18	W3	W4	W5	W6	95-
Africa, Sub Saharan	14	30	46	47	47	2	5	7	5	11
Asia (+ Oceania)	14	21	34	33	35	8	10	9	11	14
Latin America	17	25	31	30	32	9	5	9	10	13
MENA	5	19	19	18	19	1	8	6	12	14
Post socialist	12	27	29	30	30	12	21	10	13	24
West	23	25	25	25	25	21	23	15	8	25
Number of countries	85	147	184	183	188	53	72	56	59	101
Number of observations	214	577	637	653	2,610	53	72	56	59	240
OPEC+	4	17	18	18	18	2	7	3	7	8
t-test for periods/waves	The *All* column is the norm					The *All* column is the norm				
(a) *All* in T-sample	0.0%	18.1	100.0	99.9	Na	0.0	0.0	0.0	0.0	0.0
(b) *All* in W-sample						0.0	15.1	58.3	3.7	Na

The t-test gives the p-value in per cent for the representativity of the number of countries in the six country groups. Row (a) compares the distribution of countries in the period with all 188 countries in T-sample. Row (b) compares the distribution of countries in the period with all 101 countries in W-sample. The OPEC+ group is former and present OPEC countries + Bahrain and Oman. The data for this group is excluded in most calculations. The W-sample has one observation per country included in each wave, while the T-sample has the annual observations. The years from 2015-2018 have 529 observations for the T-sample. They are not used in the analysis of the periods.

3.2 Are the T- and the W-samples representative?

The *T*-data starts in 1995. 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. The ***T-sample*** covers six variables, for *N*

= 2,610 from 137 countries[5] – it misses religiosity. The starting year of 1995 limits both samples. The T-sample is divided into periods corresponding to the waves of the W-sample.

Table 3 shows the distribution of the country groups in the waves. Both samples start with too many DCs (developed countries). While the T-sample quickly grow to 180 countries, the W-sample stays with a changing sample of about 60 countries.[6]

The T-sample is 11 times larger and representative except for period (1). The W-sample should ideally replicate the results for XT from the T-sample. The replication is good but not perfect. This suggests that the skewness of the W-sample is problematic, but that the sample can be used with some care. However, when possible, the T-sample is used for calibration.

The WVS waves vary, and it is never really representative, not even in the *All* column. This gives a problem and an opportunity: One should be worried if the results reached generalize. However, 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.

3.3 Methodology

The social sciences including economics are increasingly aware that they/we have a replication problem.[7] Researchers are human with priors and interests like everybody else, and both relations analyzed deal with emotional subjects where priors may be expected as mentioned. 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 a researcher to find results he likes. When such results are due to overfitting, they do not replicate. 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.

Transitions are underlying long-run relations with a distinct form ⌒ or ⌓ depending on the scaling of the variables, where the horizontal axis is income. Thus, transition relations are non-linear, but still monotonously rising or falling, so linear approximations may tell most

[5] The T-data covers 188 countries, but some are missing in one or the other democracy index, and the OPEC countries are excluded. Thus, the T-sample 'only' holds 137 countries.

[6] 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.

[7] In November 2023 Google scholar gave 600,000 hits to *replication crisis*. One third of the hits was to economics. Two studies summarize 159 meta-studies of 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) demonstrates that if researchers behave as predicted by economic theory, this is precisely as expected.

of the story. As argued in Paldam (2021b, 2024), the best way to study transitions is to estimate kernel regressions on large datasets obtained by unifying panel data. The kernel $x = x(y)$ is written $x = K^x(y, bw)$. 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 normally a substantial range where the kernel-curve is stable. It is surrounded with a 95% confidence interval. When it is narrow, the unification of the data is justified.

4. Some descriptive statistics

4.1 Correlations

Table 4 reports the basic correlations calculated with both the normal Pearson's r and Spearman's rank correlation ρ. 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 ρ is preferable. The three democracy indices are two-topped and hence far from normal. In the XT-rows Spearman's ρ is larger, by almost 10%. In the RT-row the two correlations give comparable results, so the distributions of the variables are of minor importance.

Table 4. Two correlations: r is Pearson's and ρ is Spearman's rank correlation

	Relation	W3, 95-98		W4, 99-04		W5,05-09		W6, 10-14		*All*, 95-18	
		r	ρ	r	ρ	r	ρ	r	ρ	r	ρ
T-sam.	XT	-0.58	-0.67	-0.62	-0.71	-0.69	-0.76	-0.71	-0.75	-0.68	-0.74
	yT	-0.80	-0.84	-0.80	-0.84	-0.78	-0.81	-0.74	-0.76	-0.77	-0.80
	N	214		577		637		1,182		2,610	
W-sample	XT	-0.67	-0.79	-0.64	-0.72	-0.66	-0.79	-0.58	-0.59	-0.64	-0.73
	RT	0.48	0.52	0.53	0.54	0.63	0.58	0.51	0.44	0.53	0.53
	yT	-0.82	-0.85	-0.83	-0.87	-0.74	-0.80	-0.66	-0.69	-0.76	-0.81
	N	53		72		56		59		240	

Recall the definition of variables: T is corruption, X is democracy, R is religiosity, and y is income. The democracy index, X, used for the table is V, polyarchy. The results are similar for F and P. N is the number of observations.

In the first two rows for the large T-sample the stability of the effects is fine. The stability is also acceptable for the waves of the W-sample even when they are as different as shown in Table 3. Thus, the XT-correlation is about -0.70, the RT-correlation is 0.53, and the yT correlation is about 0.80.

Table 5 has two parts. The upper part shows the correlations to y, income. They

demonstrate that the basic results in Table 4 are far from the full story. All the correlations between *y*, *X*, *R*, and *T* are substantial. A key observation is that the sum of the numerical values of the correlations to *T* from *X*, *R*, and *y* is about two, indicating a great deal of double counting.

Table 5. The correlations to income and growth

	Sam-	Rela-	W3, 95-98		W4, 99-04		W5, 05-09		W6, 10-14		*All*, 95-18	
	ple	tion	r	ρ	r	ρ	r	ρ	r	ρ	r	ρ
Income	T	Xy	0.65	0.68	0.66	0.74	0.63	0.68	0.62	0.66	0.62	0.68
	W	Xy	0.75	0.78	0.66	0.73	0.62	0.74	0.31	0.40	0.54	0.64
	W	Ry	-0.59	-0.58	-0.53	-0.54	-0.60	-0.65	-0.30	-0.52	-0.52	-0.57
Growth	T	Xg	0.09	0.03	-0.10	-0.12	-0.22	-0.23	-0.15	-0.25	-0.12	-0.16
	T	Tg	-0.14	-0.06	0.10	0.14	0.22	0.19	0.16	0.24	0.12	0.15
	W	Xg	0.10	0.14	-0.21	-0.29	-0.52	-0.54	-0.28	-0.26	-0.17	-0.24
	W	Tg	0.01	-0.10	0.27	0.35	0.60	0.62	0.16	0.14	0.22	0.25
	W	Rg	0.11	0.04	-0.01	0.06	0.29	0.32	0.04	0.15	0.10	0.13

The lower part of Table 5 reports the correlations to the growth rate. Most are small, and they are certainly unstable. Wiseman and Young (2014) found a negative relation between religiosity and growth. This relation does not replicate on the W-sample.

Finally, it should be mentioned that the corruption data has strong autocorrelation. The Ar(1) is about 0.8, and $\text{Ar(n)} \approx \text{Ar(1)}^n$ for the first seven n's. However, it is difficult to know how much of this autocorrelation is an artefact due to the calibration used in the compilation of the index. In addition, the data also contains some noise reducing the autocorrelation. Thus, the true autocorrelation is hard to know, though it is surely substantial.

4.2 Factor analysis

The factor analysis of Table 6 adds a crucial point to the correlation analysis. Both samples have one and only one common factor, and as seen from the factor loadings, it is the same factor. All variables except the growth rate load strongly to factor1. Factor2 has an eigenvalue below 1, indicating that it should be disregarded. It also follows from the table that the three *X*-variables (democracy) tell the same story, and that the growth rate does not matter for factor1.

The variables that matter for factor1 (*T*, *F*, *P*, *V*, and *y*) have almost the same values for the two samples. Thus, it is likely that if the *R*-variable had been available for the T-sample it would have been very close to -0.51.

Table 6. Factor analyses of the two samples

	T-sample $N = 2{,}610$		W-sample $N = 240$	
	Factor1	Factor2	Factor1	Factor2
Eigenvalue	3.66	0.50	3.87	0.74
Cumulative	0.92	1.04	0.88	1.04
	Factor loadings		Factor loadings	
T, Corruption	-0.77	0.40	-0.79	0.41
$X = F$, Freedom House	0.96	0.15	0.95	0.23
$X = P$, Polity	0.84	0.36	0.83	0.42
$X = V$, Polyarchy	0.96	0.15	0.94	0.24
R, religiosity	Not available		-0.51	0.33
y, income	0.71	-0.41	0.69	-0.42
g, growth	-0.11	-0.02	-0.20	0.09

The common factor is the transition in the five first variables, $T(y)$, $F(y)$, $P(y)$, $V(y)$, and $R(y)$; see Paldam (2021b). They had one level in traditional society and another in modern society. In other words, development is a confluent process where most macro variables have substantial correlations. In models where several such variables are used as regressors their coefficients suffer from multicollinearity. That is, they have a common part that is distributed randomly between the coefficients on the variables. Section 6.6 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.

5. The three transitions of institutions

Figures 1 and 2 show the transitions in the three institutional variables, while Figure 3 shows the XT and RT relations. The T-sample is used for all three curves on Figures 2a and 3a – they do not contain the scatter, as they are estimated on 3 *x* 2,610 observations. When the scatter is displayed, it is as hollow circles. They are provided with a small black dot in the middle for a western country. OPEC countries are shown as gray diamonds in the graph for the W-sample.

5.1 The transition of corruption in the two samples

It is reassuring that Figure 1a and b for the two samples give the same picture. The strong fall in the corruption index happens late. It is in the income interval [9.7, 10.75].

Two country groups are singled out. The observations for most western countries (with the black dot) stick out at the bottom. The OPEC countries are not included in the estimates of

the transition curves, but Figure 1b shows the OPEC countries as the gray diamonds above the transition curve.

Figure 1. The transition of corruption, $T(y)$, in the two data samples

Figure 1a. T-sample. $T(y)$ transition.

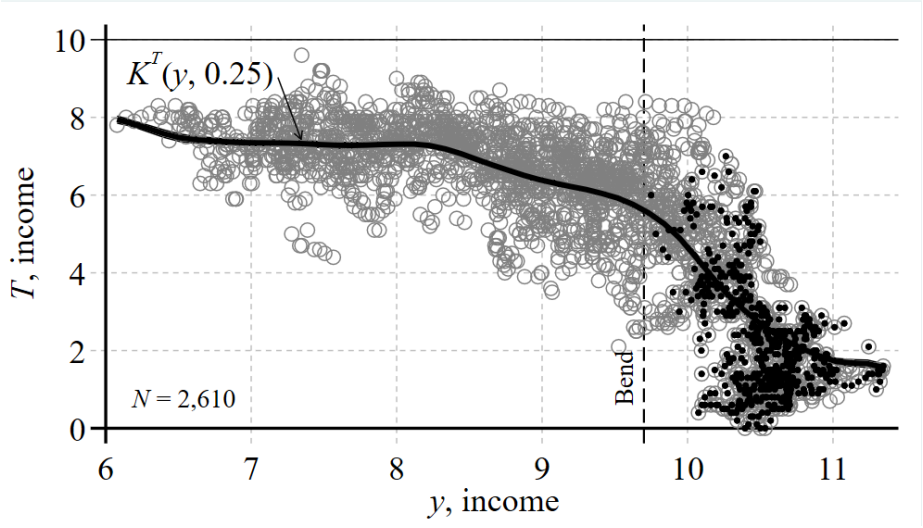
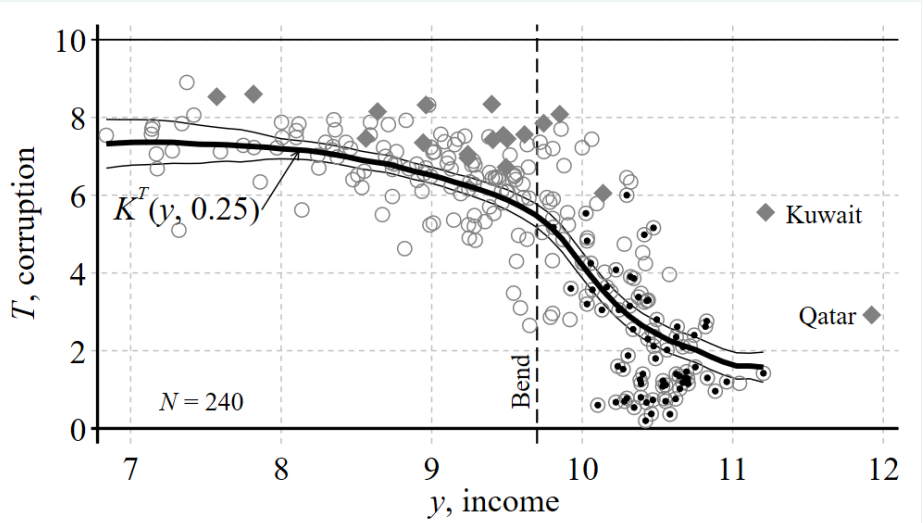


Figure 1b. W-sample. $T(y)$ transition.



5.2 The democratic transition and the transition of religiosity

Figure 2a is the democratic transition for the three X-variables. The curves have the same form, but the P-curve is higher. The polity index is more positive to democratic efforts of LDCs, while especially the polyarchy index has stricter standards which poor countries cannot meet.

Figure 2b is the religious transition. Here data is more limited, and the transition curve is less perfect. It looks like the transition is linear. However, this makes no sense – religiosity cannot keep falling and becoming negative. Thus, it must be interpreted as an incomplete transition. That is, the transition will continue for some time. When all 332 observations are considered (see Chapter 11 in Paldam 2021b), the weak bend on Figure 2b becomes clearer.

The level of religiosity may stabilize at 30%. The stories of the OPEC and the western countries in Figure 2b are the same as in Figure 1b. The OPEC countries are above, and most Western countries are below the transition curve.

Figure 2. The transitions of democracy, $X(y)$, and religiosity, $R(y)$

Figure 2a. T-sample. $X(y)$ transition, $X = F, P, V$.

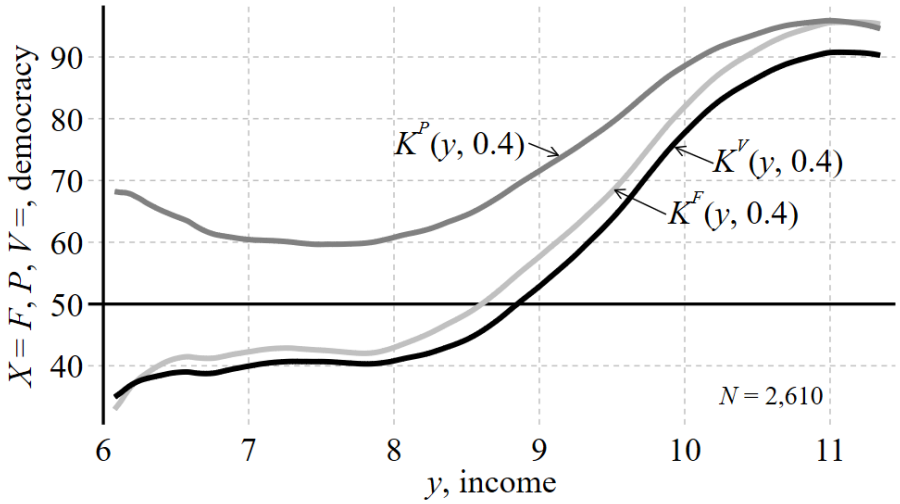


Figure 2b. W-sample. $R(y)$ transition.

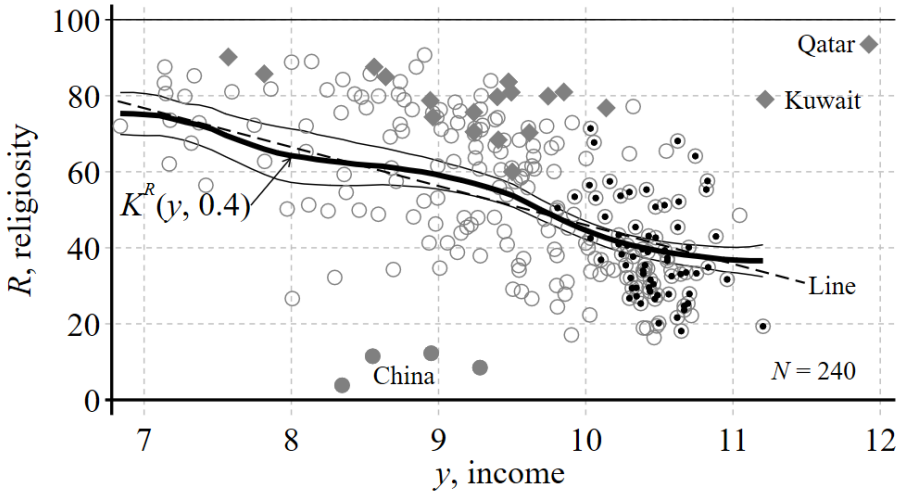


Figure 2b contains a straight line that is within the 95% confidence intervals, so it cannot be rejected that the transition is linear, but as argued in the text this makes no sense.

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.

5.3 Looking at the univariate XT and the RT relations

Figure 3 gives the kernel-graphs for XT and RT. They disregard the spurious element. Consider

first the two graphs 3a and 3b for XT on the two samples. They are as 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.

Figure 3. The form of the univariate $T(X)$ and $T(R)$ relations

Figure 3a. T-sample. XT-relation $T(X)$, $X = F, P, V$

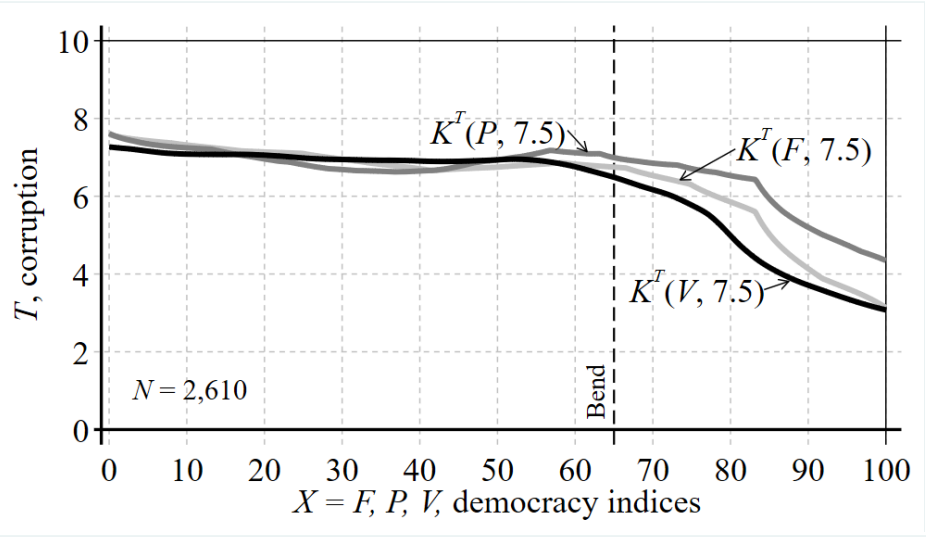


Figure 3b. W-sample. XT-relation $T(X)$, $X = V$.

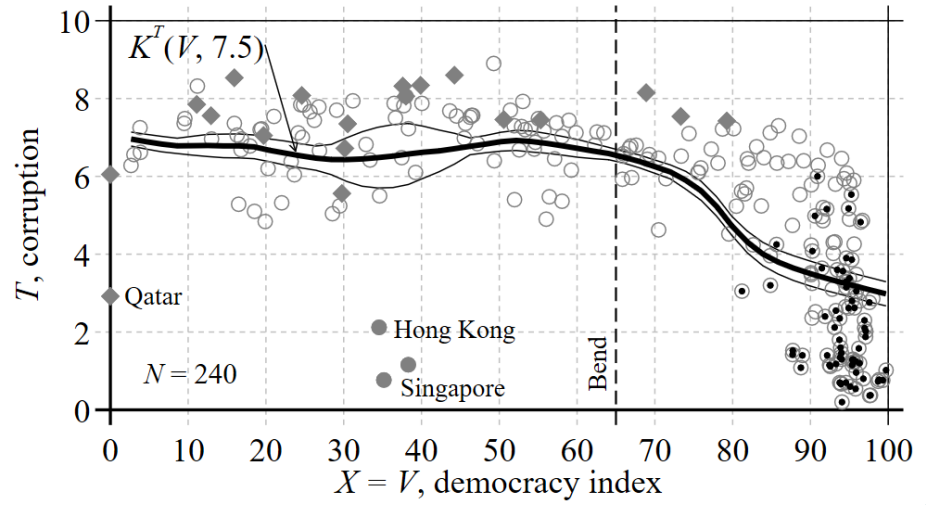
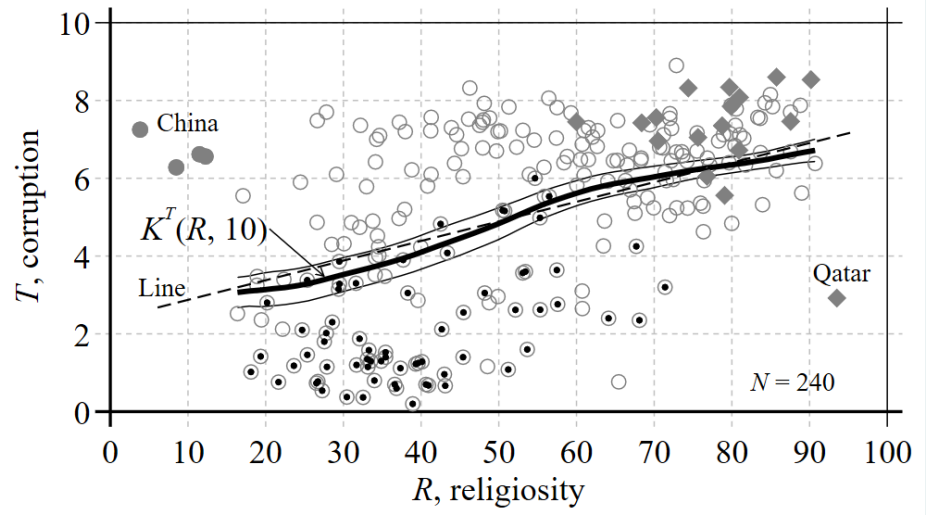


Figure 3c. W-sample. RT-relation $T(R)$.



OPEC countries deviate by combining high corruption and high religiosity. It is easy to understand. They have acquired substantial wealth without all the deep changes in society normally associated with development.

Western countries have both low corruption and low religiosity. On closer inspection the most extreme countries are 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 and high religiosity 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. The UK, New Zealand and Canada stick out in the same way, and so do Singapore.

These observations about the country groups will be further discussed in section 7.

6. Regressions: The linear approximation

The models in this section explain corruption, *T*, by OLS regressions. The *X*-variable used is *V* except in Table 7b showing that the results for $X = F$ and *P* are similar. The coefficient of variation, CV, (standard deviation over average) gives the stability of the estimates for the four waves. Parentheses hold t-ratios, aR^2 is the adjusted R^2, and *con* is the constant.

6.1 T-sample. XT-models explaining corruption, T, by democracy, X

Table 7a estimate the XT-relation on the large T-sample. Model (1) gives very stable results, with large t-ratios and small CVs. Much like the correlations in the XT row in Table 4. Model (2) controls the XT-relation for *y*. It has three effects: (i) The R^2-score increases about 50%, so relation (2) explains more of the variation. (ii) The coefficient α on *X* decreases, and (iii) becomes less stable. The same effects will appear in the next sections.

Table 7a. T-sample. Two XT-models as in Table 8

T-sample		Model (1) $T = \alpha_1 V + con$			Model (2) $T = + \alpha_2 V + \gamma_1 y + con$				α_2/α_1
Years	*N*	α_1	*Con*	aR^2	α_2	γ_1	*con*	aR^2	Ratio
95-98	214	-0.053 (-10)	8.40 (21)	0.33	-0.010 (-2.0)	-1.88 (-13)	23.01 (20)	0.64	0.18
99-04	577	-0.049 (-19)	8.60 (46)	0.38	-0.012 (-4.7)	-1.47 (-21)	19.68 (37)	0.65	0.25
05-09	637	-0.050 (-24)	8.77 (64)	0.48	-0.024 (-11)	-1.04 (-20)	16.64 (40)	0.68	0.48
10-14	653	-0.049 (-26)	8.60 (69)	0.51	-0.028 (-14)	-0.84 (-16)	15.08 (37)	0.65	0.58
All	2,610	-0.050 (-47)	8.63 (120)	0.46	-0.024 (-23)	-1.06 (-38)	16.69 (76)	0.65	0.49
CV		-0.04	0.02	0.17	-0.42	-0.31	0.16	0.02	0.44

Table 7b. T-sample. XT, model (2) for the three democracy indices, $X = F, P, V$

	Model (2) $T = + \alpha_X X + \gamma_1 y + con$, for $X = F, P$ and V, for $N = 2{,}610$					
X	α_F	α_P	$\alpha_V = \alpha_2$	γ_1	*con*	aR^2
F	-0.024 (-24)	-	-	-1.04 (-38)	16.63 (76)	0.66
P	-	-0.014 (-14)	-	-1.29 (-50)	18.40 (86)	0.61
V	-	-	-0.024 (-23)	-1.06 (-38)	16.69 (76)	0.65

The regression for *V* in Table 7b is the same as the *All* row for model (2) in Table 7a.

The results for the first two periods are small, but here the samples are less representative, and do not influence the *All*-regression. Table 7b shows that the results for the *V*-index generalize neatly to the other two democracy indices as expected from Figures 2a and 3a.

6.2 W-sample. XT- and RT-models explaining corruption, T, by X and R

The W-sample has only 9% of the observations of the T-sample. However, the W-sample allows estimates of the effects on corruption of both democracy and religiosity. The estimates in Table 8 replicate the results in Table 7a. The results are also highly significant, but the t-ratios fall substantially as they should.

Table 8. W-sample. XT, explaining corruption, *T*, by democracy $X = V$

W-sample		Model (1) $T = \alpha_1 V + con$			Model (2) $T = + \alpha_2 V + \gamma_1 y + con$				α_2/α_1
Wave	*N*	α_1	*con*	aR^2	α_2	γ_1	*con*	aR^2	Ratio
W3	53	-0.069 (-6.5)	9.91 (12)	0.44	-0.013 (-1.0)	-2.08 (-6.0)	25.42 (9.6)	0.67	0.18
W4	72	-0.053 (-7.1)	8.67 (16)	0.41	-0.015 (-2.1)	-1.83 (-8.3)	23.34 (13)	0.70	0.27
W5	56	-0.053 (-6.5)	8.72 (14)	0.43	-0.027 (-3.1)	-1.17 (-4.8)	18.06 (9.0)	0.60	0.51
W6	59	-0.039 (-5.4)	7.64 (16)	0.32	-0.028 (-4.5)	-1.21 (-5.9)	18.62 (9.7)	0.57	0.71
All	240	-0.051 (-13)	8.48 (29)	0.40	-0.026 (-6.9)	-1.44 (-13)	20.48 (21)	0.64	0.50
CV		-0.19	0.09	0.12	-0.34	-0.25	0.15	0.08	0.49

Table 9 is parallel to Table 8, but *V* is now replaced with *R*. Model (3) corresponds to Model (1) in Table 8, while Model (4) corresponds to Model (2). 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 and becomes quite unstable, even when the aR^2 doubles.

Table 9. W-sample. RT, explaining corruption, *T*, by religiosity, *R*

W-sample		Model (3) $T = \beta_1 R + con$			Model (4) $T = \beta_2 R + \gamma_2 y + con$				β_2/β_1
Wave	*N*	β_1	*con*	aR^2	β_2	γ_2	*con*	aR^2	Ratio
W3	53	0.060 (3.9)	1.73 (2.2)	0.22	-0.001 (0.1)	-2.36 (-8.3)	27.15 (8.8)	0.66	0.02
W4	72	0.069 (5.2)	1.37 (1.8)	0.27	0.016 (1.6)	-1.96 (-9.9)	22.69 (10)	0.69	0.24
W5	56	0.069 (5.9)	1.54 (2.4)	0.38	0.032 (2.7)	-1.25 (-5.1)	15.32 (5.6)	0.58	0.46
W6	59	0.049 (4.5)	2.63 (3.9)	0.25	0.026 (2.6)	-1.23 (-5.1)	15.74 (6.0)	0.48	0.54
All	240	0.061 (9.8)	1.84 (5.1)	0.28	0.022 (4.1)	-1.62 (-14)	19.30 (15)	0.59	0.37
CV		0.14	0.27	0.23	0.68	-0.28	0.24	0.14	0.71

Table 10 is the full model where *T* is explained by *X*, *R*, and *y*. The effect of both *X* and *R* falls by about 40%, but the sign of the effect stays the same. However, for the first two waves the results for both institutional variables are insignificant. The estimates of the two effects give the specific effects of the two variables. Thus, the specific effects of democracy and religiosity are -0.023 and 0.016, respectively. Recall Figures 1 and 2 for the long run.

Table 10. W-sample. XRT, explaining corruption, *T*, by both *X* and *R*

W-sample		Model (5) $T = \alpha_3 V + \beta_2 R + \gamma_3 y + con$				
Wave	*N*	α_3	β_2	γ_3	*con*	aR^2
W3	53	-0.013 (-1.0)	0.002 (0.2)	-2.31 (-7.8)	24.96 (6.6)	0.66
W4	72	-0.013 (-1.7)	0.012 (1.2)	-1.74 (-7.5)	21.75 (9.4)	0.70
W5	56	-0.025 (-3.0)	0.029 (2.6)	-0.85 (-3.2)	13.38 (5.1)	0.64
W6	59	-0.025 (-4.1)	0.018 (1.9)	-1.05 (-4.9)	16.00 (6.9)	0.61
All	24	-0.023 (-6.3)	0.016 (3.1)	-1.29 (11)	18.10 (15)	0.65
CV		-0.33	-0.64	-0.39	0.24	0.05

The democracy indices move a great deal in this perspective. Let us imagine that the democracy indices jump by 30 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 a couple of 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 10% over a decade. That will give a fall in the corruption of 0.15 points, so the corruption effect is surely small.

6.3 T and W samples. yT-models income y explaining corruption, T

To sort out the common and the specific effects of the variables, the univariate effect of *y*, the strongest variable, is needed. Table 11 reports the results, yielding three observations:

Table 11. Both samples. yT, explaining corruption, *T*, by income, *y*

T-sample. Model (6) $T = \gamma_T y + con$					W-sample. Model (6) $T = \gamma_W y + con$					aR^2
Period	*N*	γ_T	*con*	aR^2	Wave	*N*	γ_W	*con*	aR^2	Ratio
95-98	214	-2.06 (-19)	23.99 (24)	0.64	W3	53	-2.35 (-10)	26.99 (12)	0.67	0.95
99-04	577	-1.69 (-32)	20.84 (43)	0.64	W4	72	-2.12 (-12)	25.17 (16)	0.68	0.94
05-09	637	-1.42 (-32)	18.65 (46)	0.61	W5	56	-1.64 (-8.0)	20.65 (11)	0.53	1.15
10-14	653	-1.22 (-28)	17.49 (41)	0.55	W6	59	-1.50 (-6.6)	19.88 (9.0)	0.42	1.29
All	2,610	-1.45 (-61)	18.75 (86)	0.59	*All*	240	-1.87 (-18)	22.89 (23)	0.57	1.03
CV		-0.20	0.12	0.06	CV		-0.18	0.13	0.19	0.14

The aR^2 ratio compares the model fit on the T-sample and the W-sample. In the *All*-row the T-sample explains 38% more.

(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.

6.4 The replicability of the results and 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 analysis has replicated the results for *T*, *X*, 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 12. Marginal effects of variables explaining corruption

Sample		Contribution		Effects	W3	W4	W5	W6	*All*
T-sample	(1)	Total effect	Model (2) Table 7a	aR^2	0.64	0.65	0.68	0.65	0.65
	(2)	*V* marginal	Deleting *V*	$-\Delta aR^2$	0.00	0.01	0.06	0.11	0.07
	(3)	*y* marginal	Deleting *y*	$-\Delta aR^2$	0.31	0.28	0.20	0.14	0.19
	(4)	Sum of the two marginal effects			0.31	0.29	0.26	0.25	0.26
	(5)	Fraction explained by the marginal effects			48%	44%	39%	38%	39%
W-sample	(6)	Total effect	Model (5) Table 10	aR^2	0.66	0.70	0.64	0.59	0.65
	(7)	*V* marginal	Deleting *V*	$-\Delta aR^2$	0.00	0.01	0.06	0.12	0.06
	(8)	*R* marginal	Deleting *R*	$-\Delta aR^2$	-0.01	0.00	0.04	0.02	0.01
	(9)	*y* marginal	Deleting *y*	$-\Delta aR^2$	0.15	0.24	0.06	0.17	0.16
	(10)	Sum of the three marginal effects			0.14	0.25	0.16	0.30	0.23
	(11)	Fraction explained by the marginal effects			22%	36%	25%	51%	36%

The marginal effect on the aR^2 of the two/three variables are reported by Table 12. 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 (2) from Table 7a. Row (2) shows the effect of deleting the *X*-variable (that is *V* as before). 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 *X*-variable (where $X = V$) is omitted. In the *All*-column aR^2 falls by 0.06, i.e., from 0.65 to 0.59. 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 is by far the largest fall.

Row (10) brings the sum of the three marginal effects, which is 0.23 in the *All*-column. The total results in rows (1) and (6) is the same for the T-sample and 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.

7. The micro-macro problem for the RT-relation

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 very 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.

7.1 W sample. Three models without and with fixed effects

The standard way to remove the between-countries effect is to include fixed effects for

countries in the model. Table 13 reports what happens to the coefficients on democracy, *X*, and religiosity, *R*, with and without fixed effect for countries.

Table 13. W-sample. The coefficients on *X* and *R* without and with fixed effects for countries

XT: The coefficients on democracy, *X* =*V*		
For *All N* = 240	Without FE	With FE
Model 1 Table 8	-0.051 (-13)	-0.005 (-0.8)
Model 2 Table 8	-0.026 (-6.9)	-0.001 (-0.2)
Model 5 Table 10	-0.023 (-6.3)	-0.000 (-0.0)

RT: The coefficients on religiosity, *R*		
For *All N* = 240	Without FE	With FE
Model 3 Table 9	0.061 (9.8)	-0.007 (-0.9)
Model 4 Table 9	0.022 (4.1)	-0.014 (-2.0)
Model 5 Table 10	0.016 (3.1)	-0.014 (-1.9)

XT: A political regime is the same for the whole country. Thus, the fixed effects for countries should account for the full effect of *X*, and as predicted, the estimates on *X* vanish when fixed effects are included.

RT: The fixed effects should turn the macro coefficient on *R* to reveal the micro effect. As expected, fixed effects change the coefficient on *R* from positive to negative. It becomes a bit smaller, but it is mostly significant. Thus, the findings in Table 13 confirm that the within-country effect -0.014 is negative but small. It causes a reduction of the macro effect, so that the pure macro effect would have been 0.014 larger without the micro effect, i.e., from model 5 it becomes 0.030.

7.2 RT-relation: The deviations from the transition path $T^D = T - T(y)$

Model 4 in Table 9 shows the effect of controlling the RT-relation (the religiosity-corruption) for income *y*. This is a rough approximation that assumes linearity. However, the non-linear $T(y)$ transition curve is estimated in Figure 1. The best estimate of $T(y)$ in Figure 1a, from this estimate the deviation from the transition curve $T^D = T - T(y)$ can be calculated. While the correlation r(R, T) = 0.53 the correlation r(R, T^D) = 0.25, corresponding to the linear approximations in Table 9. The T^D-series allows us to identify the relatively corrupt countries, which are the two groups mentioned in section 5.

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(R, T) = 0.50 the correlation r(R, T^D) = 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(R, T) = 0.44 the

correlation r(R, T^D) = 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(R, T) = 0.40 the correlation r(R, T^D) = 0.02.

7.3 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 14 lists the high end of the 16 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.[8]

Table 14. High-end countries for low corruption. Average, and the top 3 and top 10 list

Country	Av	T3	T10	Country	Av	T3	T10	Country	Av	T3	T10	Country	Av	T10
Denmark	0.71	27	29	Singapore	1.11	5	29	Iceland	1.52	4	12	UK	1.91	5
New Zealand	0.80	27	29	Switzerland	1.32	3	26	Canada	1.53		20	Germany	2.07	6
Finland	0.82	25	29	Norway	1.36	1	26	Luxembourg	1.66		13	Hong Kong	2.21	
Sweden	1.03	10	29	Netherlands	1.41		28	Australia	1.68		13	Austria	2.33	1

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 16 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. Ireland is also twice on the top-10 list.

8. 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 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, X, religiosity, R, and income, y, is about 0.65. If the R-variable had been available for the T-sample, the total aR2-score may have increased a little – probably to 0.67. This all means that the analysis

[8] 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).

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, X, is 0.40 and 0.46 in the W- and the T-sample, 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 0.28 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 X-variable. As the common element is relatively large, the specific effect is about 0.02.

As mentioned in the first sentence of the paper, 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 in Table 11, where it was 0.57.

Sources:

Freedom House, source of *F*. https://freedomhouse.org/countries/freedom-world/scores

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 (2021b)

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:

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

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

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

Gundlach, E., Paldam, M., 2009. The transition of corruption: From poverty to honesty. *Economic Letters* 103, 146-48

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

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

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 Transition of Corruption Institutions and dynamics. *European Journal of Political Economy* 67(2) paper 101952. Updated in chapter 10 of Paldam (2021b)

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

Paldam, M., 2024. Income, Growth, and Democracy. Looking for the main causal directions in the nexus. *European Journal of Political Economy* (forthcoming)

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

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