Do relatively democratic countries grow faster?

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Abstract

The growth rate has a small, but significant positive correlation to the main democracy indices. It is often interpreted as the causal effect of democracy on growth. However, it may also be spurious, due to the democratic transition, and the transition in the growth rate. They are both stronger in the data and they have a positive slope over most of the range, so they generate a spurious correlation between growth and democracy. Relative democracy – termed *tension* – is the deviation between the actual value of the index and the transition path. Thus, it is independent of the spurious part of the democracy-growth relation, and the causal effect of democracy on growth is calculated as the effect of the tension. It is very small – even the sign is dubious. Thus, the spurious part is by far the largest part of the small correlation between democracy and growth.

Keywords:Economic growth, democracy, causal and spurious effectJel:O10, O47, O57

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1. Introduction

The relations between democracy, economic growth, and income are discussed in a large literature. Most researchers agree that there is a strong long-run relation from income to democracy, known as the *democratic transition*; see sections 2 and 3. Also growth has a transition, though it is much weaker, see section 3. In both transitions the *main causal direction* is from income to the other variable.

This paper deals with the small and much debated relation between growth and democracy. ² Together the democratic transition and the transition in the growth rate give a small spurious correlation between democracy and the growth rate, as shown in Figure 1. The numbers fit nicely, so that the two transitions shown by the black arrows can explain the whole of the growth and democracy correlation. The analysis made below supports the claim of spuriousness, but causality between macro variables that aggregate many different indicators is surely debatable – all one can hope to find is a main causal direction.

And indeed, the primacy-of-institutions school claims that the relation from democracy to growth is causal, while the relation from income to democracy is not. However, a strict concept of causality is used in the rejection causality from income to democracy. Paldam (2024b) claims that when this relation is carefully modeled it is causal, making the growth-democracy relation spurious.



Figure 1. The correlations between income, democracy, and growth in large data samples

Note: The variables are defined in Table 1. The figure is from Paldam (2024b). The three correlations are calculated on a large, unified dataset of 7,732 observations. The two black arrows are the transitions. They are quite robust.

 $^{^2}$ The effect of democracy on growth has been studied in 200 papers. They are covered by two meta-studies: Doucouliagos and Ulubaşoğlu (2008) and Colagrossi et al. (2020). They conclude that the relation is positive, but weak, and unstable. Two papers finding a positive effect are Madsen et al. (2015) and Acemoglu et al. (2019).

The paper studies the small correlation between growth and democracy by identifying a part of the democracy indices that cannot be spurious to see if it is correlated with growth. This part is termed the *tension*, and it is the deviation of the democracy index from the transition path. Thus, it considers countries that are "too" democratic relative to other countries at their income level and asks if they grow relatively fast. Conversely, if a country is "too" authoritarian relatively, does it then grow relatively slowly?

Authoritarian regimes often claim that a strong hand on the rudder is necessary to obtain faster development that will make everybody better off in the longer term. Many dictators have ruled badly, but some strongmen did implement policies that made an upward kink in the development curve. Another frequent claim in the literature is that the g(X) relation differs for poor and rich countries. Hence, the data are divided along the income dimension in four equally large parts.

Section 2 surveys the theory, while section 3 presents the claims about the two transitions taken for granted in the rest of the paper. Section 4 looks at the shape of the growth-tension relations – both for all data and for the four parts. Finally, section 7 concludes. The analysis is supported by a Net Appendix (NA). Table 1 lists the variables, models and samples for easy reference.

Table 1. The variables and sample

| Part 1: Variables. Sources see references | | | | | | | |
|---|--|--|--|--|--|--|--|
| | National accounts: | | | | | | |
| Gdp | real GDP per capita from the Maddison project | | | | | | |
| У | Income. The natural logarithm to gdp, ln gdp | | | | | | |
| g | Growth($gdp/gdp_{-1} - 1$). Recall that $g \approx \Delta y$ | | | | | | |
| | Democracy indices : $X = P$, V, in % of their original range | | | | | | |
| | P _o , original polity2 index. From Polity project. Range [-10, 10], endpoints used | | | | | | |
| Р | Converted to $P = 100/20 (P_o+10)$ that is in % of range | | | | | | |
| | V _o , original Polyarchy index. From V-Dem project. Range]0, 1[, endpoints not reached | | | | | | |
| V | Converted to $V = 100 V_o$ that is in % of potential range | | | | | | |
| Part 2: | Estimates: democratic transition and the relative democracy | | | | | | |
| X(y) | Transition: $P(y)$, $V(y)$ from kernel regressions $X(y) = K^X(y, bw)$, with bandwidth, bw | | | | | | |
| T^X | Tension: Relative democracy: $T^X = X - K^X(y, bw)$ | | | | | | |
| Part 3: Data sample, 1950-2018 , <i>N</i> = 7,732 | | | | | | | |
| The data are unified by stacking countries. Thus, one variable is one column in the dataset. | | | | | | | |
| Each row has data for all variables. If one variable is missing, the row is omitted. | | | | | | | |
| Present and former OPEC plus Bahrain and Oman are excluded, see however Paldam (2024c) | | | | | | | |
| Parts 1-4. The sample is sorted by income and divided into 4 equal parts of 1,933 observations. | | | | | | | |

The kernels give the outputs for an equidistant explanatory variable, and the program has estimated so many points that all observations for *y* have been matched up with an y(X), where the error is within ± 0.0005 . As the average is $y \approx 8.7$, the error is zero.

2.Theory³

The two democracy indices X = P, V are made (somewhat) comparable by a conversion to a percentage scale, as explained in Table 1. The indices have no natural scale, so while they are correlated, their relation is not linear. The paper bypasses the large discussion about the choice of the best democracy index by using the two most common ones and by concentrating on results that generalize to both.

The introduction claims that the correlation $r(X, g) \approx 0.06$ is the sum of two parts.

 $r_A = r_A(X, g)$ is the *spurious* part. It is due to two transitions, X(y) and g(y). They are positive, and thus, the spurious part is positive as well; see section 2.1 on transition theory.

 $r_B = r_B(X, g)$ is the *specific* part, which may be causal; see section 2.2 on the primacy-ofinstitutions theory.

The *tension* is defined as $T^X = X - X(y)$. Thus, T^X is the democracy index net of the transition, and r_B can be estimated as $r_B = r_B(T^X, g)$. The democratic transition X = X(y) is a long-run relation and hence almost constant in the short run. X is a level variable, and thus T^X is also almost a level variable. Consequently, X and T^X are highly correlated; see Table 2. In the four parts, the level moves less, and hence the correlations are very high. This also means that collinearity of the two variables can be expected, but the data samples are so large that even small effects show up.

| | For all | Part1 | Part 2 | Part 3 | Part 4 |
|--------------------------------|---------|-------|--------|--------|--------|
| Observations | 7,732 | 1,933 | 1,933 | 1,933 | 1,933 |
| $\operatorname{Cor}(P, T^{P})$ | 0.813 | 0.999 | 0.993 | 0.978 | 0.948 |
| $\operatorname{Cor}(V, T^{V})$ | 0.720 | 0.998 | 0.995 | 0.959 | 0.926 |

Table 2. The level variables and the tensions

2.1 Transition theory. The underlying skeleton of development, explaining r_A^4

Research in the field where economic history, statistics, and growth theory meet has noted that the world knows two basic steady states: the traditional and the modern; see e.g., Maddison (2002) and Galor (2011). For many centuries, all countries were in the traditional steady state,

³ Small correlations are linear, so the sum of the two parts $r_A(X, g)$ and $r_B(X, g)$ sum to r(X, g).

⁴ This section is based on a book (2021a) and a handful of papers (latest 2024a and b). As the book and the papers have detailed reference lists, the present will be parsimonious as to references.

with growth rates from -10% to 20% per century, but about 250 hundred years ago modern development started – first in a few countries and then gradually in more – so countries diverged from the traditional steady state. Much later they converged to the modern steady state, where they once again became similar as regards income. Transition theory sees 'development' as the exogenous variable, which is due to technology, history, and location. Income is taken as a proxy for development, and the theory claims that the transition in the variable (as *X* or *g*) is *caused* by income, in the sense that the *main causal direction* is from income to the variable.

The change from one steady state to another is termed a transition. Hence, the transition from the traditional to the modern steady state is *the grand transition*. It normally takes a couple of centuries. It gives transitions in most variables. They are slow but strong underlying processes with a *distinct form* looking as -- (as Figure 2) in variables that rise with income such as democracy. This creates a correlation between the variable and income that is rarely below 0.6 both in wide cross-country samples and in long time series. Transitions are as strong in institutional indices as in other series, see Paldam (2021). The power structure is taken to be determined by the control of resources by well-defined groups in society. The democratic transition is typical. It is explained by the systematic change of the power structure caused by the grand transition.

2.2 The democratic transition: The end of the three pillars model and the jumps model

The three pillars model gives the power structure of traditional society. The pillars were a hereditary king, the feudal aristocracy, and the monopoly Church. Altogether, the royals, the aristocracy and the top of the Church constituted less than 2% of the population, but they controlled at least 30% of national income. During the grand transition the agricultural and religious transitions happened everywhere. They undermined two of the pillars, so the political system had to change. Gradually the middle class grew to dominate society. It wanted mass representation, and hence democracy resulted. So, the rise in income changed the *power structure* in the same way in most countries.

The X(y)-relation is dominated by noise in the short run, but in the long run the transition is strong, generating an underlying transition path in all democracy indices as a function of income. In the first difference, the form of the transition curve becomes hump-shaped \checkmark (as Figure 3) Here the correlation between the variable and income is much smaller.

All regimes try to consolidate so they generate status quo equilibria, Even in the middle of the transition they normally last more than a decade. However, random triggering events happen to break the status quo. They give jumps in the direction of the transition path. In addition, the growth rate has a first difference transition path.

2.3 Primacy-of-institutions theory, explaining, r_B

The theory takes institutions as the exogenous element in development as they are made by political decisions. The theory also claims that the decisions are conditioned on the *power structure* in society. This gives the usual chicken-and-egg causality.⁵

The political system, as measured by X, is an institution, and of course, an important one. The populations in the high-income countries overwhelmingly agree that democracy is a good institution. One should imagine that the education and health systems would be better if the population had a say in the decisions. Some evidence supports this view. Stronger evidence shows that democracies are more peaceful, both as regards internal and external war, see Gleiditsch (1992). That surely saves on military budgets and the costs in human loss and real capital destruction. In addition, democracies have much better human rights records.

While the predictions of the transition theory are distinct, the predictions of the primacyof-institutions theory are vaguer, as they only predict the signs of the slope of relations to improved institutions such as X rising. In causa, it predicts that the slope of g(X) is positive.

2.4 The technique of kernel regressions on unified data

The data are a $(y, g, P, V)_{it}$ -panel, where *i* is country, *t* is time, and the four columns are the variables defined Table 1. Transitions are taken to be general, so that they should be clearest in the average country. Thus, the panel is unified into a $(y, g, P, V)_j$ matrix with j = it = N = 7,732 rows. The rows have no natural order, but each analysis makes an order.

The kernel regression is a smoothed MA-process with a fixed bandwidth, done on the data after sorting by the explanatory variable, which on Figure 2 is income.⁶ The kernel curve for z = z(y) is written $K^{z}(y, bw)$. Variations in the bandwidth *bw* change the kernel in a predictable way. The kernels reported are robust to a wide interval of *bw*'s.

The estimated kernel assumes no economic theory and no functional form. It provides a curve surrounded by 95% confidence intervals. Consequently, it is a test of a theory if a curve looking as predicted by the theory can be drawn within the confidence intervals. It is a strong test if (i) the prediction is distinct, and (ii) the confidence intervals are narrow. In addition (ii)

⁵ A lucid (but early) survey of the primacy-of-institutions theory is Acemoglu *et al.* (2005). It presents the causal scheme: political system \rightarrow development \rightarrow power structure \rightarrow political system, etc. The transition model is recursive in a transition perspective, as it includes the last two causal relations only, see section 3.2. In both theories the power structure is crucial, though it is a variable for which no time series is available.

⁶ The kernels are estimated by the stata command lpoly, using the default, including Epanechnikov's' kernel.

shows that the unification of the panel is justified.⁷ The democratic transition meets both conditions (i) and (ii) as demonstrated in the next section.

3. The two transitions, X(y) and g(y), taken for granted

Figures 2 and 3 report kernel regressions for the two X(y) curves and the g(y) curve. ⁸ The data are divided into four parts with the same number (N = 1,933) of observations according to income by the three vertical dashed lines on Figure 2 and 3. This division will be used below.

3.1 The democratic transition

Figure 2 shows two curves that are very robust. The 95% confidence intervals are only reported for the *P*-index. They are slightly narrower for the *V*-index. They are shown for annual data, but they look the same for 5-year and 10-year periods and for country averages. They also appear in the data for each decade separately, and in the data for the five major country groups, even when the sample for some groups misses part of the income range. The data for polity and polyarchy extend back to 1800. Though these data are thin at the start, they still replicate the transition curves. This confirms *the equivalence* of long time series and wide cross-country data as regards transitions.

The black P(y) curve is higher than the gray V(y) curve, as the Polity project is more lenient in declaring countries for democracies, while the V-Dem project compiling the polyarchy index is more stringent. However, both indices yield the same *perfect* transition pattern. The two indices P and V have a correlation of 0.883.

The figure also shows how the tensions T^{P} and T^{V} are calculated. The observations a and b illustrate the tensions by the arrows. Point a is for the income y = 7, for one country in one year. Here the polity index is a_{P} and the polyarchy index is a_{V} . They are both higher than their curves, almost by the same, so for both indices the tension is positive – the country is too democratic that year. Point b for y = 9.15 shows an observation where the indices differ substantially. Polity shows a positive tension, while polyarchy gives a negative tension. As per the definition, the average tension for all 7,732 observations is zero for both indices.

⁷ These methodological points are developed in Paldam (2021) and (2024a).

⁸ Figures 2 and 3 are from Paldam (2021, 2023a). The theory in section 3.2 is developed in Paldam (2023b), and the dynamics of two-sector models is shown in Gundlach and Paldam (2020). The missing democratic transition in the OPEC countries is analyzed in Paldam (2023c).



Figure 2. The democratic transition X(y), for X = P, and V

The kernel estimated from the 7,732 observations, see Table 1. The bandwidth is bw = 0.3. The back curve is for *P*, polity, while the gray line is for *V*, polyarchy. The three dashed lines at incomes 7.5342, 8.5450, and 9.4842 divide the observations into four parts with 1933 observations in each. The vertical arrows are the tensions (the arrow from a_P is shifted to the left to prevent clutter).

3.2 The transition in the growth rate

The correlation between growth and income is, as mentioned, only 0.12. Thus, there is ample space for relations both ways, see Paldam (2024a). The relation from income to growth depicted on Figure 3 has the hump-shape of a typical first difference transition curve. The peak of the hump is at $y \approx 9.4$. The three vertical lines divide the observations into four parts as before.



The g = g(y) relation has been discussed in the literature on economic growth as the absolute convergence relation. A linear approximation is known to have an (insignificant)

positive slope, indicating a weak divergence, but it is also known that the rich countries converge, exactly as shown on Figure 2. The confidence intervals are so narrow that both the positive slope in the interval [6, 9.4] and the negative slope in [9.4, 11.2] are significant.

Figure 3 gives g(y) estimated for the Main sample. The g(y) relation is the absolute *convergence* relation from Barro (1991), which has been analyzed in a large literature. The curve is hump-shaped, so that it gives divergence up to income $y \approx 9.5$ and convergence at higher incomes. As the hump is late, a linear approximation has a positive slope.

The transition in the growth rate follows from the two sector models of economic growth originating from Lewis (1964) that was the key model of development in the 70s and 80s. It reappeared in Lucas (2004). In the model, the modern sector starts as a few islands of modern high productivity technology. Growth means that the islands expand and gradually absorb the traditional sector. Transferring resources from the traditional to the modern sector gives extra growth. Formal models of this process replicate the hump-shaped g(y) relation, see Gundlach and Paldam (2020). In the start the modern sector is small and it cannot absorb much, and at the end the traditional sector is small it cannot release much to the modern sector.

4. The relation between growth and democracy

4.1 The g(X) relation that assumes causality

The two key relations analyzed in the paper are between g and X in Figure 4 and between g and T^X in Figure 5 (in section 5.1). The black line is for polity, while the gray line is for polyarchy.



Figure 4. The g(X)-curve, which assumes that democracy causes growth

Estimated for all 7,732 observations, and for the bandwidth bw = 7.5.

Figure 4 shows a weak but significant connection. Thus, it tallies with the correlation of r(X, g) = 0.06. The kernel curves for the two indices have roughly the same pattern, which increases in the interval for X of [20, 70]. After that, the two indices disagree. It falls for V and continues rising for P. The confidence intervals are wide.

| | Slope of kernel curve | | | | | |
|--------|-----------------------|------|------|--|--|--|
| Figure | 2 3 | | 4 | | | |
| | X(y) | g(y) | X(y) | | | |
| All | + | + | + | | | |
| Part 1 | (+) | + | + | | | |
| Part 2 | + | + | + | | | |
| Part 3 | + | (+) | + | | | |
| Part 4 | (+) | _ | (-) | | | |

Table 3. The signs of the slopes on Figures 2, 3, and 4

The signs: + is strong and (+) is weakly positive.

Table 3 shows the correspondence of the slopes on the three figures. Everything fits, so the table suggests that the relations in Figures 2 and 3 can in fact explain the g(X) relation.

4.2 Descriptive statistics, and the division in four quarters

The kernel curves for $g(T^X)$ have some sections that are not linear, so the 7,732 observations of the sample are first sorted by income, *y*. Then they are divided into four parts with 1,933 observations each. Part 1 is the quarter of observations with the smallest income, part 2 is the next smallest quarter, etc.

| Var | All | | Pai | Part 1 Part 2 | | rt 2 | Part 3 | | Part 4 | |
|-------|---|----------------------|--------|---------------|-------|-------|--------|-------|--------|-------|
| | Av | Std | Av | std | Av | std | Av | std | Av | se |
| | | Democracy indices, X | | | | | | | | |
| Р | 59.12 | 37.03 | 34.64 | 29.05 | 44.79 | 33.04 | 63.88 | 35.49 | 93.17 | 17.43 |
| V | 45.12 | 28.94 | 24.70 | 15.57 | 30.86 | 19.26 | 46.54 | 26.58 | 78.12 | 17.82 |
| | Tension variables, $T^X = X - X(y)$ | | | | | | | | | |
| T^P | 0.09 | 21.56 | -1.44 | 29.12 | -0.18 | 33.20 | -0.46 | 35.09 | 2.46 | 17.26 |
| T^V | 0.10 | 19.88 | -1.568 | 15.61 | -0.04 | 19.46 | -0.73 | 25.65 | 2.46 | 17.06 |
| | Income, <i>y</i> , and growth, <i>g</i> | | | | | | | | | |
| У | 8.56 | 1.15 | 7.10 | 0.28 | 8.05 | 0.30 | 10.08 | 0.40 | 10.243 | 0.01 |
| g | 2.27 | 4.94 | 1.15 | 5.37 | 2.38 | 5.37 | 2.61 | 3.21 | 2.373 | 0.08 |

Table 4. Statistics for the *X* and the T^X -series

Av is average. The averages for TP and TV are almost zero per definition but note the similarities of the stds (standard deviations) for the Xes and the T^{X} es.

Table 4 reports descriptive statistics. The results for all observations are in bold (also in Table 5). Standard deviations (std) are shaded in gray. The tables will be used as a reference in the text below, but two observations are worth making: (1) The ratio of $Av(T^X)$ to Av(X) is 0.001 for all data as it should. The fall is less in the four parts, but still large. The stds fall much less. (2) The key correlation r(X, g) is 0.06 on average for the two Xs. It falls to 0.007 in the $r(T^X, g)$ calculations. Thus, when instead of absolute democracy one looks at relative democracy, only 11% of the effect remains. In the four groups, a more complex picture emerges, as the effects are small and variable.

4.3 Regressions

Table 5 reports a set of simple descriptive (OLS) regressions trying to explain growth by the two democracy indices (the *X*s) in panel A of the table, and by the two relative indices (the T^X s) in panel B. The columns with gray shading show no connection. In the column for all, the two *X*s obtain significant positive coefficients, but the relations explain little of the variation. This is precisely as expected from the literature. When the transition is removed from the series by using T^X , everything vanishes. Thus, the coefficient on *X* is spurious. Democracy has no independent effect on growth.

| | | For all | Part 1 | Part 2 | Part 3 | Part 4 | | |
|-------------|---|--------------|-------------|-------------|---------------|---------------|--|--|
| | Ν | 7,732 | 1,933 | 1,933 | 1,933 | 1,933 | | |
| | | Coeff (t) | Coeff (t) | Coeff (t) | Coeff (t) | Coeff (t) | | |
| | Panel A. Explaining growth, g, by the two democracy indices $X = P$, and V | | | | | | | |
| For P | Р | 0.009 (5.8) | 0.011 (2.7) | 0.006 (1.7) | -0.001 (-0.4) | -0.024 (-6) | | |
| | Constant | 1.76 (17) | 0.76 (4.0) | 2.10 (10.2) | 3.03 (12) | 4.81 (12) | | |
| | \mathbb{R}^2 | 0.005 | 0.003 | 0.001 | 0.000 | 0.016 | | |
| For V | V | 0.009 (4.5) | 0.024 (3.1) | 0.005 (0.7) | -0.004 (-0.8) | -0.029 (-7) | | |
| | Constant | 1.88 (18) | 0.56 (2.4) | 2.38 (9.7) | 3.12 (13) | 4.90 (15) | | |
| | \mathbb{R}^2 | 0.003 | 0.004 | 0.000 | 0.000 | 0.026 | | |
| | Panel B. Explaining growth, g, by the two tensions $T^X = T^P$, and T^V | | | | | | | |
| For T^{p} | T^P | 0.003 (1.6) | 0.011 (2.6) | 0.002 (0.4) | -0.002 (-0.5) | -0.015 (-4) | | |
| | Constant | 2.27 (40) | 1.17 (10) | 2.32 (16) | 2.95 (25) | 2.64 (36) | | |
| | \mathbb{R}^2 | 0.000 | 0.003 | 0.000 | 0.000 | 0.006 | | |
| F | T^V | 0.000 (-0.1) | 0.022 (2.9) | 0.001 (0.2) | -0.005 (-1.0) | -0.020 (-5.0) | | |
| or T^V | Constant | 2.27 (41) | 1.18 (10) | 2.32 (16) | 2.95 (25) | 2.66 (36) | | |
| | \mathbb{R}^2 | 0.000 | 0.004 | 0.000 | 0.000 | 0.011 | | |

Table 5. Linear regressions explaining growth by X or T^X

The shaded columns show no relation at all. The regressions are OLS.

The leftmost column for all shows the expected effect of democracy on growth, and as the effects of the tensions are zero, it demonstrates that the full effect of democracy on growth is spurious. As expected from Table 2, the high correlations between the level variables (P and V) and their tensions (T^P and T^V) give similar results in the two sections of the table. It is clear that there is nothing in parts 2 and 3. Thus, all of the small action in the relations happens in parts 1 and 4, where the signs are the reverse.

5. The functional form of the relation between tensions and growth

5.1 Aggregate results: The two kernel curves explaining g by T^X

Table 5 showed that the relation between g and the two Xs is zero. However, the regressions were linear and may hide something when non-linearity is permitted. This is analyzed by the two graphs in Figure 5. The two curves for $g(T^X) = g(T^P)$ and $g(T^V)$ look alike, just like the two curves in Figure 2. This is a general observation. Thus, it rarely matters which democracy index the analysis uses. In reading the graphs, it should be noted that the T^X s have a distribution with a long tail to the left. This is indicated with the 5% lines on the graphs.

The key observation for Figure 5 is that it does not look like Figure 4, despite the high correlation between X and T^X . While Figure 4 showed a positive slope, this has gone on Figure 5. Also, the confidence intervals are much narrower in Figure 5. The curves have negative slopes, but this is due to the path for the high negative tensions: Most of the negative paths are for the extreme 5% of the observations. Thus, it may give high growth to have a tough tyranny, but the evidence for this conclusion is thin.



Figure 5. All data, $g(T^X)$ explaining growth by the relative level of democracy

The black line is for polity while the gray line is for polyarchy. This convention is also used below.

The high growth under hard dictatorship may be an artifact, as such regimes may exaggerate the reported growth rates.⁹ More ordinary regimes have deviations from the transition path in [-30, 30]. Here the curves look the same with a small downward bend that bottoms around -20 and an even smaller upward bend that peaks around 30. The two bends are weakly significant. This explains why the correlations are zero while the slopes of the curves look negative. The curves have a significant positive slope for T^X s from -20 to +30, but it is not strong. Consequently, the analysis of the full data set supports the evidence from Table 5. There is little to suggest that g and T^X are related.

The analysis in Table 5 suggests that there is some relation between g and T^X in parts 1 and 4 of the data, but nothing in parts 2 and 3. The analysis in Figures 6-9 covers the two indices in one figure for each quarter of the data. It is constructed as Figure 5. The confidence intervals are for the $g(T^P)$ -curve. Note that the T^V -curves are either fully within the confidence intervals around T^P , or almost so. The *App* shows all the individual curves with confidence intervals. The H0 is the hypothesis that no connection is rejected. This is interpreted to mean that a horizontal line cannot be drawn within the confidence intervals.

5.2 Part 1 of the data, the quarter with the lowest income

On Figure 6 the two curves look as if they have a common upward trend. It is strongest on the left-hand side of the graph. There is no upward drift after about +10.





⁹ A small literature shows this effect empirically: see Magee and Doces (2015) and Martínez (2022). An example is the high growth rates of the communist regimes in Eastern Europe, which proved to be an illusion. Finland left Russia in 1918 as a relatively poor part of the empire and reported lower growth rates than the USSR most years till 1990, but by then Finland had a *gdp* about three times the one of Russia.

Table 4 reported that the average X-values in part 1 are 30-40. Thus, a T^X value of -30 is a hard dictatorship as the one of North Korea. It is clearly bad for development. These conclusions are weak, as the horizontal curve for the average g is within the confidence intervals for most incomes. There is no upward drift after about +10, but when moderately positive *T*-values are reached, there are no further gains for development. It is almost possible to draw a horizontal line within the confidence intervals. Thus, the positive slope is dubious.

5.3 Parts 2 and 3 of the data, the two middle quarters with no relation

Figures 7 and 8 shows the two lines for the two middle parts. On both graphs the horizontal line for the average of g is almost within the confidence intervals.



Figure 7. Part 2, $g(T^X)$ explaining growth by the relative level of democracy

Figure 8. Part 3, $g(T^X)$ explaining growth by the relative level of democracy



5.4 Part 4 of the data, the quarter with the highest income

Figure 9 for the last quarter of the data looks strikingly different from the previous two figures, as it shows two levels of curves: A high level for the tensions in the interval [-80, -30] and a much lower level in [-20, 20]. At that level, the confidence intervals narrow.

Figure 10 shows the distribution of one tension variable T^P for part 4 of the sample as used for Figure 9. The histogram for T^V is similar, see App. The distributions have two distinct parts as shown. At the low end, the distribution consists of few observations giving wide confidence intervals. This part of the distribution covers countries catching up, including some with high growth rates. At the other end are the old West and countries that have joined the West and converged to much the same economic and political system, such as Czechia, Chile, Estonia, and Israel, which have also reached the same political system. Thus, the negative slope on Figure 9 has a special explanation.









6. Conclusions

The paper studies the weak but significant relation between democracy and growth. It is often taken as causal, but the relation may also be a spurious consequence of the transitions of democracy and of the growth rate. This paper studies if any causal part remains of the relation once the spurious component is taken out of the data.

The paper first estimates the average level of democracy as a function of income, i.e., the transition relation. Then the relative democracy is calculated as a tension between the actual level of democracy and the transition path. The growth-tension relation is taken to be the nonspurious part of the growth-democracy relation. The result is clear: The effect of relative democracy on growth is marginal. Thus, the small correlation between democracy and growth is almost fully spurious.

Policy-wise the conclusion is that while one may safely recommend democracy, for its own sake, it is unlikely that this will lead to significantly higher income.

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¹⁰ Contains updated and integrated versions of ten published papers, mostly joint work with Erich Gundlach.