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Keywords: Corruption, cross-country, income vs institutions
Jel code: D73, K42, P48

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1. Introduction: Cross-country corruption patterns

This paper uses the *Transparency Internationals* index, *T*, for corruption vs honesty.[2] When *T* rises, corruption falls. It reflects that corruption is a social ill, so *T* rises when honesty increases.

Section 2 discusses three main theories. Two are short-run theories with the reverse causal direction. (i) The *demand* theory: Honesty is a 'good' with a positive income elasticity. (ii) The *factor* theory: Honesty is a factor of production. The third is a long run theory. (iii) The *transition* theory: It claims that development causes honesty, and that an underlying transition path is strong in the data, as is indeed the case; see section 3. Gundlach and Paldam (2009) report a formal causality test for the long run. It finds that the main causal direction is from income to honesty, in accordance with both the demand and transition theories.[3]

Table 1 is a preview of the results. It gives four sets of six correlations: the right and the left hand panel for country averages vs individual observations and over and below the diagonal for all countries vs non-OPEC countries, see Figure 2c below. Note that the same correlations in each set are rather similar in most cases.

The table shows the robustness of two basic facts: Cells (a) report four correlations of *T* and income, *y*, which show ***(A) the level*** of income has a large positive relation to *T*. Cells (b) report four correlations of *T* and growth, *g*, which show ***(B) the growth*** of income has a negative relation to *T*. Facts (A) and (B) are a puzzle: (A) must be due to some relation(s) in the short run, but (B) surely fails to aggregate to (A). These facts and the remaining cells in the table will be discussed as we go along.

Table 1. Some correlations for country averages and for all observations, 1995-2016

	Country averages N = 166 and 151				All observations N = 2,977 and 2,730			
	T	*D*	*y*	*g*	*T*	*D*	*y*	*g*
T-index	-	**0.60**	**0.73** (a)	**-0.16** (b)	-	**0.64**	**0.73** (a)	**-0.08** (b)
D-index	**0.65**	-	-0.04 (c)	-0.08 (d)	**0.67**	-	**0.02** (c)	-0.00 (d)
y, income	**0.78** (a)	0.12 (c)	-	-0.04	**0.77** (a)	**0.12** (c)	-	**-0.07**
g, growth	**-0.17** (b)	**-0.17** (d)	0.00	-	**-0.09** (b)	-0.01 (d)	**-0.06**	-

Note: Significant correlations are bolded. Correlations above the diagonal are for all 166 countries with 2,977 observations. Correlations below the diagonal are for the 151 non-OPEC countries with 2,730 observations. The *D*-index measures corruption relative to the transition path, as discussed in section 3.

2. The index use a scale from 0 to 10 points. It started in 1995 in with data for 41 countries. In 2018 the data goes to 2017 had has reached 188 countries and 3,156 observations. The sample misses 13% of the observations.
3. This is also in accordance with the tail-wagging model: A dog can wag its tail, but not the other way around, though there might be repercussions where a vigorous wagging moves the dog a little.

Section 3 also reports a new *D*-index that measures corruption relative to the transition path, i.e., are countries too corrupt or too honest for their income level. When the *D*-variable is used in cells (c) and (d), the negative growth effect is smaller, so the puzzle decreases, and in section 3.3 it proves to be temporary, but it still lasts a dozen years. Thus, the relations studied proves to have complex dynamic interactions.

The puzzle suggests that the positive relation of income and corruption is indirect, so that it works through some other variables. The paper claims that these variables are institutional. Consequently, section 2.4 expands the transition theory into an institutional theory, saying that development changes institutions in ways that cause corruption to fall, which gives delays in the relations. Section 4 analyze the relation of *T* and *D* to two aggregate indices that are chosen to catch institutions broadly: The political system is measured by the Polity index, and the economic system is measured by the Fraser index for economic freedom. Both of these indices have a transition, so they have a spurious relation to the *T*-index. The *D*-index reduce the spuriousness of the relations, and still find clear relations.

The two institutional indices are also used to calculate measures of institutional change, which people often seems to see as system instability. Just like the growth rate they proves to have a negative correlation to corruption.

Section 5 gives six examples of countries with different levels of corruption that can be explained by the theory, three are to pairs of neighboring countries that are similar in most respects, but where one has much more instability and corruption. The last three are to countries with unusually large crises, and rising corruption. Finally, section 6 concludes.

2. Notes on the literature

Researchers started to notice the new corruption data in the late 1990s. The old literature before that was theory based on anecdotal evidence. After data became available, a new literature emerged.[4] Two large books survey these literatures and republish the main papers. They are: Heidenheimer *et al.* (1989) for the old literature, and Dutta and Aidt (2016) for the new.

A main question in the old literature is how to delimit corruption from other types of fraud and rent seeking. A number of definitions have been proposed. I prefer: *Corruption is the abuse of entrusted power for private gain*. This definition implies a principal-agent framework,

4. Treisman (2000) and Paldam (2001, 2002) started the cross-country approach independently in 1999, where *T* data covered 100 countries and 336 observations.

with an agent who deals with a third party. Corruption occurs when the agent colludes with the third party to defraud the principal. The longest chains of agents and sub-agents exist in the public sector. Hence, it is particularly prone to corruption.

Another question deals with measurement: The *T*-index aggregates a number of primary indices of perceptions of corruption by a calibration method.[5] It has changed over time; see section 3.4. If the true corruption is termed, T_{it}*, it is surely measured with an error, τ, so that $T_{it} = T_{it}^* + \tau_{it}$. From all we know the error is less than one point and contains a complex process of autocorrelation that has changed over time. Aidt (2003) gives a survey of the measurement discussion. The calibration method was developed by Johann Graf Lambsdorff; see the appendix of his book from 2007. I use the index as posted, but until section 5 conclusions are based on cross-country averages over N countries, where $N > 100$, so the error is divided by $\sqrt{N}$.

2.1 The three main theories

The discussion refers to the two facts mentioned in the introduction: (A) the strong correlation of y (income) and T, and (B) negative correlation of g (growth) and T. The fact that poor countries are corrupt and rich countries are honest can be explained both from the consumption and the production side by two simple mono-causal theories: [6]

The demand theory sees honesty as a 'good' with a positive income elasticity. It speaks for this theory that it can be extended to a whole family of 'nice' goods, such as democracy, generalized trust and various cultural goods. The 'consumption' of these goods increases when income rises, but they are intangible and imprecisely measured, and their prices are difficult to impute, so the parallel to goods is a bit of a construct. However, it is clear that they are 'nice' to have, but not really necessary. Most poor countries are weak on honesty and democracy, and has few art museums. The consumption of other intangible 'goods', such as religion, decreases when income rises. Thus, intangible 'goods' may have both positive and negative income elasticities. In this theory the causality is: $y \Rightarrow T$, where y is income.

The factor theory sees honesty as a factor of production that saves time and efforts in all transactions, and it also sees bribes as a cost. This will be further discussed in the next section. Here, causality is the reverse, and has two links: $T \Rightarrow g \Rightarrow y$. Both short-run theories

5. The calibration mean that the 38 countries covered all years have virtually the same average score throughout, but the average for all countries falls due to the gradual inclusion of more low and middle income countries.
6. The old literature suffers from a problem of politeness. Though it was widely known, it was not nice to mention that the level of corruption is higher in poor countries. Consequently, most papers in Heidenheimer dealt with the USA, and the 1,776 pages of volume 1 of the Handbook of Development (Chenery and Srinivasan 1988-89) did not mention corruption. This changed after data appeared, as seen already from the title of Dutta and Aidt (2016).

suffer from the problem that the growth link (B) is negative.

The transition theory:[7] The change from corruption to honesty is a consequence of development. I understand this as a reduced form relation with the causal direction $y \Rightarrow T$. Section 2.4 discuss if it can be modeled as indirect mechanism bypassing (B).

2.2 The causality controversy and the sand vs grease parables

The demand and the transition theories see corruption as a social ill that vanishes over time as countries develop, while the factor theory provides a double argument to fight corruption. It is not only a social ill in itself, but also *sand* in the machine of development. Some authors, notably Lambsdorff (2007), stress this theory and provide some evidence. The key argument is that corruption is an extra cost of production. This should give a positive correlation (B) of T and growth. The evidence suggests that this link has the wrong sign. Maybe corruption works as *grease* in the machine, increasing efficiency.

Thus, in a growth perspective corruption is either sand or grease in the machine.[8] Especially as regards public regulations, it is easy to come up with examples supporting either view:

Some regulations improve welfare, so corruption reduces the improvement. Examples are compulsory inoculation programs to eradicate epidemic diseases, or regulations reducing air pollution, etc. Even if corruption allow the individual get a welfare improvement by circumventing the regulation, it has large positive externalities disregarded by individual.

Other regulations harm welfare, so corruption limits the harm: It is easy to mention regulations that mainly serve to produce rents to politically influential groups. This, e.g., applies to most tariffs. Also, in many LDCs it is a problem that the time and effort needed to obtain property rights to a new business are far too large; see de Soto (2000).

While such grease-cases might be common, they often have several dynamic side effects that may change the conclusion: Perhaps the risk of corruption has made it necessary to have several layers of expensive controls that slow down the administrative process, so it is corruption that turns corruption into grease! A further aspect of the story is that the regulators themselves may slow down administrative processes precisely to extract bribes. To solve the full model in such cases becomes rather complex, and there are many different cases, so even if neat models have been constructed they do not cover all possibilities.

7. Transition theory sees development as a change between two steady states: the traditional and the modern, where all socio-economic variables have (very) different levels.
8. The sand theory is, as mentioned, much more popular. The grease theory that corruption increases growth goes back to Leff (1964), while Leys (1965) argues that corruption is a 'harmless' way of life in many countries.

Several researchers have tried to estimate reduced form models, with both grease-terms and sand-terms. Normally they both become significant, but they are hard to sort out; see Méon and Sekkat (2005) and Méon and Weil (2010) for somewhat different results. If both the sand and the grease mechanism work, this may explain fact (B), the negative correlation of growth and *T* (and *D*) from Table 1.

The sand vs grease parable has a parallel as regards bribes: One may see a bribe as a cost or as a cost saving device.

2.3 The internal dynamics of corruption

Many papers, starting perhaps with Andvig and Moene (1990), argue that corruption is dynamic: Corrupt countries tend to become more so, and honest countries become more so as well. Paldam (2002) gives an overview of some mechanisms having this 'seesaw' dynamics:

(i) It is impossible to punish everybody if they are all corrupt, but if few are corrupt, they can be punished.

(ii) The corrupt needs to announce his business, and it is typically done by conspicuous consumption – a Mercedes Benz is the classical method in poor countries, where no civil servant can afford a car from his salary. With low corruption such advertisement announces a criminal.

(iii) Jobs have different potential for corruption, and the jobs with the highest potential see wages competed down, so that the honest seek other jobs. Thus, the corrupt and the honest sort themselves out in jobs by high and low potential for corruption – this increases corruption.

This suggests that corruption is stuck at rather low *T*-values in most countries, as we see below, but once it starts to fall, the rise in the *T*-values is quite large.

2.4 Corruption and institutions

A main problem using institutional explanations is that 'institutions' is a wooly term. Consequently, the Polity index, *P*, is used to catch the political system, and the Fraser index, *F*, to catch the economic system. Systems are multidimensional and both indices aggregate many aspects. [9] The next section shows that the *T*-data contain a neat transition curve, but so does both the *P* and the *F* data; [10] see Figure 6 below. Thus, *y*, *T*, *P* and *F* are rather confluent due to joint transitions – relations between these variables include a great deal of spuriousness.

9. Corruption is also closely related to trust and social capital in general, but the relations seem to be conceptual, and it will not be discussed at present; see Paldam (2009).

10. See Paldam and Gundlach (2018) on the transition in *P* and Bjørnskov and Paldam (2012) on the transition in *F*. The latter use an economic system indicator from the World Values Survey. It gives peoples preferences for private vs public ownership to business – it has a very similar transition to the one of the *F*-index.

Corruption and political institutions: Apart from the confluence, it is likely that democracy and honesty reinforce each other. When civil servants are honest, people are more likely to trust elections, and hence the elected politicians. Thus, we expect that the correlation of the *T*-series and the Polity index *P* is more than spurious. The *D*-index, defined in a moment, is meant to reduce spuriousness.

Corruption and economic institutions: People have different economic ideologies. The Fraser index measures the freedom to run a private business. This is an aspect reflecting the preferences at one side of the political spectrum. Thus, apart from the confluence *F* is linked to corruption, in another way: Corruption often occurs to evade public regulations, and high values of the Fraser index indicate that few such restrictions exist. Once again, the *D*-variable should reduce spuriousness in the relation.

The empirical analysis also uses three measures of institutional stability; see section 4.1. I think that there is a parallel to the effect of poverty. Uncertainty is another hardship that is likely to increase corruption. Unfortunately, also instability has the problem of confluence, as it decreases with development; see Paldam (2018).

Thus, in the empirics of sections 3 and 4 strive to sort out the effect of development as proxied by income from all other effects analyzed.

3. The two facts (A) and (B) and the *D*-variable

Section 3.1 looks at income, *y*, and the *T*-index to find the transition path – termed T^{κ} – and it defines the *D*-index, while section 3.2 analyzes the robustness of the T^{κ}-path. Section 3.3 looks at growth, *g*, and the *T*- and *D*-indices, while section 3.4 analyzes the inertia in the series.

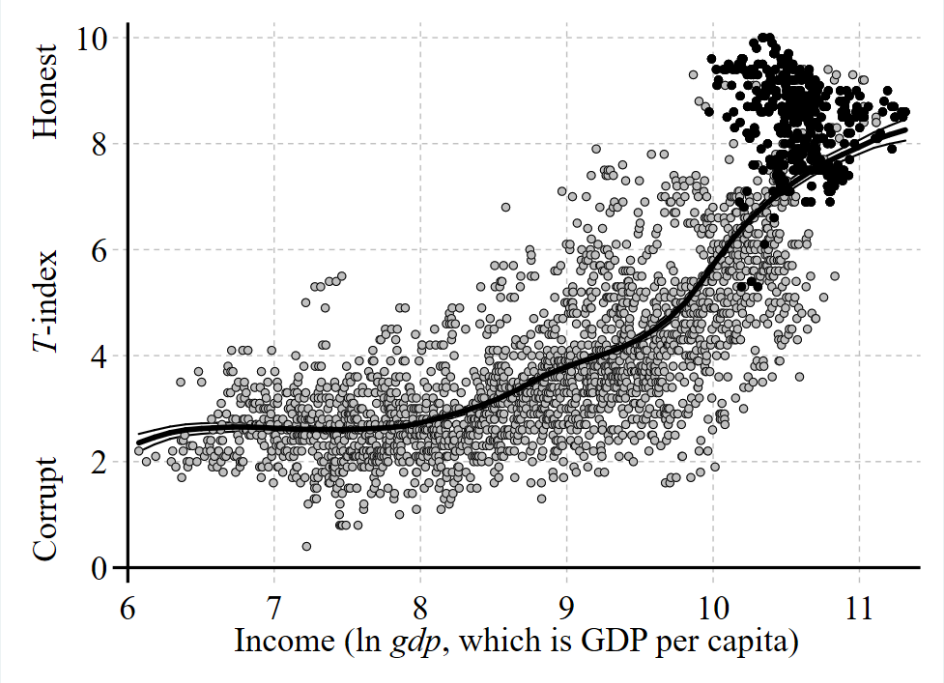
The *T* data cover 188 countries and have N = 3,156 observations. The economic data are the *cgdppc*-series from the 2018 version of the Maddison Project Database. These data are the *gdp* (GDP per capita) in real PPP prices. The logarithm to *gdp* is *income*, *y*. The overlapping data for *T* and *y* are from 166 countries (N = 2,730), of which 15 are OPEC countries (N = 247).

3.1 (A) the relation of y and T and the D-index

The correlations of *T* and *y* are in cells (a) of Table 1. They are from 0.73 to 0.78. Figure 1 is the scatter of the *T*-score over income for all observations from the 151 non-OPEC countries. A kernel regression, $T^{\kappa}(y)$, is included.[11]

11. Paldam and Gundlach (2018) discuss the use of kernel regressions in the study of transitions. I use $X^{\kappa}(z)$ for the kernel in *X* over *z*. A note gives the bw (bandwidth), while all kernels use Epanechnikov's formula.

Figure 1. All non-OPEC observations for the *T*-index, with a kernel regression $T^{\kappa}(y)$



Note: Epanechnikov kernel, with bandwidth 0.3, 95% confidence intervals, N = 2,730. The *gdp* data are from the 2018-update of the Maddison project. The most deviating group of countries is the North West countries; see Tables A2 and A3 in the Appendix. The NW-countries are the black circles at the top.

The kernel looks as a typical transition curve, rising about six *T*-points from 2½ at the poor end to 8½ in the wealthy end. The flat section at the low end is well defined, while the convergence to a stable level at the high end is incomplete. This suggests a slow adjustment to income changes. The North-Western countries have been wealthy for at least half a century, and the black circles for these countries have a level well above the transition curve and suggests that the transition may end at 9 points.

Thus, we have identified the path, $T^{\kappa}(y)$, for the transition of corruption. From that path the *D-index* is defined as: $D_{it} = T_{it} - T^{\kappa}(y_{it})$, where t is time and i is country. The *D*-index is negative if the country has 'too' much corruption, and it is positive if the country has 'too' little corruption at its level of development. Table 1 showed the correlation of D and y in cells (c). They are from -0.04 to 0.12. This is insignificant, precisely as it should.

3.2 Robustness of the $T^{\kappa}(y)$-kernel from Figure 1

Figure 2a shows the robustness of the T^{κ}-curve to the bandwidth. As usual the kernel is a bit wobbly for small bandwidths and becomes more and more linear (and flat) for large bandwidths, but the basic form is rather robust. Figure 2b reports that the curve is rather stable over

time – though it does move marginally to the right. Figure 2c shows that the transition curve has the same form for OPEC and non-OPEC countries. As the OPEC-countries are relatively wealthy at each level of development, the T^{κ}-curve shifts to the right for these countries.

Figure 2. Analyzing the robustness of T^{κ}

Fig. 2a. Estimates of T^{κ} for 6 bandwidths

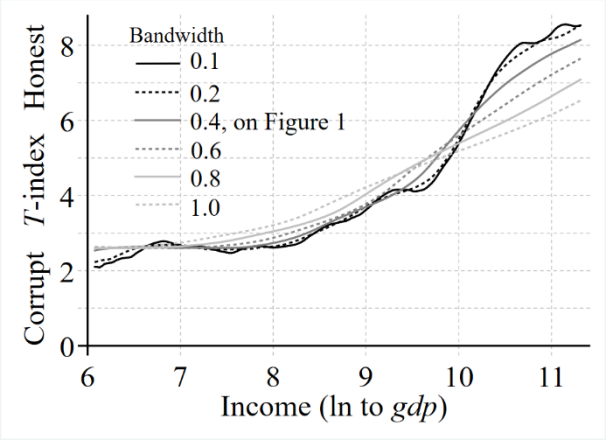


Fig. 2b. Estimates of T^{κ} for 5 periods

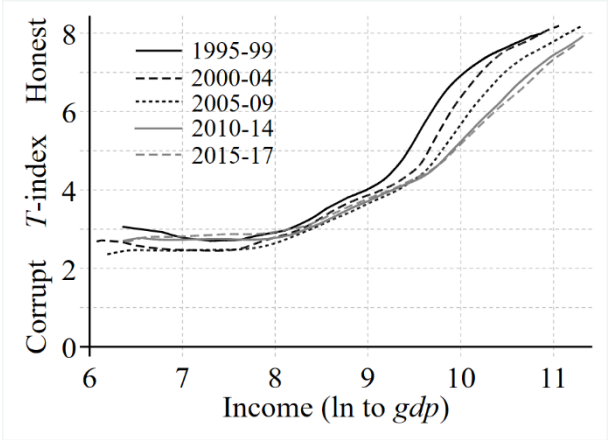
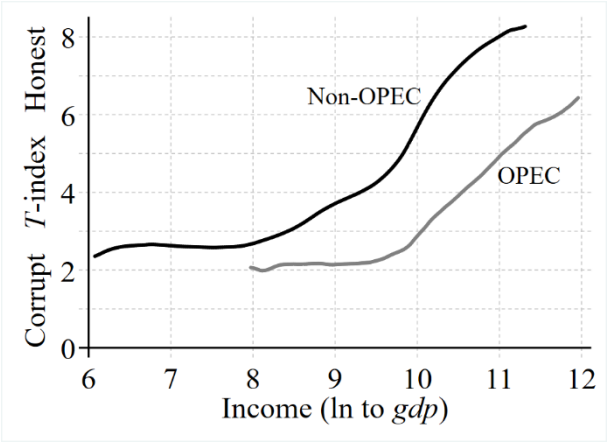


Fig. 2c. Estimates of T^{κ} for OPEC and non-OPEC countries



Note: The scatter is suppressed on the three graphs. Epanechnikov kernel, bw = 0.4 on Figures b and c.

3.3 (B) the static and dynamic relations of growth, g, and T and D

Cells (b) in Table 1 reported that cor(T, g) is from −0.08 to−0.17 – they are all significant. Cells (d) gives cor(D, g) from 0 to -0.17 – they are mostly insignificant. These correlations are static. The dynamics is analyzed by Figures 3 that show correlograms between g and T (on Figure 3a) and the g and D (on Figure 2b). The intersections with the vertical axis for no leads or lags are the correlations from Table 1.

Figure 3. Correlogram between growth, *g*, and corruption, *T* and *D*

Fig. 3a. Growth and the *T*-index

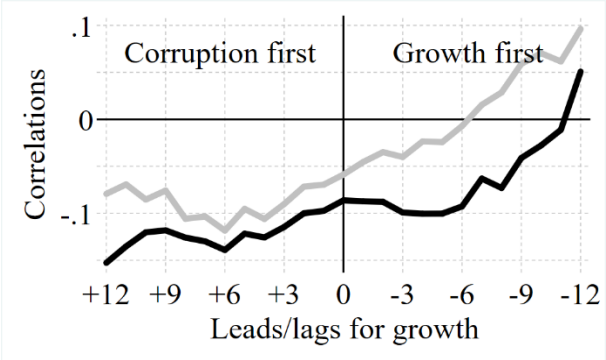
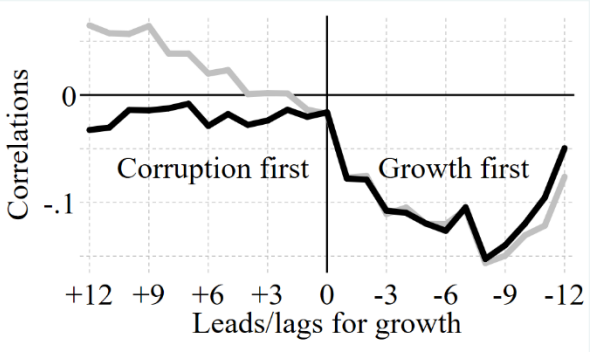


Fig. 3b. Growth and the *D*-index



Note: The unlagged correlation is made on N = 2,783 observations, and for each lag to either side about 160 observations are lost. The black curve are for all countries, while the 20 most developed countries and the OPEC countries are deleted for the gray curve. Countries with less than 5 observations are omitted.

Figure 3a is on the raw data so it does contain the cross-country version of the transition in corruption, while it is deleted from the *D*-data used for Figure 3b. As already argued that makes the negative correlation from corruption to growth go away. That is, while both curves to the left of the vertical axis are negative on Figure 3a this is not the case on Figure 3b where the effect is insignificant.

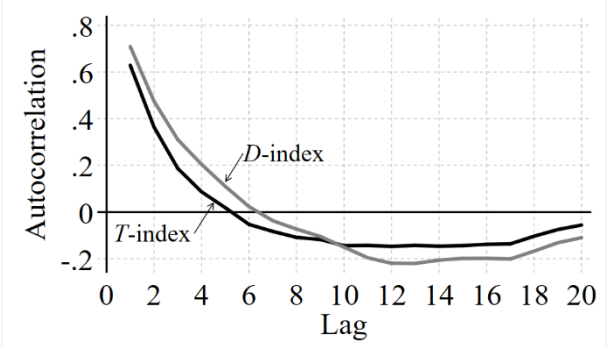
Figure 3b show that the lagged effect of extra growth is a small wave of extra corruption lasting a dozen years. This points to a causal relation. It is clear that growth in poor and middle income countries does cause social disruption and hence some corruption, but this is only a temporary connection, as high growth give a faster transition so that corruption will fall in the longer run. The figure suggests that the longer run is a bit more than 12 years.

3.4 Two levels of inertia in the T and the D-data

Corruption is a decentralized 'institution' that changes slowly, but it is also affected by short-run inertia, maybe due to measurement. When people are asked about their perceptions of inflation, it is likely that they are affected by experience over a period that exceeds one year, and the calibration method may also lead to some autocorrelation. Thus, we expect that the data contain at least two levels of inertia as illustrated by figures 4 and 5.

Figure 4 looks at the short run. The autocorrelations are significant for three to four years. Interestingly it appears that the autocorrelations are a little larger in the *D*-index than in the raw *T*-index – the difference turns out to be borderline significant only.

Figure 4. Autocorrelation functions for the *T* and *D*-series



Note: Average of the results for all 39 countries with full data.

Figure 5. Frequency distribution for the t-ratios and slopes for Ds of 166 countries

Fig.5a. Histogram of t-ratios

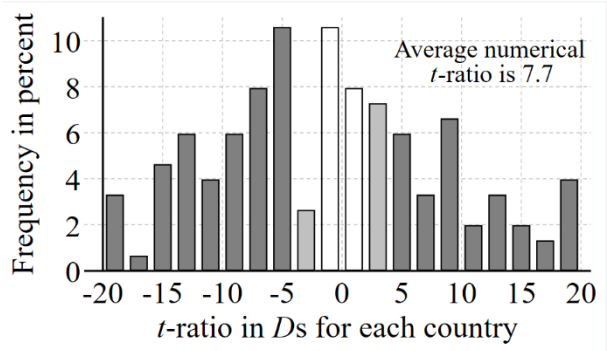
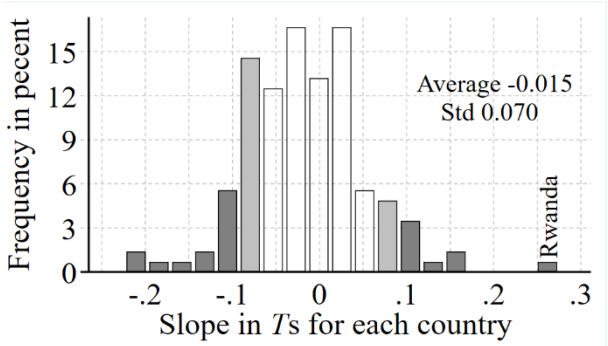


Fig 5b. Histogram of slopes



Note: Empty bars are for assessed insignificant observations, and light gray are for mixed significant and insignificant. For the *t*-ratios the problem needing assessments is the autocorrelation in the series. For the slopes the significance does not only depend on the size but also on the variation. The t-ratios are truncated at ± 20. At the negative end the 4 extreme countries are Taiwan, North Korea, Paraguay, and South Korea. At the positive end the 5 truncated are New Zealand, Cape Verde, Sweden, Denmark and Botswana.

The average number of *T*s and *D*s per country is 18.1, with the standard deviation of 0.46. Thus, we can calculate a *t*-ratio to test if the level of the *D*-index for each country is above or below the transition curve. Figure 5 shows the frequency distribution of the 166 *t*-ratios.

The white bars for *t*'s in [-2, 2] are the frequency of countries that do not deviate significantly from the transition path. However, it has just been demonstrated that the *T*-scores do contain autocorrelation. Thus, the significance levels should be a bit wider, as indicated by the light gray. The dark gray bars are thus significant – they are 64% of the countries.

There should be some reversion to the mean, countries that are too corrupt should have a positive slope in their *D*s, and countries that are too honest should have a negative slope in their *D*s. This would give a negative correlation of the *t*-ratios and the slopes. Table 2 reports that the correlation is negligible.

Table 2. The correlation of the *T*- and *D*-index and the *t*-ratio and the slope

	All 166 countries		151 non-OPEC countries	
	t-ratio	slope	*t*-ratio	slope
T-level	**0.62**	**0.90**	**0.65**	**0.89**
D-level	**-0.17**	0.10	**-0.22**	**0.14**
t-ratio		-0.01		0.00

These longer run country levels must be due to something that changes slowly. Section 4 assumes that this 'something' must be institutions. Another possibility is culture, which is a soft concept where measurement is difficult, and much is discussed by way of examples. A typical example is the difference in the corruption in the North West with Anglo-Germanic culture and Southern Europe with Latin-Mediterranean culture. The paper argues that the difference is caused by Northern Europe became wealthy first, but culture may play a role too.

It has also been suggested that culture can be proxied by religions, as analyzed by Paldam (2001). It found that countries with Protestant Christianity do stick out as relatively honest, but the Protestant countries seem to be the only ones that differ. Neither Catholics nor Muslims differ when income is controlled for.

4. Institutional explanations

The Polity2 index is used for the political system and the Fraser index of economic freedom for the economic system.[12] All underlying series are different and strictly confined to either the political or the economic system as claimed. No correlation between the indices can be due to measurement overlapping.[13]

Polity2 exists for almost all observations of *T*, but the Fraser index started as an annual index in 2000. This section works with *the overlapping sample* that covers the 17 years from 2000 to 2016 and 144 countries of which 13 are OPEC members. As seen from Table 3 (below), this does not change the effect of income on *T* and *D*.

Section 4.1 presents the series used, while section 4.2 presents a set of regressions. Section 4.3 compares the transitions in the *T*-index and the two institutional indices.

12 The two indices are compiled from many underlying series. Marshall *et al.* (2016) and the Polity home page explain the Polity2 index. Gwartney *et al.* (1996, 2018) and the Fraser home page explain the Fraser index.
13. The *P* and *F* indices have a correlation of about 0.45, which is partly explained by confluence due to the transition in the two indices. The three variability measures V^P, Z^P and V^F are introduced in Paldam (2019).

4.1 Data for the political and economic spheres: Polity and Fraser indices

The *Polity index* tries to describe the political system on an authoritarian/democratic scale of integers from -10 to +10. Three variables from Polity are used:

$\boldsymbol{P_{it}}$ is Polity2, but the index is set to zero for temporary foreign interference.

$\boldsymbol{V_i^P} = \sum_{t=2000}^{2016} \left|\Delta P_{it}\right| / 17$ is the average numerical change in *P* per year.

$\boldsymbol{Z_i^P}$ is the share of years where *P* is zero, i.e., anarchy or temporary foreign domination.

The *Fraser index of economic freedom* tries to characterize the economic system by the freedom to run a business on a scale from 1 to 10. Two variables from the Fraser index are used:

$\boldsymbol{F_{it}}$ is the index itself.

$\boldsymbol{V_i^F} = \sum_{t=2000}^{2016} \left|\Delta F_{it}\right| / 17$ is the average numerical change in *F* per year.

Both *V*s and *Z* are first difference versions of their level variables, but calculated in average for each country for the period. Thus, the three first difference variables are measures of the instability of institutions in the two spheres.

Table 3 provides a quick first view of the relation of *T* and *D* and income plus the five institutional variables. If the high correlation of *T* and *y* is due to a transition, and T^{κ} is a good estimate of the transition, we expect that cor(*D*, *y*) ≈ 0, precisely what is found. The correlations of both *T* and *D* to the levels *P* and *F* are positive and rather large. In particular it is worth to note that the cor(*T*, *P*) ≈ cor(*D*, *P*), thus, the relation of corruption and democracy is not spurious, while half of cor(*T*, *F*) is due to the common transition. The relations of both *T* and *D* to the three stability measures are all negative and mostly significant.

Table 3. Correlations of the two corruption variables and institutions

Country averages	*Level variables*			*Instability variables*		
N = 144	*y*	*P*	*F*	V^P	Z^P	V^F
Between *T* and:	**0.75**	**0.41**	**0.74**	**-0.48**	**-0.25**	**-0.48**
Between *D* and:	-0.05	**0.40**	**0.39**	**-0.17**	-0.12	**-0.25**

4.2 The regressions of Table 4

The table has two panels and four parts: Panel 1 to the left analyzes the relations explaining *T*, while Panel 2 brings the same relations explaining *D* to reduce spuriousness.

Table 4. Seven regressions explaining *T* and *D*

Tab. 4a. Panel 1 explaining *T*

Part 1	(T1)								
Level	Coef	t-ratio	beta						
Income	**1.24**	(13.4)	**0.74**	Without income					
Constant	**-6.95**	(8.39							
R^2	0.56								
Part 2	(T2)			(T3)					
Level	Coef	t-ratio	beta	Coef	t-ratio	beta			
Income	**0.78**	(7.7)	**0.47**						
P	**0.04**	(2.4)	**0.13**	0.04	(1.7)	0.10			
F	**0.85**	(5.7)	**0.38**	**1.56**	(11.0)	**0.69**			
Constant	**-8.78**	(-		**-6.43**	(-7.0)				
R^2	0.68			0.55					
Part 3	(T4)			(T5)					
Changes	Coef	t-ratio	beta	Coef	t-ratio	beta			
Income	**0.92**	(8.2)	**0.55**						
Z^P	-2.42	(-1.4)	-0.08	**-6.01**	(-3.0)	**-0.19**			
V^P	**-1.18**	(-3.6)	**-0.21**	**-2.26**	(-6.2)	**-0.40**			
V^F	**-6.11**	(-3.1)	**-0.19**	**-13.59**	(-6.4)	**-0.41**			
Constant	**-2.72**	(-2.3)		**6.99**	21.7				
R^2	0.62			0.43					
Part 4	(T6)			(T7)					
Both	Coef	t-ratio	Beta	Coef	t-ratio	beta			
Income	**0.62**	(5.8)	**0.37**						
P	**0.05**	(3.0)	**0.15**	**0.05**	(2.6)	**0.15**			
F	**0.80**	(5.0)	**0.36**	**1.19**	(7.4)	**0.53**			
V^P	**-1.16**	(-4.0)	**-0.20**	**-1.68**	(-5.5)	**-0.29**			
Z^P	-2.30	(-1.5)	-0.07	**-4.35**	(-2.7)	**-0.14**			
V^F	-0.18	(-0.1)	-0.01	-1.96	(-0.9)	-0.06			
Constant	**-6.46**	(-5.0)		**-3.03**	-2.4				
R^2	0.72			0.65					

Tab. 4b. Panel 2 explaining *D*

	(D1)								
	Coef	t-ratio	beta						
	-0.04	(0.5)	-0.05	Without income					
	0.20	(0.3)							
	0.00								
	(D2)			(D3)					
	Coef	t-ratio	beta	Coef	t-ratio	beta			
	-0.45	(-5.4)	**-0.48**						
	0.05	(3.5)	**0.26**	**0.06**	(3.4)	**0.28**			
	0.73	(6.0)	**0.58**	**0.33**	(3.1)	**0.26**			
	-1.29	(-1.9)		**-2.63**	(-3.8)				
	0.35			0.21					
	(D4)			(D5)					
	Coef	t-ratio	beta	Coef	t-ratio	beta			
	-0.35	(-3.8)	**-0.38**						
	-3.19	(-2.2)	**-0.18**	-1.81	(-1.3)	-0.10			
	-0.81	(-3.0)	**-0.25**	-0.40	(-1.5)	-0.12			
	-7.02	(-4.3)	**-0.38**	**-4.15**	(-2.7)	**-0.22**			
	4.30	(4.3)		**0.56**	(2.5)				
	0.17			0.09					
	(D6)			(D7)					
	Coef	t-ratio	beta	Coef	t-ratio	beta			
	-0.60	(-7.0)	**-0.65**						
	0.06	(4.0)	**0.29**	**0.06**	(3.5)	**0.30**			
	0.64	(5.0)	**0.51**	0.26	(1.9)	0.21			
	-0.83	(-3.5)	**-0.26**	-0.32	(-1.2)	-0.10			
	-3.02	(-2.5)	**-0.17**	-1.03	(-0.8)	-0.06			
	-1.97	(-1.3)	-0.11	-0.23	(-0.1)	-0.01			
	1.32	(1.3)		-2.03	(-1.9)				
	0.43			0.23					

Note: For national averages N = 144. The explanatory variables have different scales, so to make the effects comparable the standard estimates are supplemented with beta coefficients.

Parts 1 and 2 analyze the relations of *T* and *D* to the levels of *y*, *P* and *F*. The relations in Panel 2 of the table have strong collinearity, especially of *y* and *F*. Regression (T1) explains *T* by income, and (T3) explains *T* by the two institutional variables *P* and *F*. Both regressions have an R^2 score of about 0.55; but (T2) shows that when all three variables are in together, R^2 only increases by 0.13 to 0.68. When both the corruption transition and income are taken out of the regression in (D2), the two institutional variables explain 0.21 of the variation. In

regression (D3) the effects of P and F are the same. Thus, the transition is the strongest factor explaining corruption, but that both P and F have an independent role as well.

Part 3 reports that all three measures of instability have a negative effect on honesty, especially the two Vs that are almost equally strong. Thus, instability increases corruption. This tallies well with the strong effect of poverty. Poverty and uncertainty increase corruption, and it does not matter if the uncertainty is in the economic or political sphere.

Part 4 combines the level and instability variables. While P and V^P produce the same coefficient whether or not the other variable is included, this is not the case for F and V^F, where F 'knocks out' V^F. Thus, perhaps the large effect of V^F in Part 3 of the table is an artifact. The table certainly tells a story of collinearity. I return to this knock-out point in a moment.

The positive effect on corruption of the two institutional variables and the negative effect of the instability of the same two institutional variables are easy to interpret. Transition is a process of system change.[14] The changes are mainly to the better so in the longer run corruption decreases; but the changes are also instability so in the short run it increases corruption. This is a story of short-run costs versus long-run gains. It points back to (A) the positive effect of income and (B) the negative effect of growth from section 3. If part of the transition is caused by the transitions in the institutional variables, it reinforces the idea that the causality is from the transition to corruption, not the other way around.

On Figure 1 the old wealthy countries of the North West stuck out as unusually honest. This was interpreted as an effect of time on the internal dynamics of corruption. Once countries become honest, they get even more honest over time; but there is more causal evidence:

4.3 Comparing transitions: An additional causality indication

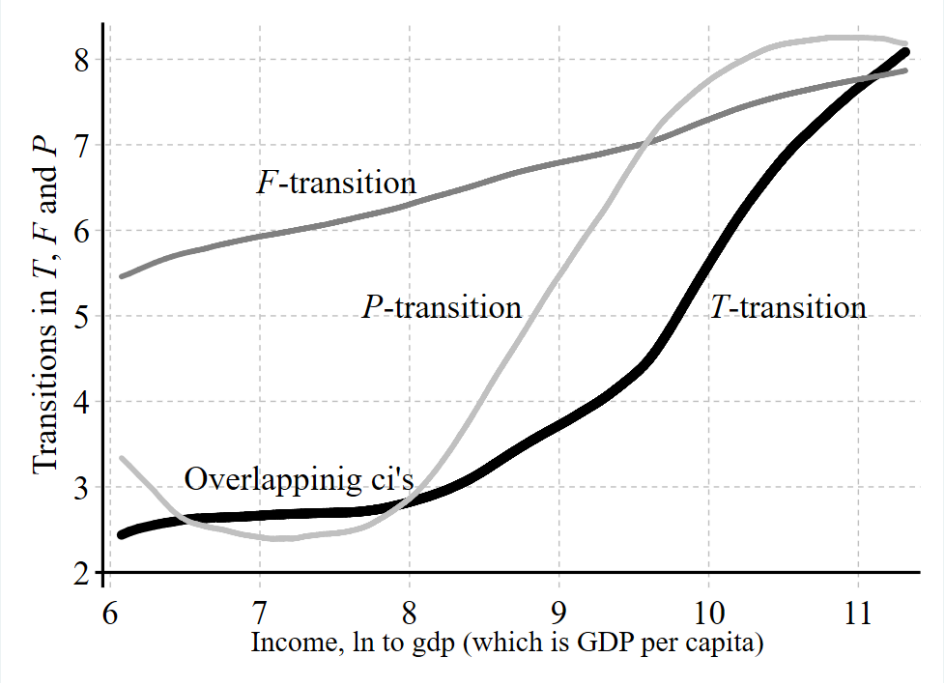
Figure 6 compares three transitions: the path, T^κ, for corruption, the path of the democratic transition, P^κ, and the transition in the economic system, F^κ. All three estimated on the over-lapping data for the same countries and years. The T^κ curve on Figure 6 looks strikingly as the T^κ-curve on Figure 1, so it, once again, illustrate the robustness of the curve.

When the T^κ-curve is compared to P^κ-curve of the democratic transition, the paths of the two transition curves look rather similar, but the T^κ-curve is one full log-point of income later than the P^κ-curve. One log point is 2.7 times, which is growth in 20-50 years. Thus, first the political system becomes more democratic and after several decades, corruption falls. I

14. Paldam (2019) tell much the same story of economic growth and institutions. Economic growth causes transitions of institutions, as seen on Figure 6, but many people see institutional changes as system instability, which causes lower investments and growth.

interpret this as evidence on long-run causality from *P* to *T*.

Figure 6. Comparing three transition paths: F^{κ}, P^{κ} and T^{κ}



Note: Estimated for N = 1965 for the years 2000-16. *F* is the Fraser index for economic freedom, *P* is the Polity2 index for the degree of democracy, and *T* is corruptions as on Figure 1. The abbreviation 'ci' is the 95% confidence intervals. OPEC countries are excluded. Bandwidths are 0.4, 0.5 and 0.4 for F^{κ}, P^{κ} and T^{κ} respectively.

The transition curve F^{κ} is less clear. The curve has a positive slope throughout, but no signs of convergence at either end; but the confidence intervals (not shown) are narrow, so it does represent a systematic change. The F^{κ}-curve looks as a typical (log-linear) income curve. This explains the 'knock-out' point from the previous section. However, given that the *F*-curve is interpreted as a transition curve, it is clear that it starts to rise well before the T^{κ}-curve. Thus, it can explain the T^{κ}-curve, and support the conclusion that the corruption transition is late and due to transitions in other variables, notably institutions

.

5 Some examples

The story told above is in accordance with the evidence presented. It will now be illustrated by some cases that the reader may take as 'smoking guns'. The first three are for country pairs on three continents, where each pair has many similarities and a significant difference in the level of corruption. Table 5 gives the data for the country pairs shown in Figures 7 to 9, while Figure

10 looks at three countries with spectacular crises. The four figures are drawn for the *D*-data, so the transition curve is horizontal at $D = 0$ per definition.

Table 5. The institutional variables in 3 country pairs

	Argentina	Chile	Latvia	Estonia	Côte d'Ivoire	Ghana
P	8.12	9.65	8.00	9.00	1.88	7.29
Z^P	0	0	0	0	0.16	0.02
V^P	1.00	0.52	0.43	0.46	0.27	1.12
F	5.78	7.75	7.55	7.80	5.73	6.53
V^F	0.26	0.07	0.13	0.08	0.11	0.15
Start	1995	1995	1998	1998	1998	1998

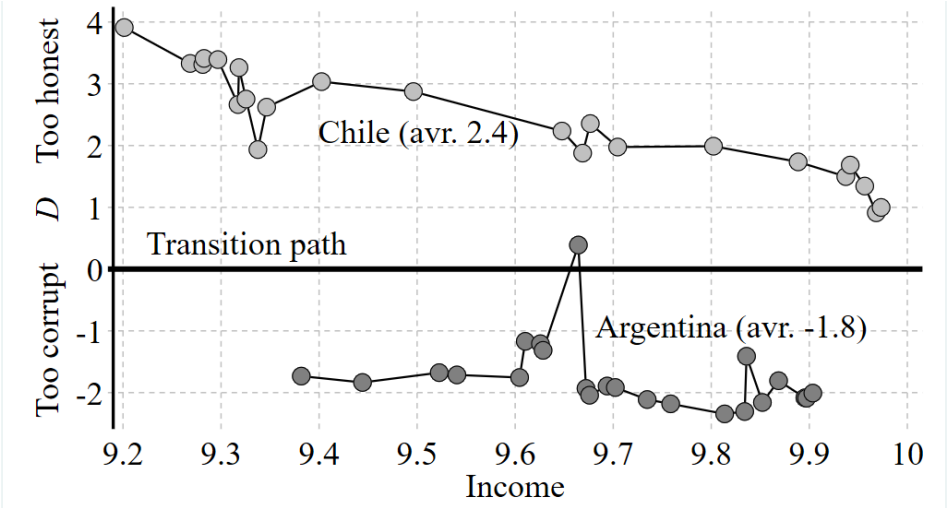
Note: The period always ends in 2017. The values given are the averages for the periods given. The table gives the most corrupt of the pair first and shaded.

5.1 Argentina and Chile

The two neighboring countries on the Southern Cone are both Spanish ex-colonies, with much the same immigration history, language, religion, etc. They are also at the same income level, though Chile has grown much faster. Still, the level of corruption differs by 4.2 points.

The two institutional indices show that Argentina has had less democracy and economic freedom. Argentina has also had much more volatility both in the political and economic system – and the differences started long before the indices. Thus, it fits our story perfectly well. It is difficult to explain why the two countries had such a different history, but once things started going awry in Argentina, there was an amazing lack of brakes

Figure 7. *D*-levels over income in Argentina and Chile, 1995-2017



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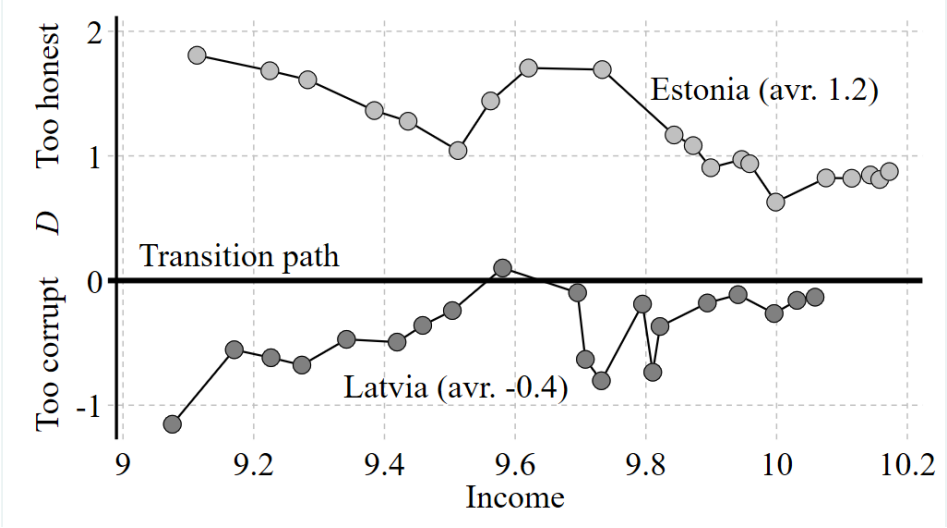
5.2 Estonia and Latvia

The two Baltic countries Estonia and Latvia have had much the same history – at least since 1795 where they both were integrated into Russia as provinces. They were independent from 1918 to 1940, where Russian rule returned. After the brief German occupation, they returned to Russian rule until liberation in 1990/91. In spite of this common history, and a similar income level and population size, the two countries have a difference of 1.6 points in the level of corruption.

Figure 8. *D*-levels over income in Estonia and Latvia, 1998-2017



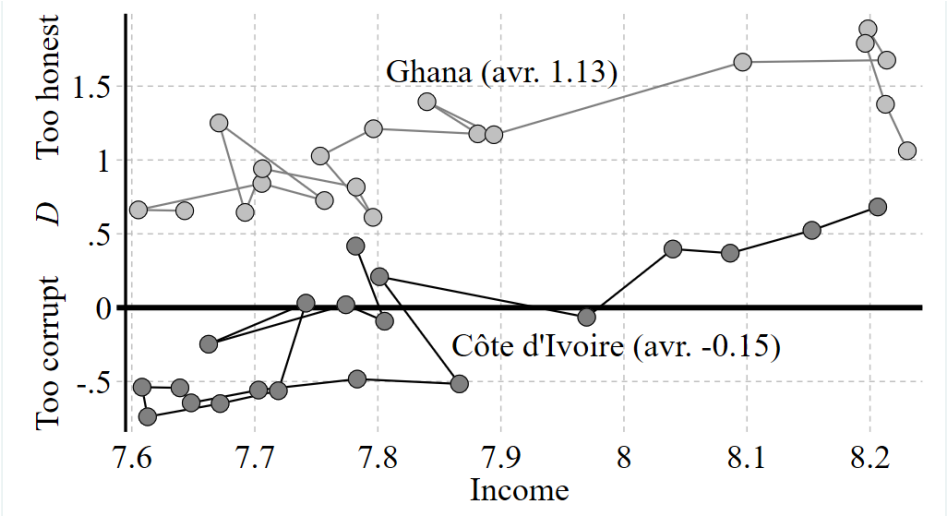
The level of the institutional variables are higher in Estonia, while there is no difference in the instability variables, but perhaps it is not so much the actual instability that counts as the potential one: Latvia is a much more divided country, both as regards ethnicity and religion. This surely gives some uncertainty.

5.3 Côte d'Ivoire and Ghana

Côte d'Ivoire and Ghana are (also) neighbors, at roughly the same size and income level, but they differ as to colonial history, languages and ethnicity. The *T*-index differs by 1.3 points.

As regards the institutional variables there has been a dramatic shift: In the 1960 and 70s Ghana was a much more unstable country, but now it is the other way round. The level of the institutional indices are (much) higher in Ghana, while the volatility variables give a more unclear picture. The Z^P-variable is 0.26 in Côte d'Ivoire. It reflects that the country has had about 5 years of civil war in the period. That the difference in the level of corruption is not larger is probably due to the previous period, where Ghana fared badly.

Figure 9. *D*-levels over income in Côte D'Ivoire and Ghana, 1998-2017

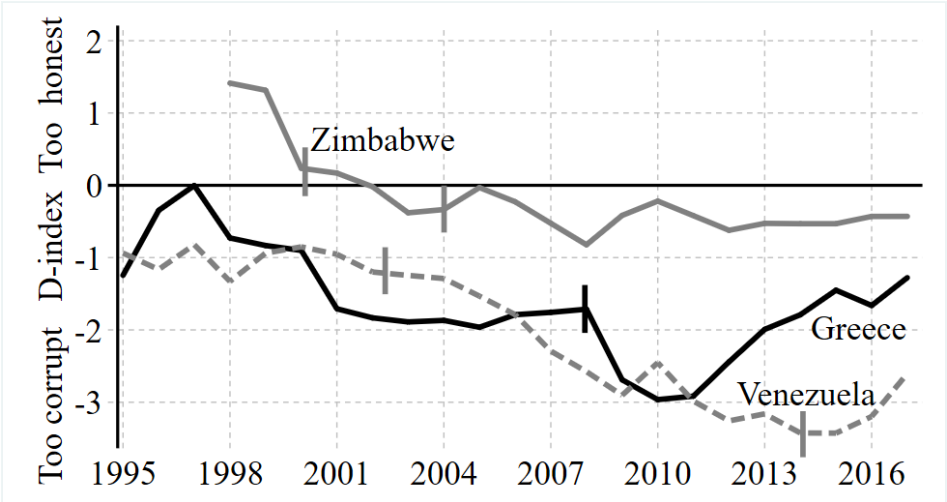


Note also that the two low-income African countries have had a more volatile economic development than the middle income countries of the previous pairs.

5.4 Three crises: Greece, Venezuela and Zimbabwe

Figure 10 shows the development in the *D*-index in three countries (on different continents) that have experienced very big economic crises: Greece, Venezuela and Zimbabwe. Their *D*-indices are depicted with time on the horizontal axis. The crises in the three countries were preceded by at least a decade of inconsistent economic policies that sober observers soon found irresponsible. At some stage the policies caused galloping debt, balance-of-payment deficit and increasing inflation, and finally a large fall in the *gdp*. This sequence led to a fall in the *D*-index in all three cases where the index turned negative. The small vertical lines indicate main events.

Figure 10. The story of the *D*-index in three crisis-countries



Greece became relatively corrupt around 2000 maybe as a the Greeks became cynical as regards the policies pursued, and it increased quite strongly, but temporarily only, during the full scale crisis 2008-13. However, Greece remains a relatively corrupt country.

Venezuela has fared rather poorly for a long time, in spite (or because) of its oil wealth. This led to the political victory of the populist Hugo Chaves, who was president 1999-2013. Maybe 2002 was the turning year, where his policies became unsustainable. The economic balance in Venezuela gradually worsened, and corruption that was already too high increased by further two points. After the death of Chaves, power went to his vice-president Nicolás Maduro, who continued his policies with catastrophic results. The upturn in the last two years of the *D*-index does not happen in the *T*-index (that remains constant at 1.7-1.8) – the increase in *D* is due to the large fall in the income level.

Zimbabwe was known as a relatively honest country till the rapid socialization program was started in 2000, but then corruption increased by about 2 points. During the dramatic debacle for the economy it remained rather trendless. When this evidence is summarized, it is clear that an economic crisis increases corruption, but the timing is not so clear. It probably depends upon the extent to which people understand what is going on.

6. Conclusions

The paper has shown a strong transition in the level of corruption as measured by Transparency International's *T*-index. Poor countries are rather corrupt, but they become honest as they grow wealthy. The transition is a complex process that interacts with institutions. They also have transitions, so the relations examined contain a great deal of collinearity. When the transition path is deducted from the *T*-index – to give the *D*-index – it greatly reduces multicollinearity, and allows an identification of the substantial genuine effect of institutions.

The transition of corruption happens relatively late in the development process. The lateness argues that the transition, and hence *T*, is caused by development and not the other way around. This tallies with the long-run causality test in Gundlach and Paldam (2009).

A main reason for the late transition is that development creates many changes that inevitably give uncertainty, which causes setbacks in the corruption index. Such setbacks are temporary, and when institutions stabilize and countries become stable, wealthy, liberal democracies, honesty comes to dominate. Thanks to the short-run reverses and the internal dynamics of corruption, the process takes time.

References:

Aidt, T.S., 2003. Economic Analysis of Corruption: A Survey. *Economic Journal* 113 (491), 632-52. Also chpt. 3 in Dutta and Aidt (2016)

Andvig, J.C., Moene, K.O., 1990. How corruption corrupt. *Journal of Economic Behavior and Organization* 13, 63-76. Also chpt. 16 in Dutta and Aidt (2016)

Bjørnskov, C., Paldam, M., 2012. The spirits of capitalism and socialism. A cross-country study of ideology. *Public Choice* 150, 469-98

Chenery, H.B., Srinivasan, T.N., eds., 1988, 1989. *Handbook of Development Economics,* vol. 1 and 2. North-Holland, Amsterdam

Dutta, J., Aidt T.S. eds., 2016. *Corruption and Economic Development.* The International Library of Critical Writings in Economics series, vol. 324, Elgar, Cheltenham

Fraser index of economic Freedom. URL: https://www.fraserinstitute.org/studies/economic-freedom. See also Gwartney *et al*. (2018)

Gundlach, E., Paldam, M., 2009. The transition of corruption: From poverty to honesty. *Economic Letters* 103, 146-48. Also chpt. 27 in Dutta and Aidt (2016)

Gwartney, J., Lawson, R., Block, W. 1996. *Economic Freedom of the World: 1975-1995*. Fraser Institute, Vancouver, B.C. First annual publication of the Fraser index.

Gwartney, J., Lawson, R., Hall, J., Ryan Murphy, R., 2018. Economic Freedom of the World 2018 Annual Report. Fraser Institute, Vancouver, B.C. See also Fraser index for home page.

Heidenheimer, A.J., Johnson, M., LeVine, V., eds., 1989. *Political Corruption: A Handbook.* Transaction Publishers, New Brunswick, NJ.

Lambsdorff, J.G., 2007. *Institutional economics of corruption and reform. Theory, evidence and policy*. Cambridge UP, Cambridge UK

Leff, N. H., 1964. Economic development through bureaucratic corruption. *American Behavioral Scientist* 8, 8-14, and in Heidenheimer *et al.* (1989), chpt. 24 pp. 389-403, and chpt. 23 pp. 553-59 in Dutta and Aidt (2016)

Leys, C., 1965. What is the problem about corruption? *Journal of Modern African Studies* 3, 215-30, and in Heidenheimer *et al.* (1989), chpt. 5 pp. 51-66

Marshall, M.G., Gurr, T.R., Jaggers, K., 2016. *Polity IV project. Users' manual*. University Center for Systemic Peace. See Polity index for home page

Méon, P.-G., Sekkat, K. 2005. Does corruption grease or sand the wheels of growth? *Public Choice* 122, 69–97

Méon, P.-G., Weil, L., 2010. Is Corruption an Efficient Grease? World Development 38, 244-59. Also chpt. 24 in Dutta and Aidt (2016)

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

Paldam, M., 2002. The big 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., 2009. The macro perspective on generalized trust, chpt. 21, pp. 354-78 in Svendsen and Svendsen (2009)

Paldam, M., 2019. Does system instability harm development? A comparative empirical study of the long run.

P.t. available from http://martin.paldam.dk/Papers/GT-Main/13-Instability.pdf

Paldam, M., Gundlach, E., 2018. Jumps into Democracy: Integrating the Short and Long Run in the Democratic Transition. *Kyklos* 71, 456-81

Polity index. URL: http://www.systemicpeace.org/polityproject.html. See also Marshall *et al.*, 2016.

Soto, H. de, 2000. *The Mystery of Capital. Why capitalism triumphs in the West and fails everywhere else*. Black Swan Books, London

Svendsen, G.T., Svendsen, G.L.H., eds., 2009. *Handbook of Social Capital. The Troika of Sociology, Political science and Economics*. Elgar, Cheltenham

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

Appendix: Additional tables

Table A1 lists data, Table A2 and A3 give country groups. Figure A1 shows distributions.

Table A1.1. Some descriptive statistics – first 80 countries. Data since 1995

Country	*N*	Avr *T*	Avr *D*	*t*-ratio	Country	*N*	Avr *T*	Avr *D*	*t*-ratio
Afghanistan	12	1.41	-1.22	-9.6	Denmark	23	9.40	2.43	21.6
Albania	17	3.04	-0.70	-12.3	Djibouti	11	3.18	0.42	4.9
Algeria	15	3.13	-1.09	-20.5	Dominica	11	5.58	1.72	15.4
Angola	17	1.94	-1.35	-10.8	Dominican R	17	3.05	-1.00	-11.9
Argentina	23	3.20	-1.75	-15.1	Ecuador	21	2.64	-1.04	-12.2
Armenia	17	3.04	-0.46	-5.8	Egypt	21	3.20	-0.46	-5.4
Australia	23	8.51	1.47	13.8	El Salvador	20	3.77	0.24	2.8
Austria	23	7.73	0.77	7.0	Equatorial G.	8	1.86	-5.14	-48.4
Azerbaijan	19	2.32	-1.45	-11.8	Estonia	20	6.34	1.17	14.6
Bahrain	15	5.11	-1.79	-8.1	Ethiopia	17	2.93	0.31	2.6
Bangladesh	18	2.09	-0.58	-4.2	Finland	23	9.32	2.55	20.1
Barbados	13	7.17	2.55	14.0	France	23	6.93	0.22	3.1
Belarus	19	3.18	-1.32	-5.2	Gabon	14	3.21	-1.38	-13.0
Belgium	23	7.00	0.19	1.6	Gambia	15	2.83	0.19	1.6
Benin	14	3.24	0.61	5.1	Georgia	17	3.81	0.25	1.1
Bolivia	22	2.81	-0.22	-3.2	Germany	23	7.93	0.97	12.3
Bosnia	15	3.46	-0.32	-3.9	Ghana	20	3.88	1.13	12.8
Botswana	20	6.01	1.78	21.5	Greece	23	4.37	-1.64	-10.8
Brazil	23	3.77	-0.33	-4.3	Guatemala	19	2.86	-0.55	-7.2
Bulgaria	20	3.85	-0.52	-5.4	Guinea	12	2.21	-0.41	-4.1
Burkina Faso	14	3.52	0.90	8.1	Guinea-Bissau	11	1.96	-0.65	-8.6
Burundi	13	2.07	-0.56	-9.1	Haiti	16	1.83	-0.80	-13.3
Cambodia	13	2.08	-0.63	-17.8	Honduras	19	2.55	-0.45	-6.4
Cameroon	21	2.25	-0.44	-6.1	Hong Kong	23	7.83	0.64	8.9
Canada	23	8.68	1.66	15.1	Hungary	23	5.00	-0.12	-0.9
Cape Verde	11	5.46	2.04	25.4	Iceland	20	8.78	1.81	10.6
CAR	12	2.24	-0.38	-6.2	India	23	3.20	0.31	7.2
Chad	14	1.88	-0.76	-15.5	Indonesia	22	2.57	-0.76	-13.3
Chile	23	7.10	2.40	14.0	Iran	15	2.64	-2.11	-14.0
China	23	3.43	-0.07	-1.0	Iraq	15	1.74	-2.01	-10.5
Colombia	23	3.46	-0.43	-4.2	Ireland	23	7.61	0.47	2.4
Comoros	11	2.53	-0.10	-1.6	Israel	22	6.53	0.09	0.6
Congo, Bra	15	2.32	-0.72	-4.3	Italy	23	4.57	-2.16	-18.6
Congo, Kin	15	2.05	-0.57	-15.6	Jamaica	18	3.66	0.12	1.3
Costa Rica	20	5.18	1.05	8.8	Japan	23	7.14	0.33	3.4
Côte d'Ivoire	20	2.56	-0.15	-1.5	Jordan	21	4.86	1.27	9.4
Croatia	19	4.10	-1.05	-13.1	Kazakhstan	19	2.62	-1.98	-9.8
Cuba	14	4.27	0.76	8.5	Kenya	21	2.26	-0.43	-8.9
Cyprus	15	6.01	-0.23	-2.6	Korea N	6	0.90	-1.73	-27.7
Czech R	22	4.77	-1.16	-11.3	Korea S	23	4.92	-1.32	-20.3

Table A1.2. Some descriptive statistics – last 86 countries

Country	*N*	Avr *T*	Avr *D*	*t*-ratio	Country	*N*	Avr *T*	Avr *D*	*t*-ratio
Kuwait	15	4.48	-3.44	-21.7	Qatar	15	6.47	-2.23	-15.8
Kyrgyzstan	16	2.31	-0.61	-13.6	Romania	21	3.60	-0.83	-13.6
Laos	13	2.44	-0.60	-5.2	Russia	22	2.51	-2.27	-12.9
Latvia	20	4.44	-0.41	-6.2	Rwanda	13	4.27	1.65	4.5
Lebanon	15	2.85	-1.68	-14.4	Saint Lucia	6	6.57	2.74	8.6
Lesotho	13	3.86	1.15	6.9	Sao Tome	11	3.65	0.86	4.2
Liberia	12	3.20	0.57	3.1	Saudi Arabia	15	4.23	-2.60	-18.6
Libya	15	2.11	-3.44	-15.1	Senegal	20	3.51	0.86	7.3
Lithuania	19	5.02	-0.03	-0.4	Serbia	18	3.26	-0.83	-6.6
Luxembourg	21	8.43	0.80	10.5	Seychelles	13	4.87	-0.69	-6.0
Macedonia	16	3.56	-0.51	-4.1	Sierra Leone	15	2.55	-0.06	-0.6
Madagascar	16	2.82	0.20	2.1	Singapore	23	9.01	1.94	10.0
Malawi	20	3.24	0.62	6.0	Slovakia	20	4.37	-0.94	-11.3
Malaysia	23	4.96	0.17	1.1	Slovenia	19	6.06	0.00	0.0
Mali	15	3.01	0.39	6.3	South Africa	23	4.72	0.71	6.0
Malta	14	5.81	-0.16	-1.0	Spain	23	6.24	-0.12	-0.9
Mauritania	12	2.78	0.00	0.0	Sri Lanka	15	3.48	-0.12	-1.4
Mauritius	20	4.98	0.21	2.6	Sudan	15	1.63	-1.16	-9.7
Mexico	23	3.33	-1.03	-12.1	Swaziland	11	3.44	-0.21	-1.5
Moldova	19	2.95	0.02	0.2	Sweden	23	9.12	2.17	22.0
Mongolia	15	3.32	-0.30	-1.9	Switzerland	23	8.76	1.37	17.2
Montenegro	11	4.05	-0.73	-14.0	Syria	15	2.41	-0.82	-5.5
Morocco	19	3.62	0.23	2.6	Taiwan	23	5.73	-1.02	-35.3
Mozambique	17	2.80	0.18	2.6	Tajikistan	15	2.17	-0.58	-14.4
Myanmar	15	1.85	-1.08	-14.3	Tanzania	20	2.83	0.19	1.9
Namibia	20	4.84	1.21	9.6	Thailand	23	3.41	-0.62	-11.6
Nepal	14	2.65	0.00	-0.1	Togo	12	2.78	0.17	1.8
Netherlands	23	8.73	1.62	16.2	Trinidad	16	3.94	-1.89	-5.5
New Zealand	23	9.32	2.98	28.9	Tunisia	19	4.51	0.57	4.2
Nicaragua	19	2.66	-0.25	-4.3	Turkey	22	3.92	-0.67	-7.6
Niger	14	2.91	0.28	2.2	Turkmenistan	13	1.83	-2.88	-12.8
Nigeria	22	2.05	-0.94	-10.5	UAE	15	6.42	-1.71	-8.3
Norway	23	8.70	1.06	8.6	Uganda	21	2.49	-0.13	-2.6
Oman	15	5.15	-1.73	-6.1	UK	23	8.22	1.41	11.9
Pakistan	22	2.47	-0.43	-5.9	Ukraine	20	2.49	-1.18	-13.8
Palestine	3	2.70	-0.12	-0.8	Uruguay	20	6.07	1.54	8.2
Panama	17	3.51	-1.17	-9.1	USA	23	7.47	0.10	1.6
Paraguay	18	2.26	-1.20	-21.7	Uzbekistan	19	2.03	-1.30	-8.5
Peru	20	3.77	0.13	0.9	Venezuela	23	2.21	-2.01	-10.3
Philippines	23	2.93	-0.31	-4.1	Vietnam	21	2.78	-0.16	-6.4
Poland	22	4.85	-0.14	-1.1	Yemen	15	2.15	-0.72	-7.5
Portugal	23	6.32	0.51	4.3	Zambia	20	3.16	0.44	4.7
Puerto Rico	7	5.86	-0.96	-6.0	Zimbabwe	20	2.50	-0.17	-1.3

Note: Country names are as short as possible. R means republic. The 166 have at least 6 observations that can be paired with the corresponding income observation. The *t*-ratio is for the *D*-index.

Table A.2. Descriptive stats for country groups

	Number of		Averages				
	Countries	Obs.	Income	*T*-index	*D*-index	*t*-ratio	Slope
Africa, Sub-Saharan	44	688	7.71	2.99	0.03	-0.90	0.03
Asia	23	434	8.86	3.79	-0.34	6.57	-0.01
Latin America and Caribbean	26	471	9.06	3.96	-0.07	-2.48	-0.03
MENA	19	300	9.61	3.77	**-1.29**	**-8.61**	-0.06
Post-communist	29	532	9.24	3.60	-0.73	-6.85	0.03
West (including 4 overseas)	25	552	10.47	7.62	0.81	7.83	-0.06
Sum/Avr.	166	2977	9.10	4.36	-0.14	-2.57	-0.02
West divided into							
North	16	363	10.6	8.54	**1.48**	**13.75**	-0.07
South	9	189	10.2	5.97	-0.37	-2.70	-0.04

Note: The North West group is the one deviating most from the transition path, while the MENA-group that includes many OPEC countries deviates the opposite side; in accordance with Figures 1 and 2c.

Table A.3. Countries in the groups

Africa, Sub-Saharan:	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, CAR, Chad, Comoros, Congo (Bra), Congo (Kin), Côte d'Ivoire, Djibouti, Equatorial G., Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe
Asia:	Afghanistan, Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea N, Korea S, Laos, Malaysia, Mauritius, Myanmar, Nepal, Pakistan, Philippines, Seychelles, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam
Latin America and Caribbean:	Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican R, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Lucia, Trinidad, Uruguay, Venezuela
MENA:	Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, UAE, Yemen
Post-communist:	Albania, Armenia, Azerbaijan, Belarus, Bosnia, Bulgaria, Croatia, Czech R, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
West:	Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA
North West:	Australia, Austria, Canada, Denmark, Finland, Germany, Iceland, Ireland, Luxembourg, Netherlands, New Zealand, Norway, Sweden, Switzerland, UK, USA
South West:	Belgium, Cyprus, France, Greece, Israel, Italy, Malta, Portugal, Spain

Note: Mauritius and Seychelles are moved from Sub-Saharan Africa to Asia. Israel is moved from MENA to West. As the data starts in 1995 I distinguish West and Post-communist, the distinction was important in the 1990s, but gradually loses its importance. The division of the West is in the Germanic-Anglo countries of the North, and the Latin-Mediterranean countries of the South. Belgium could be in both groups.

Finally Figure A1 shows how the main variables are distributed, on the overlapping data.

Note that the *D*-index is close to the normal distribution.

Figure A1. The frequency distribution of the eight series discussed – the overlapping data

Fig. A1.1. *T*-index

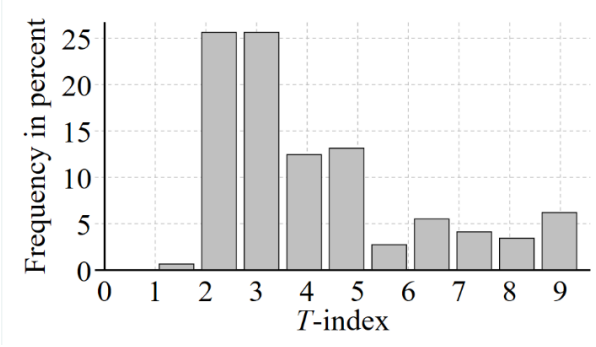


Fig. A1.2. *D*-index

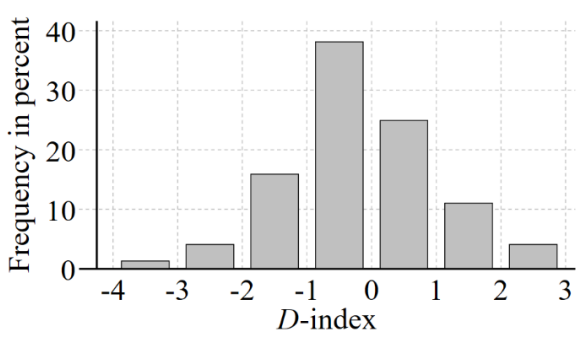


Fig A13. *P*-index

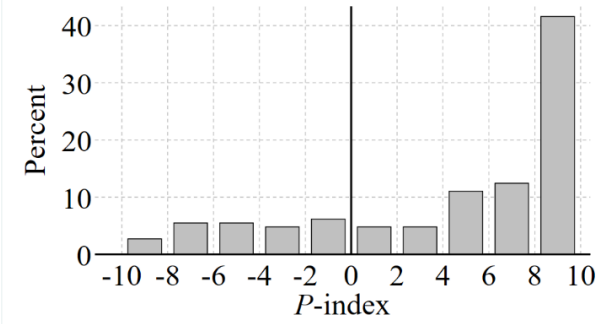


Fig A1.4. *F*-index

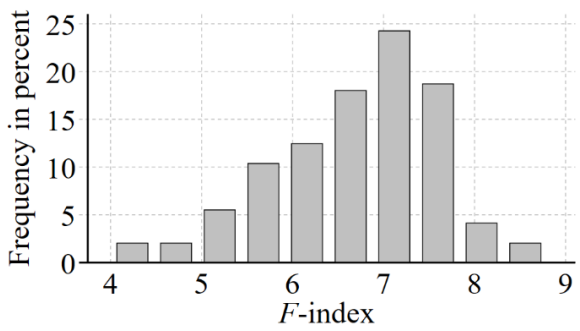


Fig. A1.5. *Income*

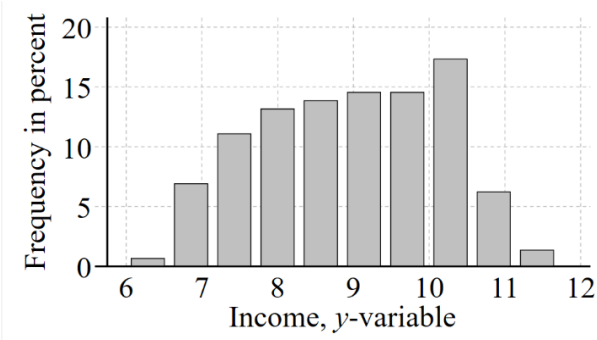


Fig. A1.6. Z^P-variable

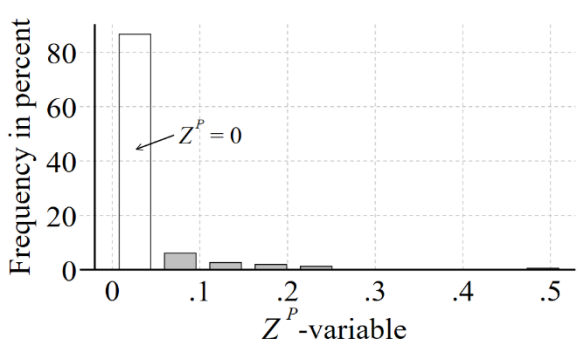


Fig A1.7. V^P-variable

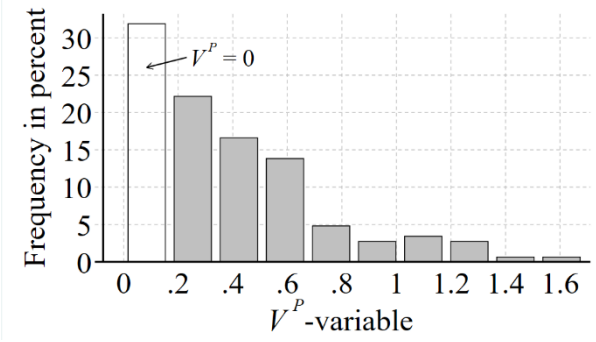
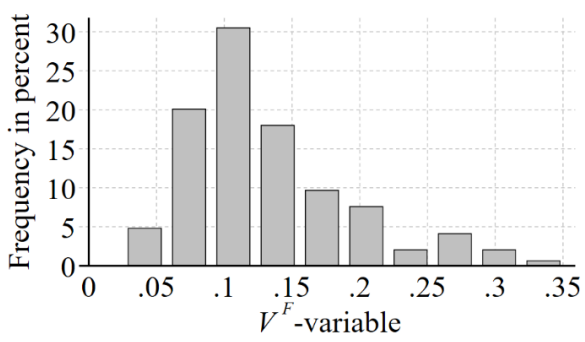


Fig A1.8. V^F-variable



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