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Political Institutions and Output Collapses

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ABSTRACT: Major output collapses are costly and frequent in the developing world. Using cross-country data, we classify five-year periods using a two-dimensional state space based on growth regimes and political institutions. We then model the joint evolution of output growth and political institutions as a finite state Markov chain, and study how countries move between states. We find that growth is more likely to be sustained under democracy than under autocracy; output collapses are more persistent under autocracy; and stagnation under autocracy can give way to outright collapse. Democratic countries appear to be more resilient.

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WORKING PAPERS

Political Instiutions and Output Collapses

Prepared by Patrick A. Imam and Jonathan R. W. Temple[1]

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Executive Summary

Major output collapses are costly and frequent in the developing world. Using cross-country data, we classify five-year periods using a two-dimensional state space based on growth regimes and political institutions. We then model the joint evolution of output growth and political institutions as a finite state Markov chain, and study how countries move between states. We find that growth is more likely to be sustained under democracy than under autocracy; output collapses are more persistent under autocracy; and stagnation under autocracy can give way to outright collapse. Democratic countries appear to be more resilient.

I. Introduction

Since the advent of modern growth theory in the 1950s, economists have investigated how countries can improve their living standards. A related challenge, but one less discussed in literature reviews and textbooks, is how to explain major collapses in output. These are not confined to wars or natural disasters and raise many questions. Why do some societies, which had previously grown, and without the destruction of labor or capital, spend a long time below their previous growth paths? What factors are associated with longer or more severe collapses? Which countries are especially at risk?

We use the term 'output collapse' to denote a decline in output that lasts longer, and is more severe, than the recessions typical to the business cycle in developed countries. Unstable growth is the norm, such that many national growth experiences are best understood in terms of distinct episodes or regimes, such as booms, busts, and poverty traps (Pritchett 2000, 2003). This contrasts with conventional growth theories, many of which yield a single growth regime and assume that convergence to a steady-state path is monotonic.

Some output collapses are associated with financial crises, on which the literature is extensive. But not every output collapse coincides with a financial crisis, and sometimes a collapse may lead to a financial crisis rather than vice versa. The literature on output collapses, more broadly defined, is relatively small, but Aiyar et al. (2018), Becker and Mauro (2006), Bleaney et al. (2018), Eichengreen et al. (2014), Hausmann et al. (2008), Kar et al. (2013) and Reddy and Minoiu (2009) all present stylized facts on either collapses or growth slowdowns.

Our paper contributes to this literature. We model growth outcomes jointly with aspects of institutions, to generate new stylized facts about how collapses arise and how long they last. In particular, we look at the role of democratic institutions. Democracies can more readily remove failing leaders, and may be better at resolving social conflict, as argued by Rodrik (1999).[2] This suggests that major output collapses may be more frequent and severe under autocracy. The recent literature on democracy and growth has mainly studied the effects of democratic transitions, but the long-run pathologies of autocracy are also relevant, and it is those we investigate here.

To do this, we use cross-country data to classify five-year periods using a two-dimensional state space, based on growth regimes and political institutions. We define three growth regimes — phases of growth, stagnation, or collapse — but also distinguish between the political institutions in place at the time. Using a finite state Markov chain, we contrast the transition patterns between democracies and autocracies, while allowing the compositions of the two groups to evolve. We find that growth is more likely to be sustained under democracy than under autocracy; output collapses are much more protracted under autocracy; and stagnation under autocracy is more likely to presage outright collapse. It is then easier to understand why autocracy is associated with a wide variety of long-run outcomes (Rodrik 2000).

In our main results, the transition matrix is approximately block diagonal. This reflects the fact that transitions between growth regimes are common, while transitions between institutional forms are not. With this in mind, we distinguish between two sets of findings. In the first set, we look at the persistence of growth, stagnation, and collapse, and contrast these between institutional forms. These results are mostly based on large numbers of observations and should be reliable. In the second set, we ask questions about institutional transitions, such as whether countries undergoing a crisis are especially likely to democratize. These results are less robust because there are relatively few institutional transitions in the data, especially from democracy to autocracy. Hence, we give these findings less emphasis in the paper.

[2] Matta et al. (2022) find that regime crises accompanied by mass civil protest are especially likely to result in a lengthy fall in output.

In the longer term, the Markov chain approach will allow the study of the two-way relations between economic collapse and institutional transitions. The approach could be extended in many directions, and some of its limitations will recede as more data become available. In the meantime, one virtue of the approach is its transparency: it will clarify where interesting conclusions can already be drawn, and where the data have relatively little to say.

We derive some results on longer-term outcomes, including the stationary distribution implied by a given transition matrix. Fukuyama (1989, 1992) argued that, with the end of the Cold War, there would be no intellectual destination — or no better organizing principle — beyond liberal democracy. We have since learnt that ideological contention has not gone away, and liberal democracy is not an absorbing state, whatever arguments may be advanced to support it.[3] Acemoglu and Robinson (2019), in the opening and closing pages of their book, argue that the long-run outcome will be diversity: neither the end of history nor the general anarchy that Kaplan (1994) expected. Our approach sheds light on the likely extent of diversity. If we extrapolate from the data since 1971, we find that countries will spend only a half to two-thirds of their time under democracy, with long-run diversity inevitable.

In another analysis, we split the time span to see if transition probabilities have changed. The results suggest that growth has become more common and collapse less common. But at the time of writing, the strains of the Covid-19 pandemic, high inflation and debt, and higher interest rates may lead to a new round of crises; see Rogoff (2022). History suggests that the recoveries may be unsteady and protracted. One lesson of this paper's analysis is that, once countries move into stagnation or collapse, it may be a long way back.
The paper has the following structure. The next section provides some background discussion and context. Section 3 introduces our approach. Section 4 describes the data, section 5 presents a simple example to fix ideas, and section 6 sets out the main results. Section 7 distinguishes more finely between political institutions, while section 8 studies the robustness of the main results. Section 9 concludes. Sequences of states for individual countries are reported in a separate online appendix.

II. Background

There have been some prominent output collapses since the start of this century: Zimbabwe in 2008 was followed by Venezuela in 2013, and more recently, by Lebanon and Sri Lanka.[4] These were in peacetime and typically preceded by, or were accompanied by, the weakening of democratic institutions. In some cases, what remained were only partial democracies. The Polity project (Marshall and Gurr 2020), which classifies political regimes around the world, calls these anocracies — hybrids of democracy and autocracy which do not meet the criteria for either.

This paper will study output collapses and political institutions jointly, in terms of distinct growth regimes. This reflects what might be called the 'episodic growth' perspective, starting with Easterly et al. (1993) and especially Pritchett (2000, 2003), and taken up by economic historians such as Jerven (2010) and Broadberry and Gardner (2022). These authors broadly agree that, since long-run growth experiences often combine periods of expansion and decline, studying growth episodes may be more informative than looking at average growth rates alone.

[3] In the theoretical analysis of Acemoglu et al. (2015, p. 1043), a democracy can endure if it is not shocked or severely challenged as it moves toward a "sufficiently democratic constitution/state", but a shock before this state is reached can lead to a reversal. That would suggest there is an absorbing state, but our empirical analysis will exclude the OECD countries that would be the natural candidates.
[4] Venezuela had previously collapsed in the 1980s and 1990s; see Hausmann (2003).

Major collapses in output differ from the business cycles seen in developed countries. The influential study of emerging market business cycles by Aguiar and Gopinath (2007) linked short-run instability to innovations in the permanent component of productivity, perhaps associated with policy changes. At least for emerging markets, such changes could explain movements between distinct phases of growth. The conventional distinction between short-run cycles and long-run growth breaks down, and work in this area does not fit neatly into either analytical category. This may be one reason why output collapses have been under-researched and rarely feature in a teaching syllabus, even at graduate level. In another well-known paper, Cerra and Saxena (2008) cast doubt on the idea that output returns to its pre-crisis trend.[5] More recently, Aikman et al. (2022) find that severe contractions often have a scarring effect, with growth afterwards remaining below trend. Since countries may spend many years below an earlier trend path, this is another reason to see output collapses as costly. They are not confined to financial crises or conflict and, given their prevalence, it seems worth studying the pathways into collapse and out again. This may help governments and aid donors identify which countries are most vulnerable and when, and devise strategies for lessening the risks.

The stylized facts we generate concern interactions between political institutions and growth regimes; a companion paper, Imam and Temple (2023), examines interactions between state capacity and growth regimes. The underlying view is that inclusive political institutions and high state capacity should help to stave off dysfunctional politics, conflict other political instability, and state failure. Goldstone (2008) argued that states with neither effectiveness nor legitimacy are especially likely to become failed states. Goldstone et al. (2010) argued that certain aspects of political institutions are more powerful predictors of political instability than economic conditions. The worst forms of instability, such as civil war, are likely to bring economic and social dislocation or collapse.

There are many reasons to study these connections, but one is that democracy has faltered in recent years. Democratic lapses are one pathway to state failure identified by Goldstone. As various authors have observed, we are now about fifteen years into a ‘democratic recession’: after several decades of advances in political rights around the world, some countries are regressing to partial democracy or even autocracy.[6] Some pro-democracy social movements have met with resistance, and the initial optimism of the Arab Spring proved especially short-lived.

For the period we study, 1971-2016, transitions to democracy outnumber transitions to autocracy. But Goldstone and Kocornik-Mina (2005) argued that countries experiencing democratic transitions are often ‘bouncers’ or ‘cyclers’, moving back and forth between autocracy and democracy. That status is not without risks: such countries may be more likely to engage in armed conflict (Mansfield and Snyder 1995) and are more prone to political instability and other forms of conflict or unrest (Goldstone et al. 2000). It is possible that growth helps to stabilize autocracy: in our findings, democratic transitions are slightly more likely from autocratic stagnation or collapse than from autocratic growth. The fall of Suharto in Indonesia is one example: his regime oversaw several decades of robust growth and then ended abruptly amidst a macroeconomic crisis (see Temple 2003).

Growth may also help to stabilize democratic regimes, while an economic crisis may sometimes prompt a transition from democracy to autocracy. Acemoglu and Robinson (2019, ch. 15) cite Franklin D. Roosevelt’s 1944 State of the Union address, in which he said that "People who are hungry and out of a job are the stuff of which dictatorships are made"; see also Møller et al. (2015) on democratic breakdown in the interwar years. Although we find some supporting evidence — the transition probability to autocracy is higher for democratic countries experiencing an output collapse, rather than growth — the number of cases is so low that the finding

[5] This contrasts with the V-shaped recessions sometimes seen, as during the Covid-19 pandemic.

[6] See, for example, Diamond (2008, 2015) and Lührmann and Lindberg (2019); for more sceptical assessments, see Levitsky and Way (2015) and Little and Meng (2023).

has limited usefulness. Output collapses under democracy, and transitions to autocracy, are both too rare to allow firm conclusions about the relation between them.

As well as periods of collapse, we also include a distinct stagnation regime in some of our analyses. Olson (1982) argued that democratic societies may stagnate in the long run, as coalitions of interest groups form. Krusell and Ríos-Rull (1996) developed a political economy model with innovation, in which stagnation and growth alternate due to vested interests. Among the richer countries, Japan is the best-known example of long-term stagnation. For the developing countries we study, democracies that are stagnating often return to growth. At first glance, stagnation is even less persistent under autocracy, but this is because there is a high probability of moving into outright collapse. Stagnation may be a greater problem for autocracies than democracies.

We aim to generate new stylized facts rather than causal inference; put differently, we examine what happens rather than why. For some questions, the use of more conventional panel data methods or duration analysis would be more informative. For example, Acemoglu et al. (2019) estimate the effect of democratization on growth, a parameter that has no direct counterpart in our analysis and is beyond this paper's scope.[7] We see our approach as complementary and focused on different questions: the paper contributes to a larger picture, taking in the risks and nature of output collapses, and the long-run pathologies of autocracies. This should be informative even in the absence of causal inference. Despite decades of research on democracy, there are few credible ways to isolate exogenous variation in political institutions, and useful but imperfect stylized facts may be the most we can hope for.

III. Basic Ideas

This paper investigates how transitions between growth regimes differ between democracies and autocracies, allowing the compositions of the two groups to evolve endogenously. We achieve this using a finite state Markov chain. Since the basics of Markov chains are well known, we describe them only briefly. Consider a discrete state space S with states 1,.., S. The transition matrix will be denoted by *M*. The elements of this matrix are non-negative and each row sums to one; the individual elements are probabilities of transitions between states. The maintained assumption in a first-order Markov chain, known as the Markov property, is that the transition probabilities depend only on the current state and not on the earlier history of the process.
Denote the marginal or unconditional distribution over the states at time t by a row vector ψ_t.[8] Over time the evolution of the process can then be described by

$$\psi_{t+1} = \psi_t M$$

It can be shown (for example, Stachurski, 2009, theorem 4.3.5) that every Markov chain on a finite state space has at least one stationary distribution. Each stationary distribution will satisfy $\psi^* = \psi^* M$. When ψ^* is unique, this will be the long-run outcome. The individual elements of the row vector ψ^* indicate the proportions of time the process will spend in each state if the process runs for a long time. But depending on the elements of the transition matrix M , the process will converge slowly or quickly to the long-run equilibrium, and the nature of the stationary distribution will be more or less sensitive to the individual elements of M (the transition probabilities). We discuss this more formally later in the paper.

[7] See also Boese and Eberhardt (2021), Eberhardt (2022), Papaioannou and Siourounis (2008), Persson and Tabellini (2008), and Rodrik and Wacziarg (2005), among others. On the political economy of non democracies, see the survey by Egorov and Sonin (2023).
[8] For a more rigorous treatment, see Stachurski (2009, pp. 74-76).

The use of Markov chains to study 'distribution dynamics' has been one alternative to modelling growth using linear regressions. The problems with the latter are well known (Durlauf et al. 2005). In the paper which initiated distribution dynamics for countries, Quah (1993) argued that growth regressions say little about how the distribution of GDP per head will evolve, not least given the medium-run instability of growth. Easterly et al. (1993) and Pritchett (2000, 2003) also drew attention to instability. Pritchett (2003) argued that conventional growth theories may be less useful than approaches which model transitions between distinct regimes, such as expansion or collapse. Later work isolated accelerations or decelerations in growth, as in Hausmann et al. (2005), Jones and Olken (2008) and Kar et al. (2013) among others. Recent work has often used duration (survival) analysis, to investigate the onset and persistence of sustained growth (Berg et al. 2012, Berg et al. 2018) or — as in Hausmann et al. (2008) — the onset and duration of collapses.

The current paper generates findings which are complementary to those of duration analysis. We return to Quah's idea of using Markov chains but apply them to transitions between growth regimes and political institutions rather than transitions between income levels. This has several advantages to be discussed shortly.

In using Markov chains, one choice is whether states are treated as directly observable, as in Quah (1993), or unobservable, as in Hamilton (1989). There are a few growth papers which take the former approach, such as Fiaschi and Lavezzi (2003, 2007) and Im and Rosenblatt (2015), but the recent growth literature has mostly followed Hamilton in treating the current state as unobservable. It then estimates transition probabilities, perhaps as a function of a small number of variables. Papers in this line include Jerzmanowski (2006), Kerekes (2012) and Morier and Teles (2016).

For the questions we are interested in, there may be a case for experimenting with observable states, as in Quah's original work. It could be argued that growth outcomes and political institutions are easier to observe than the underlying state of the business cycle that Hamilton studied. Much of the empirical literature on political transitions, such as Epstein et al. (2006), treats the transitions as observable, and we follow suit.

In contrast, estimating transitions between unobservable states needs plenty of data. When studying developing countries, this usually means using annual data and modelling year-to-year transitions. That risks saying more about short-run cyclical fluctuations than the medium-run phenomena (sustained growth, major output collapses) that we are interested in here. Treating the state as unobservable limits the ability to consider a large state space, and the Markov property is less likely to hold for transitions over short intervals, as Kremer et al. (2001, p. 284) discuss.[9]

In more detail, whereas Quah studied transitions between relative income levels, we study transitions between alternative medium-run growth outcomes. We use five-year periods and classify them into periods of growth, stagnation, or collapse, our three growth regimes of interest.[10] But we can easily expand the state space beyond this. If we allow three growth regimes and two forms of political institutions (democracy/autocracy, again both observed) the total number of states will be six (3 × 2), which is easily manageable for analysis and reporting.

As Azariadis and Stachurski (2005) noted, the literature after Quah usually used a one-dimensional state space, even though the process generating the data will have more dimensions. They also note that projecting a multi-dimensional process onto a single dimension will undermine the Markov property. By enlarging the state space,

[9] On the first point, Morier and Teles (2016, p. 1563) note that, in their framework, allowing four states appears to ask too much of the available data. Jerzmanowski (2006) and Kerekes (2012) study models with four states: crisis, stagnation, steady growth and 'miracle' growth.

[10] This takes the analysis closer to that sketched by Pritchett (2003). He writes (p. 133) that 'The encompassing approach to a broader theory of growth requires not only individual models of growth within states but also explanations for country transitions between states.' We modify this a little by extending the state space and using this to generate stylized facts.

our analysis begins to address these criticisms of earlier work, although data limitations — above all, the small number of countries in the world — rule out a full solution.

Using combinations of political institutions and growth regimes to define states is new to this paper. Transition probabilities between levels of democracy were previously considered in Gleditsch and Ward (1997) and Epstein et al. (2006). Relative to the early studies, we now have more data. Quah's data ended more than thirty-five years ago, in 1985, while that of Gleditsch and Ward ended in 1994. In our case, even though we use five-year subperiods rather than annual data, our main results can draw on almost 1000 transitions from which to estimate transition probabilities.

Markov chains may be better suited to growth regimes than to Quah's relative income classes. Quah (1993) identified an emerging tendency towards 'twin peaks' in the stationary distribution of GDP per head. But since countries rarely move between income classes, the transition matrices in his work were relatively sparse, with many zeroes away from the main diagonal. Convergence to a stationary distribution may then be rather slow. Perhaps more seriously, even when the stationary distribution implied by a sparse transition matrix is unique, its form will often be sensitive to small changes in transition probabilities. These could arise through alternative state definitions, measurement errors, or small changes in the sample of countries.[11]

This latter point — the sensitivity of the stationary distribution — is among those analyzed by Kremer et al. (2001). After their work the approach became less common in the literature, although Fiaschi and Lavezzi (2003, 2007) defined states by growth as well as income; Im and Rosenblatt (2015) looked for a middle-income trap; and Feyrer (2008), Johnson (2005) and Barseghyan and DiCecio (2011) showed what could be learnt from combining Quah's ideas with those of development accounting. For some other extensions and applications, see Quah (1996a, 1996b, 1997), while Durlauf and Quah (1999) discussed the approach and how it relates to the goals of a researcher.

Since we look at movements between growth regimes rather than income classes, we have fewer zeroes in our transition matrices. To consider this more formally, we use the Dobrushin (1956) coefficient, defined later in the paper. It indicates that, in our case, convergence to the stationary distribution will typically be faster than in Quah's analyses, and that distribution will be less sensitive to small changes in transition probabilities. This gives us more confidence in what our analysis implies for the long run.

Given the need to keep the state space manageable, not least for summarizing the results, we cannot extend the size of the state space very far. This limits how much we can say about the forces driving transitions: when we look at democracy in this paper, and state capacity in the companion paper, the results may ultimately be driven by variables correlated with democracy or state capacity. As Besley and Persson (2011) show, there is strong evidence for 'development clusters' in which some countries do well on a range of outcomes, and others do much worse across the board. This pattern reinforces uncertainty over causal effects and mechanisms, while the small number of countries in the world constrains the testing or refining of detailed hypotheses (Durlauf et al. 2005). We see Markov chains as worth exploring, as a complement to other methods.

IV. Methods and Data

The state space in this paper will distinguish between growth regimes and political institutions. We are most interested in developing countries. In all the analyses that follow, we exclude the 24 countries that were OECD

[11] The problem was noted by Ben-David in his discussion of Proudman et al. (1998). On state definitions in Quah's setting, see Bulli (2001). Müller et al. (2022, Table 1) briefly present a long-run transition matrix using data for 1960-2017 and confirm that transitions between income quartiles are rarely seen.

members by 1975.[12] This will isolate the state-to- state transitions of developing countries and avoid conflating their experiences with those of much richer countries. For the issues we are interested in, the rich countries often behave similarly to one another and do not add much useful information, especially since democracy appears to have been consolidated in all of them (at least for now). Including the rich countries would make the results less relevant to the population of main interest here, the set of developing countries.

Our sample includes most of the non-OECD world. The main exception is the transition economies of Europe and central Asia, including the successor states of the USSR. The latter would be especially hard to include in a balanced panel: the lack of reliable subnational data for the USSR rules out a continuous time series for each of the successor states. Arguably this set of countries may be following a distinct process in any case, so that including them would have drawbacks of its own.

In our main analysis, our five-year periods begin in 1971, ending in 2016. Given our data sources, it might seem more natural to begin in 1970. Starting in 1971 means that our 1971-76 period contains the first oil shock and its aftermath, 1981-86 contains the debt crisis that began with Mexico's 1982 default, 1996-2001 contains the East Asian financial crisis of 1997-98, and 2006-11 contains the global financial crisis of 2007-9 and subsequent recession. By 'contains', we mean that the first year of weak growth will be early in the five-year period rather than just before it or towards the end. When starting earlier or later, the periods would align less well with these major events; in the worst case a collapse will straddle the boundary year between two periods and remain undetected. To see how much this matters, we consider alternative timing choices in the robustness section. We do not use data before 1970, partly because a balanced panel seems preferable, and partly because many developing countries were still colonies for part of the 1960s.

We measure output by GDP at constant national 2017 prices, from the national accounts data used in constructing version 10 of the Penn World Table (PWT; Feenstra et al. 2015). We use the national accounts series because we are interested in growth over time rather than cross-national comparisons of productivity levels at a point in time; for more discussion see Nuxoll (1994). The use of national prices to evaluate growth rates corresponds to the usual methods for dating recessions, which do not use information on international price differences or make levels comparisons.

Output collapses could be defined in terms of total output, or a measure closer to productivity. The distinction matters most when a country experiences a rapid change in population, as when conflict leads to emigration; the Rwandan genocide in 1994 is one important case. We use measures closer to average living standards and productivity, and work with output per head, using the PWT 10 data on population. In the robustness section, we also try output per working-age adult (ages 15-64), from the World Development Indicators. This has the advantage that it can approximate output per worker even when the informal sector accounts for a high share of output and employment; Mankiw et al. (1992) used this approach.

We define an output collapse as a major decline in output that is sustained over time. Within each five-year period, we look at whether output declines by 5 percent or more over five years, over either of the two subperiods of four consecutive years, or over any of the three subperiods of three consecutive years. Since countries can collapse in a variety of ways, it makes sense to use several criteria; and the use of subperiods avoids the risk that the results are driven solely by what happens at the start and end of a five-year period.

Looking for at least a 5 percent decline means that we do not classify milder recessions, which are part of the business cycle, as output collapses. Measuring output changes over at least three years means that we do not pick up V-shaped recessions, such as those associated with the Covid-19 pandemic (and note that our sample ends before the pandemic, given the availability of data). Given this, the way we define an output collapse tallies

[12] This means that we exclude New Zealand — which joined in 1973 — but not Mexico, the next joiner in 1994.

with the common sense idea that such events involve output losses that are substantial and protracted. We discuss our timing assumptions in more detail in the appendix.[13]

If a five-year period is not classified as one of collapse, we can assign it to either a growth regime or stagnation. To classify countries as in a growth regime, we look at whether their growth rate is similar to that of countries at the frontier, taking into account that frontier growth rates vary over time (see, for example, Kremer et al. 2021). We define the relevant threshold as

$$G(t) \geq \max\,(0.50,\, GR(t) - 0.75)$$

where GR(t) is the average rich country (OECD) growth rate in period t.[14] This imposes two requirements. First, we require that annual growth is at least equal to the average OECD growth rate in that five-year period, minus 0.75 percentage points (we explain this adjustment shortly). Second, annual growth should also be at least 0.50 percentage points. Given that average OECD growth is occasionally negative, as in the 2006-11 period, it seems sensible to require at least modestly positive growth to qualify for the growth regime.

We can think of countries that qualify as following the regime of a neoclassical growth model, and growing either at the rate of the frontier, or faster through increasing capital intensity and technological catch-up. In defining frontier growth, we allow a shortfall of up to 0.75 of a percentage point; this is because some OECD member countries, used to compute the OECD average, will also be converging to balanced growth paths from below, rather than at the slower rate of frontier countries. Countries which do not meet our two requirements, but are not collapsing, are classified as stagnating. Hence, the stagnation state is effectively a residual category for countries which are neither collapsing nor growing at a rate that is at least modestly positive and comparable to the frontier.

To classify political institutions as democratic or autocratic, we use the V-Dem dataset, version 12, and in particular its Regimes of the World variable (v2x_regime). This variable is ordinal, taking the value zero for a closed autocracy, 1 for an electoral autocracy, 2 for an electoral democracy and 3 for a liberal democracy.[15] We look at whether the minimum value over the five-year period is at least two. This means that our democratic regimes have been democratic for the full five years; if they have been democratic only briefly within the period, that period will be classed as autocratic. The motivation here is that, for a period to be classified as democratic, that should be a stable characteristic. In the robustness section, we will show that our main results are robust to using a less demanding criterion.

Researchers in political science have long tangled with hybrid regimes or partial democracies, and what Collier and Levitsky (1997) called ‘democracy with adjectives’. Epstein et al. (2006) argued that such distinctions are vital. To address this, we first combine the growth and stagnation states, so that countries are either collapsing or growing/stagnating. This allows us to divide political institutions three ways, into democracy, autocracy, and the intermediate concept of ‘anocracy’ associated with the Polity project (Marshall and Gurr, 2020). That concept is used to describe hybrid or transitional regimes that mix democratic with autocratic features. We will discuss our definition of these regimes in section 7 of the paper.

[13] A different approach would be to combine prior criteria with statistical tests for structural breaks in growth rates, as in Kar et al. (2013). Here that would have some disadvantages, including the loss of observations at the start and end of the sample, and the use of ultimately arbitrary conventions when translating break tests into period classifications.

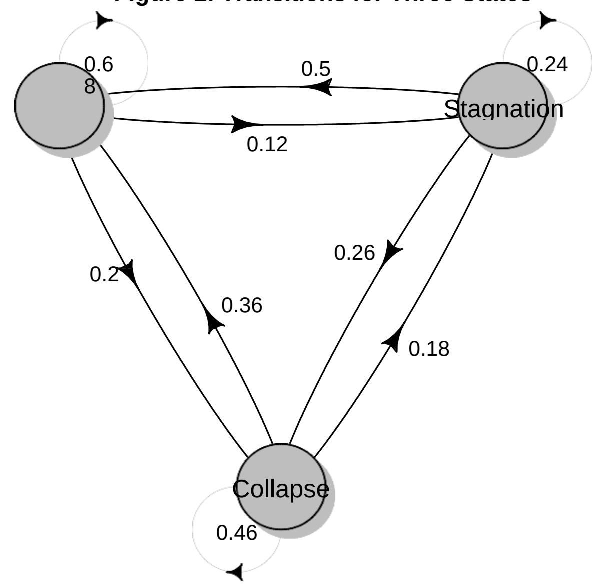
[14] The long-horizon forecasts of Müller et al. (2022) also use the mean OECD growth rate to proxy the growth of the frontier in-sample.

[15] For more details, see the V-Dem website and codebook, Coppedge et al. (2022). For an introduction to the V-Dem project, see Coppedge et al. (2020).

V. A Simple Example

To fix ideas, we start with a simple case of just three states: growth, stagnation, and collapse. Our balanced panel has 155 countries with nine state observations for each country, which implies that we have data on 155×(9−1) = 1240 transitions. Figure 1 represents the transitions between the states in an obvious way, reporting the probabilities of each type of transition.[16] We can see that the growth regime is more persistent than either stagnation or collapse, since countries remain in this state in the next five-year period with a probability of slightly more than two-thirds. Nevertheless, this does imply a high risk that a growth regime comes to an end. This reflects the instability stressed by Easterly et al. (1993) and Quah (1993). It suggests that developing countries either often depart from orthodox growth theory, or sometimes converge to growth paths from above, as can happen if there is an investment collapse.

Figure 1: Transitions for Three States



Stagnation quite often (five-year transition probability 0.26) turns into a collapse in the next period, although returning to growth is more common (0.50). This is also true when in a collapse: a return to growth is more likely (0.36) than moving into stagnation (0.18). A movement from collapse to stagnation is more likely than one from growth to stagnation. The collapse state is more persistent than stagnation, while a direct return to growth is more likely from stagnation than from collapse. We consider less direct pathways below, using the mean passage times.

Since we estimate transition probabilities, we avoid the right-censoring that arises when particular events are unfinished at the end of the sample; see Hausmann et al. (2008) for an extended discussion of censoring in the context of output collapses. We face a slightly different problem, which is that a collapse which starts late in the final period will not be detected. But given that we typically have nine observations on states for each country, the proportion of collapses we miss, relative to those we detect, will be rather small.

In much of the growth literature, countries where stagnation or collapse are persistent— Afghanistan, the Democratic Republic of Congo, Somalia — are especially likely to be missing from the data, biasing the results. Our analysis includes those three countries, but where other fragile states are missing, we may underestimate the persistence of stagnation and collapse for the population of interest. Another problem is highlighted by

[16] This and the other graphs are drawn using the diagrampackage for R; see Soetaert (2020).

Martinez (2022), who finds that autocracies manipulate GDP numbers to make them look better. There is no simple way to account for this here, and hence we may overstate growth persistence and understate the persistence of stagnation or collapse for autocracies. These effects would tend to hide, rather than strengthen, the contrasts that we highlight in our results.

In Table 1 we first show the transition matrix for the three-state analysis. The entry in a row and column indicates the probability of moving from the row state to the column state. The individual transition probabilities are derived by asking what proportion of countries in a given row state at time t are found in a given column state at time t + 1. By a standard argument, these are the maximum likelihood estimates, as used in Quah (1993) and Kremer et al. (2001) among others.

In presenting the results, here and later, we round the matrix entries downwards to the nearest 0.01 and adjust entries on the main diagonal so that each row continues to sum to one. This means that some zeroes are not true zeroes, although less than 0.01.[17] Other results, such as the stationary distribution and the Dobrushin coefficient, are based on the original (non-rounded) transition matrix, so may differ slightly from those implied by the rounded version.

Given the literature that followed Quah (1993), which demonstrated that small changes in the transition probabilities sometimes matter for long-run predictions, we think it is good practice to also report the transition counts (the absolute numbers of transitions). This information is not redundant: the transition probabilities can be derived from the transition counts but not vice versa.

That said, we should dispel some potential misconceptions about transition counts, and low counts in particular. These are not always a problem. If a state x is observed many times in the data but is followed by state y only a handful of times, this should be reliable evidence that the probability of moving from state x to state y is low, and there is no reason for that probability to be estimated imprecisely. A more serious problem arises when a state is observed only rarely in the data. In that case, the numerator and denominator of a transition probability may both be small numbers, and the results will be sensitive to individual cases. But some results will be robust even then: a state which is observed only rarely will have little effect on the long-run properties of the process, such as the stationary distribution and the asymptotic rate of convergence. These points imply that low transition counts should be interpreted carefully and are not in themselves enough to preclude useful findings. We discuss this more formally as part of the appendix, drawing on the asymptotic results of Anderson and Goodman (1957).

The final panel of Table 1 also shows the mean passage times and the mean first recurrence times. In reading the former, the initial state sets the row, and the destination state the column. The entry in a row and column indicates the number of years that will elapse, on average, in moving from the row state to first reaching the column state. These passage times take into account the many possible routes through the states over time.[18]

[17] This approach to reporting may seem problematic, but the total number of cells affected in the paper is very small; most zeroes in the rounded matrices are true zeroes.

[18] For the calculations, which are matrix-based as in Grinstead and Snell (2006), we use the markovchain package for R of Spedicato and co-authors (2017).

Table 1: Growth, Stagnation, and Collapse

	Growth	Stagnation	Collapse
Transition matrix (rounded)			
Growth	0.68	0.12	0.20
Stagnation	0.50	0.24	0.26
Collapse	0.36	0.18	0.46
Dobrushin coefficient	$\alpha(p) = 0.69$		$h = 2.71$
Last period ψ_T	0.73	0.10	0.17
Future distribution ψ_{T+25}	0.56	0.16	0.28
Stationary distribution ψ^*	0.56	0.16	0.28
Transition counts			
Growth	436	83	130
Stagnation	110	51	58
Collapse	134	67	171
$NT = 1240$	$N = 155$	$T = 8$	
Mean first passage and recurrence times			
Growth	0.00	35.20	23.90
Stagnation	11.00	0.00	22.10
Collapse	12.90	32.70	0.00
MFR	9.00	31.40	17.60

Entries in the transition matrix have been rounded down to the nearest 0.01 and entries on the main diagonal adjusted to ensure the rows sum to one. Note that the 25-year projection coincides with the stationary distribution, since convergence in this instance is very fast. For more details see the text.

In this simple first example, the stationary distribution indicates that countries will spend 56 percent of the time in the growth regime, 16 percent stagnating, and 28 percent in an output collapse. As in Quah (1993, fn. 4), we should see this not as a serious long-run forecast — given the many forces not modelled — but as a way to reveal tendencies hidden in the data. Also note that we are not including rich countries, where democracy is much closer to being an absorbing state and major output collapses are rare. This means that our stationary distributions will be too pessimistic when considering the future of the world as a whole.

The stationary distribution is far more informative when it is unique. The table also reports the Dobrushin coefficient, α(p), introduced in Dobrushin (1956). Our presentation follows Stachurski (2009, section 4.3.2). Consider again a right stochastic matrix M defined over the set of states S, and denote the transition probability from state x to state y by
p(x, y). The Dobrushin coefficient is defined as:

$$\alpha(p) := \min_{(x,x')\in S\times S} \sum_{y\in S} p(x,y) \wedge p(x',y)$$

where the notation $a \wedge b := \min\{a, b\}$ and the index $\alpha(p) \in [0, 1]$. It can be shown that the process is globally stable if and only if there exists a strictly positive integer t such that $\alpha(pt)>0$. If this is true, the process will converge to a unique stationary distribution regardless of the initial conditions.[19]

This means we can take a transition matrix M and check whether it implies a unique stationary distribution. If the Dobrushin coefficient $\alpha(p)$ for M is non-zero, the process is globally stable. If the coefficient is zero, we should compute the Dobrushin coefficient for an iterate of the transition matrix, M 2, and try again. As long as we can find a strictly positive integer t such that the coefficient associated with Mt is non-zero, the process is globally stable.

The intuition is that, when the Dobrushin coefficient is greater than zero, separate Markov chains starting from any two states have a strictly positive chance of meeting each other in at least one state. The transition matrix is then said to be 'scrambling'.[20] This rules out cases where, for example, there are two or more absorbing states, or two or more mutually exclusive sets of states which are separately absorbing. To take an extreme example, if M is the identity matrix, every state is absorbing, the process never departs from the initial conditions, every initial distribution is stationary, and the Dobrushin coefficient will be zero for any iterate of the transition matrix.

The coefficient is useful beyond indicating global stability. It is tightly connected to the rate of convergence to equilibrium: see Stachurski (2009, theorem 4.3.17). The higher is $\alpha(p)$, the more quickly the process will converge to the stationary distribution. And as Seneta (1988) showed, the larger is the Dobrushin coefficient, the less sensitive the stationary distribution will be to perturbations of the transition matrix. We can then give more weight to what a given matrix implies for the long run. Recall that Kremer et al. (2001) argued that Quah's analysis was sensitive to small changes in transition probabilities. Since we define the state space differently, our transition matrices have fewer zeroes, and the stationary distributions should be more robust.

An alternative measure of convergence speed, which we also report, is the asymptotic half-life; see Kremer et al. (2001), p. 290. This is defined as:

$$h = -\frac{\log(2)}{\log|\lambda_2|}$$

where $\lambda 2$ is the second largest eigenvalue (after 1) of the transition matrix. This gives the number of periods needed to halve the norm of the difference between the current distribution and the stationary distribution. Note that, as an asymptotic rate, this does not take the initial distribution into account, and so actual convergence will sometimes be faster than this. We adjust h for the fact that our periods are five years long. In the case of Table 1, the asymptotic half-life of h = 2.71 indicates very fast convergence, since the norm of the difference is halving every 2.71 years. In our later findings, convergence will be much slower than this, but faster than in Quah's analysis of income classes.

VI. Political Institutions

In this section we present the main analysis, which makes the state space two-dimensional. We identify countries as democratic or autocratic using the V-Dem data, as previously described. Hence, we retain three growth regimes (growth, stagnation, and collapse) and distinguish between two forms of political institutions (democracy, autocracy). This implies 3 × 2 = 6 states in total.

[19] For a formal statement, see Stachurski (2009, theorem 4.3.18); a related result appears in Stokey et al. (1989, theorem 11.4).
[20] See Seneta (1979), noting that the τ coefficient used there is one minus the Dobrushin coefficient used here.

A graph of the transitions is shown in Figure 2. Transition probabilities below 0.04 are rounded down to zero, so that the relevant arrow can be omitted from the graph for legibility. As when rounding the transition matrix, we adjust the main diagonal so that the matrix rows still sum to one. These adjustments mean that detailed analysis of the results should be based on the tables rather than the graphs; the latter are intended to give a first impression, at the expense of omitting low-probability transitions and overstating persistence (the entries on the main diagonal) relative to the original transition matrix.

Figure 2: Political Transitions, V-Dem

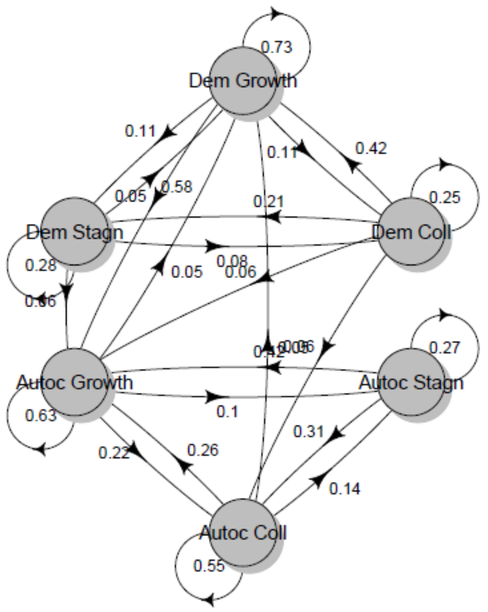


Table 2 presents the rounded transition matrix, the transition counts, and the mean passage times, as in the previous example but now with six states. In the table, democratic institutions are denoted by D, autocratic institutions by A, and growth/stagnation/collapse by G/S/C. To give a concrete example, the probability of a direct transition from democratic growth to autocratic collapse, from state DG to state AC, is very low at 0.01 over five years (there are only two such events in the data).

The transition matrix is approximately block diagonal, reflecting the paucity of institutional transitions mentioned earlier. Most of our discussion of the Table 2 results will contrast the two sub-matrices on the main diagonal. This is rather like estimating separate growth regime processes for the set of democracies and the set of autocracies, and then contrasting them. Although that might seem simpler, we think estimating a single matrix is more elegant: it allows for ongoing changes in the composition of the two groups, even if these changes are modest. The emphasis on sub-matrices does make clear that we can derive some useful findings even when there are few institutional transitions. For a more formal analysis, including estimated standard errors, see the appendix.

What we can see immediately from either the graph or the (more accurate) transition matrix is that growth is more likely to be sustained under democracy than autocracy. Stagnation is slightly more persistent under democracy, but this is partly because stagnation turns into outright collapse more often in autocracies (transition probability 0.31) than in democracies (0.08 + 0.02). This suggests that stagnating autocracies are especially vulnerable to further deterioration in their prospects. Overall, democratic countries appear to be more resilient.

Table 2: Democracy and Output Collapses

Transition matrix		DG	DS	DC	AG	AS	AC
	DG	0.72	0.11	0.11	0.05	0.00	0.01
	DS	0.53	0.26	0.08	0.06	0.00	0.02
	DC	0.42	0.21	0.25	0.06	0.00	0.06
	AG	0.05	0.00	0.00	0.63	0.10	0.22
	AS	0.03	0.03	0.00	0.42	0.21	0.31
	AC	0.05	0.01	0.01	0.26	0.14	0.53
Dobrushin coefficient		$\alpha(p) = 0.14$		$h = 20.21$			
Last period ψT		0.32	0.04	0.06	0.43	0.03	0.12
Future distribution $\psi T{+}25$		0.32	0.08	0.07	0.28	0.07	0.19
Stationary distribution ψ^*		0.34	0.08	0.07	0.26	0.06	0.18
Transition counts							
	DG	112	19	19	9	0	2
	DS	27	11	4	3	0	1
	DC	14	7	8	2	0	2
	AG	20	3	2	218	37	79
	AS	4	4	1	51	22	37
	AC	15	5	5	73	40	136
$NT = 992$		$N = 124$	$T = 8$				
MFP/MFR times							
	DG	0.00	67.50	78.00	71.80	147.50	92.50
	DS	17.20	0.00	81.90	70.70	146.30	91.10
	DC	22.60	63.20	0.00	69.00	143.40	86.90
	AG	70.90	118.70	133.30	0.00	84.20	38.10
	AS	70.80	116.30	132.50	24.10	0.00	34.60
	AC	69.40	116.00	130.30	29.80	81.00	0.00
	MFR	14.50	60.40	71.40	19.00	77.30	28.50

In interpreting the state labels, D/A refer to democratic/autocratic, G/S/C refer to growth/stagnation/collapse. Entries in the transition matrix have been rounded down to the nearest 0.01 and entries on the main diagonal adjusted to ensure the rows sum to one. For more details see the text.

Moreover, output collapses are far more persistent under autocracy than under democracy; the probability a country stays in a collapse is more than twice as high for autocracies (0.53 compared to 0.25). A country stagnating under democracy will return to democratic growth with probability 0.58, and become autocratic with probability 0.08 (0.06 + 0.02), although there are only four such events in the data. A country stagnating under autocracy will transit to autocratic growth with a lower probability, 0.42, and to democracy with probability 0.06 (0.03 + 0.03).

We can relate these findings to the variation in growth rates across autocracies, and the observation that autocracy is a gamble: see Rodrik (2000), Monteforte and Temple (2020), and the references in the latter paper. A structural interpretation would be that autocracies differ in ways that lead to varying growth outcomes (Besley and Kudamatsu 2008). A stochastic interpretation would be that, given the risk of protracted collapse under autocracy, long-term growth will vary randomly between autocracies even in the absence of structural differences. A long span of data might be needed to distinguish this from a structural explanation.

Table 2 also reports the Dobrushin coefficient, which is non-zero, confirming that the stationary distribution is unique. At 0.14, the coefficient is higher than in Quah's analyses, suggesting there will be less sensitivity of the stationary distribution to perturbations of the transition probabilities. The asymptotic half-life (h) is 20.21 years, which is much faster convergence to the stationary distribution than in the case of Quah's income classes. For comparison, the same statistic is equal to 295 years for a five-year transition matrix for income classes, as estimated in Kremer et al. (2001, p. 290).

The stationary distribution suggests that countries will spend around half the time under democracy, and half under autocracy. Hence, the stationary distribution is consistent with the Acemoglu and Robinson (2019) view that long-run institutional diversity is inevitable. From the transition counts, we can see that reversions to autocracy are rare over the period as a whole: there are only nineteen such events. Democratic transitions are more common, with 59 in total. If democratic transitions are more common, why does the stationary distribution indicate that democracy will apply only around half the time? To think about the latter, we should look at the transition probabilities rather than the transition counts: over the whole period, there are far more autocracies than democracies, so it is not surprising that democratic transitions are observed more often than reversions to autocracy.

Interestingly, there is no clear route to democracy which stands out, but a democratic transition is slightly more likely from an autocratic collapse (0.05 + 0.01 + 0.01) than from autocratic growth (0.05). As the mean first passage times indicate, the average time to move from autocratic states to democratic states is high. For example, to move from autocratic growth to democratic growth will take just under 71 years on average.

At this point, we should note a drawback of our analysis relative to Quah's. His definitions of income classes ensured that each state was well represented in the data. In our analyses, one state is observed only infrequently: in the data, there are relatively few output collapses under democracy. This is informative in itself, but it also means that the transition probabilities to and from that state are driven by relatively small numbers of cases. Compared to Quah's work, there are both gains and losses: our stationary distributions are less sensitive to small changes in transition probabilities, but some of our transition probabilities will be more sensitive to events in individual countries. One way to address this would be to combine the two stagnation and collapse states under democracy into one, a step we take in the later robustness section.

Another potential objection to our findings is that, if an output collapse quickly leads to an autocratic transition, our classification rules will classify that period as an output collapse under autocracy. (This is because our democratic states are those where democracy obtains over the whole of a five-year period.) In the robustness section, we will use a less stringent criterion for democracy, and we show that this makes little difference to our findings.

VII. Three Political States

The previous section distinguished between two forms of political institutions, democracy and autocracy. In this section, we experiment with the intermediate category of 'anocracy', neither full democracy nor full autocracy, a concept associated with the Polity project (Marshall and Gurr 2020). This gives us three forms of political institutions. Retaining three growth regimes would imply 3 × 3 = 9 states in total, risking low representation of certain states and making it harder to present the results clearly. In this section, we work with six states: the three types of political institutions, and whether or not the country is undergoing a collapse. In the tables, we denote democracy/anocracy/autocracy by D/N/A respectively, and the growth/collapse regimes by G/C.

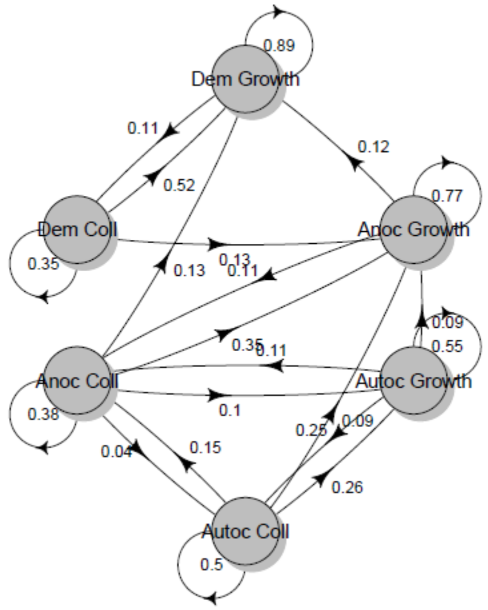
The Polity score, used in much of the literature, runs on a 21-point scale from −10 (strongly autocratic) to +10 (strongly democratic) with a qualification discussed shortly. We use version 5 of the Polity data. In cases where the Polity score lies between −10 and +10, we code a country-period as democratic if the Polity score exceeds

5 in each of the five years; autocratic if the Polity score is less than −5 in each of the five years; while other cases are assigned to the hybrid or transitional concept of anocracy.

An awkward feature of the Polity score is that some country-years are coded as −66,−77, or −88. These values correspond respectively to cases of foreign ‘interruption’; interregnum or anarchy; and transitional arrangements. We assign the first case (−66) an adjusted score of −7. This reflects the idea that citizens typically lack political rights during foreign interruptions; it is ad hoc, but avoids dropping countries such as Afghanistan and Iraq from our balanced panel. In the less troublesome cases of −77 and −88, we follow the conventions of the Polity2 variable; for more details, see the Polity 5 dataset users’ manual.[21]

Note that some applications of the anocracy concept have been questioned; Vreeland (2008) drew attention to problems in relating civil war to anocracy. We treat these results with caution, since anocratic regimes reflect a wide range of types and events. The case for persevering is that political scientists often regard intermediate or hybrid categories of political institutions as empirically important (for example, Diamond, 2002; Levitsky and Way, 2002; Epstein et al. 2006; Brownlee 2009).

Figure 3: Political Transitions, Polity



The results are reported in Table 3. Most uses of ‘anocracy’ suggest that it is a transitional state which may be short-lived. In turn, this suggests that growth under anocracy, or an output collapse under anocracy, may also be short-lived: a political transition will soon come, implying a change to alternative political institutions (democratic or autocratic) and hence to one of the other states. In practice, even despite this, the growth regime is more persistent under anocracy than under autocracy. Using the Polity data, and consistent with the earlier results using V-Dem data, growth is more persistent under democracy than under autocracy, and output collapses tend to persist longer under autocracy.

[21] Plümper and Neumayer (2010) question the use of the Polity2 variable for year-to-year changes, but their concerns are less relevant here because we convert the 21-point annual scores into just three states, based on five years of data.

Table 3: Introducing Anocracy

Transition matrix	DG	DC	NG	NC	AG	AC
DG	0.86	0.11	0.03	0.00	0.00	0.00
DC	0.52	0.33	0.13	0.02	0.00	0.00
NG	0.12	0.03	0.70	0.11	0.03	0.01
NC	0.13	0.02	0.35	0.36	0.10	0.04
AG	0.00	0.00	0.09	0.11	0.55	0.25
AC	0.00	0.00	0.09	0.15	0.26	0.50
Dobrushin coefficient	$\alpha(p) = 0.04$	h = 22.74				
Last period ψT	0.40	0.06	0.33	0.07	0.08	0.06
Future distribution $\psi T{+}25$	0.49	0.09	0.23	0.07	0.07	0.05
Stationary distribution ψ^*	0.56	0.10	0.19	0.06	0.05	0.03
Transition counts						
DG	144	19	6	1	0	0
DC	19	11	5	1	0	0
NG	24	6	130	23	7	3
NC	14	3	37	33	11	5
AG	0	0	19	22	104	49
AC	0	1	11	19	32	57
NT = 816	N = 102	T = 8				
MFP/MFR times						
DG	0.00	56.00	91.40	178.80	381.90	457.80
DC	18.10	0.00	78.20	165.10	368.50	444.40
NG	45.10	86.30	0.00	110.20	301.40	377.30
NC	47.50	88.90	39.30	0.00	269.50	344.90
AG	68.20	108.80	45.20	70.70	0.00	174.70
AC	66.60	106.60	45.60	67.30	149.30	0.00
MFR	8.90	49.00	25.80	84.50	102.80	144.50

In interpreting the state labels, D/N/A refer to democratic/anocratic/autocratic, G/C refer to growth/collapse, with previous cases of stagnation now in the growth category. Entries in the transition matrix have been rounded down to the nearest 0.01 and entries on the main diagonal adjusted to ensure the rows sum to one. For more details see the text.

At first glance, it may seem interesting that autocratic countries rarely move straight to democracy, but this will often be an artifact of how we classify the five-year periods (for example, two years of full autocracy followed by three years of full democracy will be classified as anocracy). More interestingly, the five-year transition probability from autocratic collapse to anocracy and collapse is 0.15. This suggests that crises can lead to political change — see Acemoglu and Robinson (2006) for extended discussions — but the effect is smaller than might have been expected and suggests that autocratic institutions can survive lengthy periods of collapse.[22] We should repeat our usual cautions about small numbers of events, and about causality; our findings are best seen as complementing the more rigorous IV-based approaches of Brückner and Ciccone (2011) and Burke and Leigh (2010).

As in our previous analysis, since output collapses under democracy are rare, some of the transition probabilities are based on a small number of transitions. In addition, transitions from democracy to anocracy or autocracy are relatively rare, with only 13 such events in the data when using five-year time periods. The

[22] See Pei and Adesnik (2000) on why recessions may not become revolutions.

patterns are clearly reflected in the stationary distribution, in which democratic outcomes are the most common. In the long run, countries will spend 56 + 10 = 66 percent of the time under democracy, 25 percent under anocracy, and only around 8 percent the time under full autocracy. Note that this outcome was less marked in the earlier analysis using V-Dem data, which predicted a higher long-run proportion of time under autocracy. This demonstrates the need for caution: choices about data, definitions, and how to partition the states all influence the findings. We investigate some aspects of this in the next section.

VIII. Robustness

In this section, we examine whether some of our results are robust to using other data, looking at subgroups, splitting the time period, or classifying states differently. Given our chosen method, a robustness analysis is perhaps even more important than usual. A vulnerability of our approach is that it relies on various decisions on timing and how to translate the experience of each five-year period into a particular state. To keep the number of results manageable, we focus on variations to our main findings using the V-Dem data.

If a given state is observed only rarely, the transition probabilities for that row of the matrix will have numerators and denominators that are small numbers, and hence will be sensitive to a few cases. With this in mind, we rework the analysis of section 6 and combine the states of democratic stagnation and democratic collapse (recall that output collapses under democracy are rare) so that we have five states rather than six.[23] Neither the stationary distribution for the states in common across the two analyses (e.g., democratic growth) nor the Dobrushin coefficient are much affected. This is more intuitive than it may seem, because if a given state is observed only rarely, its influence on the long-run properties of the process will be modest.

Next we consider a simpler change: replacing GDP per head with GDP per working-age adult (ages 15-64) in our calculations of output growth. In the first panel of Table 4, we can see that this changes some state classifications, in around 10 percent of the periods in total. But comparing the two rows of the first panel — our main (per-head) results in the first row and the per-working-age-adult results in the second — the stationary distributions are similar.

Next, we use a different criterion for classifying a five-year period as democratic. Our default has been to require that a country should be democratic in each year of the period. We now adopt a less demanding criterion: we look at whether the median value, over five years, of the V-Dem Regimes of the World variable corresponds to democracy. Use of this alternative criterion matters much less than one might expect: it changes only 3 percent of the state classifications, and our revised findings, not reported, are barely altered.

Thus far, our approach has assumed that transition probabilities are stable across countries. The ‘growth tragedy’ of Africa in the 1980s and 1990s might lead to one think that African countries, in particular, have behaved differently and have been more at risk of collapse. Table 4 reports the stationary distributions when we split the sample into sub-Saharan African countries, and those outside sub-Saharan Africa. Compared to the rest of the developing world, the African countries spend slightly less time (0.32 versus 0.37) in democratic growth (DG), and more time (0.25 versus 0.13) in autocratic collapse (AC). But these differences are smaller than might have been expected. This is likely to reflect Africa’s experiences in the 1970s, the 2000s, and the early 2010s, to which a simple growth tragedy story does not apply, as well as the tendency to collapse seen in Latin America and, in the late 1990s, in East and Southeast Asia.

[23] For technical results on state aggregation in Markov chains, see Rubino and Sericola (2014, chapter 4).

The Dobrushin coefficient (not reported) is lower for Africa, reflecting the paucity of institutional transitions in that region. We do not pursue the details of the subgroup analysis further: sub-Saharan Africa has relatively few instances of the 'democratic stagnation' and 'democratic collapse' states, making our conclusions tentative.

We have assumed that the Markov process is homogeneous in time. But since transition probabilities might evolve, we now split the time span in two: we look at 1971-96 and 1996- 2016 separately. This involves a trade-off between robustness and efficiency. Allowing the probabilities to change increases robustness in one dimension, but means we typically have fewer observations from which to estimate each transition probability.

Table 4: Robustness Tests (V-Dem Case)

	%Δ	DG	DS	DC	AG	AS	AC
Per head/Per adult							
Per head	0.00	0.34	0.08	0.07	0.26	0.06	0.18
Per working-age adult	0.10	0.33	0.09	0.08	0.24	0.07	0.19
Subgroups							
SSA	-	0.32	0.06	0.03	0.26	0.09	0.25
Non-SSA	-	0.37	0.10	0.09	0.26	0.05	0.13
Shorter spans							
1971-1996	-	0.28	0.09	0.09	0.22	0.06	0.25
1996-2016	-	0.44	0.03	0.06	0.36	0.02	0.08
Different start years							
1970	0.17	0.36	0.08	0.07	0.26	0.07	0.17
1971	0.00	0.34	0.08	0.07	0.26	0.06	0.18
1972	0.18	0.37	0.09	0.07	0.24	0.08	0.15
1973	0.30	0.35	0.10	0.06	0.25	0.08	0.15

Robustness tests: we report the proportion of state classifications that are altered with different choices (%Δ), and the stationary distributions under those choices. In interpreting the state labels, D/A refer to democratic/autocratic, G/S/C refers to growth/stagnation/collapse. SSA indicates sub-Saharan Africa. For more details see the text.

The split of the time span yields two stationary distributions, reported in the third panel of Table 4. There are some clear differences: countries are now predicted to spend more time growing (DG and AG) and less time under collapse (DC and AC). This tallies with recent work suggesting that growth and convergence in the developing world has become more common (Kremer et al. 2021, Patel et al. 2021).[24] But any associated optimism may be short-lived, since some developing countries are now likely to face significant macroeconomic difficulties.

The analysis also suggests that the transition probabilities have seen material changes over time. But across the two-time intervals, the predicted long-run proportion of time spent under autocracy has, if anything, fallen slightly. This casts a little doubt on the idea of a democratic recession, but there are many reasons to be cautious. The number of transitions to autocracy is small and limits how much we can say using statistics. In addition, since the second period starts in 1996, some democratizations early in that second period may be offsetting later transitions to autocracy. A more rigorous approach would use continuous measures of political rights, rather than broad categories, to capture gradual 'autocratization'; or it could trace the sequence of events, as in Boese et al. (2021). Given the limitations of the current analysis, we do not pursue this further, but note that the prospects for reliable findings will improve as more data become available.

[24] For related discussions, see Johnson and Papageorgiou (2020) and Roy et al. (2016).

We now look at a different aspect of robustness. Rather than start the five-year periods from 1971, which could seem arbitrary, we try starting from 1970, 1972, or 1973. Inevitably, the state classifications will change: at the two extremes, our first period is 1970-75 in one case or 1973-1978 in the other, so the results are bound to vary. As the lower panel of Table 4 shows, if we start two years later — in 1973 rather than 1971 — this alters around 30 percent of the state classifications, which seems high. But we can also see that many of the changes wash out: the stationary distributions, also reported in the table, are similar across the start dates, and lead to the same qualitative conclusions.

Finally, one might wonder if a Markov process for growth and institutions should have order higher than one, especially given that there may be some path dependence in political institutions. In principle, we could estimate a transition matrix with more than two dimensions, or (more conveniently) transform a higher-order process into a first-order process defined over a larger state space. In practice, the prospects for success are constrained by the size of the cross-country panel. We have compromised on a first-order process using five-year periods, as in Kremer et al. (2001); the analysis of higher-order processes may have to wait until longer spans of data become available. In the interim, one possible alternative would be a variable-order process; on this, see Davison (2003, p. 235).

IX. Conclusions

Textbooks on economic growth typically present a range of growth models, but have much less to say on output collapses, despite their prevalence and their consequences for growth and welfare. In this paper we have suggested using a finite state Markov chain to model transitions between growth regimes. This allows us to contrast transition patterns between democracies and autocracies, while allowing the composition of the two groups to evolve over time. We find that collapses are much longer-lasting under autocracy, and growth less likely to be sustained. In addition, under autocracy, stagnation is riskier because it is especially likely to presage outright collapse.

These findings could help to explain why long-term growth rates vary more across autocracies than across democracies; they also suggest that democratic countries are more resilient. Our results are thereby consistent with the recent work of Knutsen (2021). Using different statistical methods, he argues that democracy provides a safety net, ruling out the worst outcomes. This is an important result, given that some observers have questioned the economic benefits of democracy.
A natural explanation for the findings is that, in democracies, failing leaders can be voted out. More generally, it seems that countries with democratic political institutions are better able to prevent or manage crises, as Rodrik (1999) argued, and can better adapt to shocks, as Acemoglu et al. (2010) analyzed. In that case democratization may have long-term benefits that extend well beyond the initial growth effects that the recent literature has focused on. But the results also suggest that countries will continue to experience extended spells of autocracy, and democracy in developing countries is not an absorbing state. The long-run outcome will be diversity in political institutions rather than a more benign end of history.

Another finding is that, at least for developing countries, the route out of collapse is often lengthy. It will sometimes take in extended stagnation, or cycles of stagnation and collapse. This reinforces the interest of the findings on political institutions. There are likely to be many types of output collapse, requiring different policy responses; the origins will differ widely, from conflict to financial crises or macroeconomic mismanagement. But if democracy helps to limit some of the risks, it would be interesting to know whether undemocratic regimes can adopt partial reforms — such as term limits, or mechanisms for conflict resolution — that make collapse less likely. It would also be interesting to study how often output collapses hasten the exit of authoritarian leaders, or perhaps lead them to cling to power in ways that further undermine growth and welfare. Egorov and Sonin (2023) discuss how authoritarian leaders with long tenures often preside over deteriorating governance and poor economic outcomes.

The approach we have taken has obvious limitations. It generates stylized facts of a certain kind, but says little about causal mechanisms. Progress might be made by combining our approach with the study of financial crises or macroeconomic mismanagement. Another route would be to combine the analysis with ideas in Acemoglu and Robinson (2019), Besley and Persson (2011), Canen and Wantchekon (2022), or the quantitative theory in Buchheim and Ulbricht (2020). The small number of countries in the world will remain a constraint on the complexity of the state space, even when treating states as observable.

In our main analysis, the transition probabilities are treated as constant over time, but political scientists have identified ‘waves’ of democratization, and more recently a wave of reversals. When we allow transition probabilities to change over time, the stationary distributions suggest the predicted long-run proportion of time spent under autocracy has fallen slightly, but these results should be interpreted cautiously. A more reliable finding — since it draws on far more cases — is that, compared to earlier decades, countries are now expected to spend more time growing and less in an output collapse. This is consistent with recent work pointing to improved growth and convergence in the developing world, although macroeconomic fragility may yet undermine some of the recent achievements.

This latter point highlights a limitation of our approach. We allow frontier growth to change over time, but otherwise assume that transitions between states are independent across countries. A version of this assumption is common (arguably typical) in the growth literature, including state-of-the-art work on convergence such as Startz (2020). But the effects of the 1973 oil shock, the 1980s debt crisis, the 1997-98 East Asian financial crisis, and the 2007-9 financial crisis all suggest that transitions between growth regimes are correlated across countries. Finding a good way to relax this assumption, perhaps drawing on the study of contagion in financial markets, would be an interesting topic for further research.

Despite its limitations, the approach taken in this paper is one way to generate stylized facts about some of the most important macroeconomic phenomena in the developing world. For this purpose, the simplicity and transparency of the approach may be appealing. At the very least, it could suggest new research questions. The companion paper, Imam and Temple (2023), extends the analysis to incorporate state capacity. The approach is simple enough that it could be extended in many directions, contributing to a picture of output collapses that is otherwise surprisingly incomplete.

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Annex I.

In this appendix we first briefly discuss our timing assumptions as they apply to five-year periods, before turning to the question of sampling variability.

The timing assumptions are chosen so that, in converting annual data to five-year periods, we use each annual realization of growth or the political variables once and only once. Consider a sequence of years 1971, 1976, 1981... Using obvious notation, our first growth observation is (log(y1976) −log(y1971))/5, our second is (log(y1981) −log(y1976))/5, and so on. Each year of growth will then influence only one period's classification. (We measure OECD growth in the same way, taking an average across OECD members.)

Table A11: Standard Errors for Main Results

Transition matrix	DG	DS	DC	AG	AS	AC
DG	0.696	0.118	0.118	0.056	0.000	0.012
	(0.036)	(0.025)	(0.025)	(0.018)	(0.000)	(0.009)
DS	0.587	0.239	0.087	0.065	0.000	0.022
	(0.073)	(0.063)	(0.042)	(0.036)	(0.000)	(0.022)
DC	0.424	0.212	0.242	0.061	0.000	0.061
	(0.086)	(0.071)	(0.075)	(0.042)	(0.000)	(0.042)
AG	0.056	0.008	0.006	0.607	0.103	0.220
	(0.012)	(0.005)	(0.004)	(0.026)	(0.016)	(0.022)
AS	0.034	0.034	0.008	0.429	0.185	0.311
	(0.017)	(0.017)	(0.008)	(0.045)	(0.036)	(0.042)
AC	0.055	0.018	0.018	0.266	0.146	0.496
	(0.014)	(0.008)	(0.008)	(0.027)	(0.021)	(0.030)
Transition counts						
DG	112	19	19	9	0	2
DS	27	11	4	3	0	1
DC	14	7	8	2	0	2
AG	20	3	2	218	37	79
AS	4	4	1	51	22	37
AC	15	5	5	73	40	136
$NT = 992$	$N = 124$	$T = 8$				

In interpreting the state labels, D/A refer to democratic/autocratic, G/S/C refer to growth/stagnation/collapse. Anderson-Goodman (1957) asymptotic standard errors in parentheses. For more details see the text.

To classify (say) the 1971-76 period as an output collapse, we look at the output changes between 1971 and 1976, 1971 and 1975, 1972 and 1976, 1971 and 1974, 1972 and 1975, and 1973 and 1976. We look for at least one fall of 5 percent or more among these output changes. This approach should capture collapses that are substantial and protracted, rather than mild or V-shaped recessions that an economy quickly moves beyond.

The political variables for the first period are based on 1971-75; hence, in the V-Dem case, we ask whether a country was democratic in each of the five years 1971-75. For the next period, we look at 1976-80, and so on.

Next, we turn to the question of sampling variability. In some ways, we would prefer to see our transition matrices as reflecting the dynamics of a population — a near-complete set of developing countries — rather than a random subsample from a much larger population. Of the papers which followed Quah's work, the most sophisticated is Kremer et al. (2001), and they do not report standard errors.[25] Nevertheless, some readers may want to see us support our informal claim that we can estimate transition probabilities precisely in this setting. For our main results using V-Dem data, Table 5 reports the transition matrix, now to three decimal places, with estimated standard errors in parentheses below each transition probability. These are based on Anderson and Goodman (1957). They derived the asymptotic variances of estimated transition probabilities pij for a Markov chain; for a transition from state i to j, they showed that

$$\sqrt{n_i}(\hat{p}_{ij} - p_{ij}) \longrightarrow N(0, p_{ij}(1 - p_{ij}))$$

where ni is the number of observations of state i prior to the final period. In the growth literature, this result was previously used by Proudman et al. (1998).

It can be seen in Table 5 that the standard errors are highest when the initial state is democratic collapse (DC), since there are relatively few observations of that state. In other rows, the transition probabilities are estimated quite precisely. For rare transitions, conventional statistical significance (that is, discernible difference from zero) is much less important for our purposes than whether the relevant probability is precisely estimated. Table 5 indicates that this is often the case, reflecting the fact that we have many observations on states other than democratic collapse.

[25] They do carry out formal inference on the stationary distribution, but their tests require that all transition probabilities off the three longest diagonals are zero, and that is not true in our case.

Annex II. Sequence of States by Country

The following three tables present the sequence of states for each country, based on a 1971 start date. The first table is the simple three-state example, the second uses V-Dem data on political regimes to classify states, and the third uses Polity data.

Table A2.1

State classifications

	1971	1976	1981	1986	1991	1996	2001	2006	2011
ABW	1	1	1	1	2	2	2	3	1
AFG	3	3	1	3	3	3	1	1	3
AGO	3	3	2	3	3	2	1	1	3
ALB	2	1	2	3	1	1	1	1	1
AND	2	3	3	2	3	1	1	3	1
ARE	3	1	3	2	2	2	3	3	1
ARG	2	3	3	3	1	3	1	1	3
ATG	3	1	1	1	1	2	1	3	1
BDI	2	1	3	2	3	3	3	1	2
BEN	3	1	1	3	1	2	2	1	1
BFA	3	1	1	2	1	1	1	1	1
BGD	3	2	2	2	1	1	1	1	1
BGR	1	1	1	3	1	3	1	1	1
BHR	1	3	3	2	1	2	2	3	1
BHS	3	1	1	2	3	1	2	3	2
BLZ	2	1	3	1	3	1	1	2	2
BMU	1	1	2	2	1	1	1	1	3
BOL	1	3	3	1	1	2	1	1	1
BRA	1	1	1	3	1	2	1	1	3
BRB	2	1	2	2	2	2	1	3	2

Continuation of Table

Classifications (cont.)

BRN	1	3	3	3	2	3	2	3	3
BTN	3	1	1	1	1	1	1	1	1
BWA	1	1	1	1	1	2	1	1	1
CAF	2	3	3	3	3	2	3	1	3
CHL	3	1	3	1	1	2	1	1	1
CHN	2	1	1	1	1	1	1	1	1
CIV	1	3	3	3	3	3	3	1	1
CMR	3	1	2	3	3	2	1	1	1
COD	3	3	2	3	3	3	1	1	1
COG	3	1	3	3	3	3	1	1	3
COL	1	1	2	1	1	3	1	1	1
COM	2	1	2	3	3	2	2	3	1
CPV	3	1	1	1	1	1	1	1	2
CRI	1	2	3	2	1	1	1	1	1
CUB	1	1	1	3	3	1	1	1	1
CYM	1	1	1	1	2	3	2	3	1
CYP	3	1	1	1	1	1	1	3	3
CZE	3	3	3	3	1	2	1	1	1
DJI	3	3	3	3	3	2	1	1	1
DMA	1	3	1	1	1	2	1	1	2
DOM	1	1	2	3	1	1	1	1	1
DZA	1	1	2	3	3	2	1	1	1
ECU	1	1	2	2	2	3	1	1	1
EGY	1	1	1	1	1	1	1	1	1
ETH	3	2	3	3	1	3	1	1	1

Continuation of Table

Classifications (cont.)

FJI	1	1	3	1	1	2	1	2	1
FSM	1	3	3	2	2	2	2	1	3
GAB	1	3	3	3	2	3	3	3	1
GHA	3	3	3	1	1	2	1	1	1
GIN	1	2	2	2	1	2	2	1	1
GMB	2	3	3	2	3	2	3	3	2
GNB	1	3	2	1	1	3	2	1	3
GNQ	1	3	3	3	1	1	1	3	3
GRD	1	1	1	1	2	1	1	3	1
GRL	1	1	3	3	2	1	1	1	1
GTM	1	1	3	2	1	2	2	1	1
GUY	1	3	3	3	1	1	1	1	1
HKG	1	1	1	1	1	2	1	1	1
HND	2	1	3	2	2	2	1	1	1
HTI	1	2	3	3	3	2	3	3	1
HUN	1	1	1	3	2	1	1	2	1
IDN	1	1	1	1	1	3	1	1	1
IND	2	1	1	1	1	1	1	1	1
IRN	1	3	3	3	3	2	1	1	3
IRQ	1	3	3	3	1	1	3	1	1
ISR	1	1	2	1	1	2	2	1	1
JAM	3	3	3	1	1	2	1	3	2
JOR	3	1	3	3	1	2	1	3	3
KEN	2	1	2	2	3	2	1	1	1
KHM	3	3	2	1	1	1	1	1	1

Continuation of Table

Classifications (cont.)

KIR	1	3	3	3	2	2	2	3	1
KNA	1	1	1	1	1	1	1	3	1
KOR	1	1	1	1	1	1	1	1	1
KWT	3	3	3	3	1	3	1	3	3
LAO	1	3	1	2	1	1	1	1	1
LBN	3	1	1	3	1	2	2	1	3
LBR	2	3	3	3	3	1	3	1	1
LBY	1	3	3	3	3	3	1	3	3
LCA	1	1	1	1	1	3	1	1	2
LIE	2	1	1	1	2	1	1	3	1
LKA	2	1	1	1	1	1	1	1	1
LSO	1	3	3	1	1	2	1	1	1
MAC	1	1	1	1	1	3	1	1	3
MAR	1	2	1	1	3	2	1	1	1
MCO	1	1	2	1	2	2	1	3	1
MDG	3	3	3	3	3	2	3	3	2
MDV	3	1	1	1	1	1	1	1	1
MEX	1	1	3	2	2	1	2	3	1
MHL	1	3	1	3	1	3	2	1	1
MLI	1	2	1	1	1	1	1	1	1
MLT	1	1	2	1	1	1	1	1	1
MMR	2	1	2	3	1	1	1	1	1
MNG	1	1	1	3	3	2	1	1	1
MOZ	1	2	3	1	1	1	1	1	1
MRT	2	3	3	2	1	3	1	3	1

Continuation of Table

Classifications (cont.)

MUS	1	3	1	1	1	1	1	1	1
MWI	1	3	2	3	3	3	1	1	1
MYS	1	1	1	1	1	2	1	1	1
NAM	2	2	3	3	2	2	1	1	1
NCL	3	3	2	1	2	2	1	1	2
NER	3	1	3	3	3	3	2	1	1
NGA	1	3	3	1	3	2	1	1	1
NIC	1	3	3	3	1	1	1	1	1
NPL	2	2	1	1	1	1	1	1	1
NRU	2	3	3	3	3	3	3	1	1
OMN	1	1	1	3	1	1	3	3	3
PAK	2	1	1	1	1	2	1	2	1
PAN	2	1	2	3	1	2	1	1	1
PER	1	3	3	3	1	2	1	1	1
PHL	1	1	3	2	1	2	1	1	1
PLW	3	2	2	1	3	3	2	3	1
PNG	3	3	2	3	1	3	2	1	1
POL	1	3	1	3	1	1	1	1	1
PRI	2	1	1	1	1	1	2	2	1
PRK	1	1	1	3	3	2	2	2	1
PRY	1	1	3	1	2	3	1	1	1
PSE	1	2	3	3	1	3	1	1	1
PYF	2	1	1	2	3	2	2	3	2
QAT	2	3	3	3	1	1	1	1	3
ROU	1	1	1	3	1	3	1	3	1

Continuation of Table

Classifications (cont.)

RWA	3	1	3	3	3	1	1	1	1
SAU	1	3	3	3	3	3	1	1	1
SDN	1	3	3	3	1	1	1	1	1
SEN	2	3	3	3	3	2	1	1	1
SGP	1	1	1	1	1	2	1	1	1
SLB	1	1	3	1	1	3	1	1	1
SLE	2	2	2	3	3	3	1	1	3
SLV	1	3	3	2	1	1	1	1	1
SMR	1	1	2	1	1	1	1	3	3
SOM	3	3	3	3	3	3	2	2	2
STP	2	1	3	3	2	2	1	1	1
SUR	1	3	3	3	3	2	1	1	3
SWZ	1	3	3	1	1	2	1	1	1
SYC	1	1	1	1	1	1	3	1	1
SYR	1	1	3	3	1	3	1	1	3
TCA	1	1	1	1	1	1	1	3	1
TCD	3	3	1	2	3	2	1	1	3
TGO	3	3	3	2	3	3	3	1	1
THA	1	1	1	1	1	3	1	1	1
TON	2	1	1	2	1	2	3	3	1
TTO	1	1	3	3	1	1	1	1	3
TUN	1	1	2	1	1	1	1	1	1
TUV	3	3	3	1	2	1	3	1	1
TZA	2	3	3	1	2	2	1	1	1
UGA	3	3	3	1	1	1	1	1	1

Continuation of Table

Classifications (cont.)									
URY	1	1	3	1	1	3	1	1	1
VCT	3	1	1	1	1	1	1	3	1
VEN	1	3	3	3	3	3	3	1	3
VGB	1	1	2	1	1	1	3	3	1
VNM	2	1	1	1	1	1	1	1	1
VUT	1	3	1	1	2	2	2	1	2
WSM	3	2	1	3	1	1	1	2	1
ZAF	2	2	3	3	2	2	1	1	2
ZMB	3	3	3	3	3	2	1	1	1
ZWE	3	3	3	1	3	3	3	1	1

End of Table

Table A2.2: State Classification

	1971	1976	1981	1986	1991	1996	2001	2006	2011
AFG	6	6	4	6	6	6	4	4	6
AGO	6	6	5	6	6	5	4	4	6
ALB	5	4	5	6	4	4	4	1	1
ARE	6	4	6	5	5	5	6	6	4
ARG	5	6	6	3	1	3	1	1	3
BDI	5	4	6	5	6	6	6	4	5
BEN	6	4	4	6	4	2	2	1	1
BFA	6	4	4	5	4	4	1	1	4
BGD	6	5	5	5	4	1	4	4	4
BGR	4	4	4	6	1	3	1	1	1

Continuation of Table

Classifications (cont.)

BHR	4	6	6	5	4	5	5	6	4
BOL	4	6	6	1	1	2	1	1	1
BRA	4	4	4	6	1	2	1	1	3
BRB	2	1	2	2	2	2	1	3	2
BTN	6	4	4	4	4	4	4	4	1
BWA	1	1	1	1	1	2	1	1	1
CAF	5	6	6	6	6	5	6	4	6
CHL	6	4	6	4	1	2	1	1	1
CHN	5	4	4	4	4	4	4	4	4
CIV	4	6	6	6	6	6	6	4	4
CMR	6	4	5	6	6	5	4	4	4
COD	6	6	5	6	6	6	4	4	4
COG	6	4	6	6	6	6	4	4	6
COL	4	4	5	4	1	3	1	1	1
COM	5	4	5	6	6	5	5	6	4
CPV	6	4	4	4	1	1	1	1	2
CRI	1	2	3	2	1	1	1	1	1
CUB	4	4	4	6	6	4	4	4	4
CYP	6	1	1	1	1	1	1	3	3
CZE	6	6	6	6	1	2	1	1	1
DJI	6	6	6	6	6	5	4	4	4
DOM	4	4	5	6	4	1	1	1	1
DZA	4	4	5	6	6	5	4	4	4
ECU	4	4	2	2	2	3	1	1	1
EGY	4	4	4	4	4	4	4	4	4

Continuation of Table

Classifications (cont.)

ETH	6	5	6	6	4	6	4	4	4
FJI	1	1	3	4	4	5	4	5	4
GAB	4	6	6	6	5	6	6	6	4
GHA	6	6	6	4	4	2	1	1	1
GIN	4	5	5	5	4	5	5	4	4
GMB	5	6	6	5	6	5	6	6	5
GNB	4	6	5	4	4	6	5	4	6
GNQ	4	6	6	6	4	4	4	6	6
GTM	4	4	6	5	4	5	2	1	1
GUY	4	6	6	6	4	4	1	1	1
HKG	4	4	4	4	4	5	4	4	4
HND	5	4	6	5	2	2	1	4	4
HTI	4	5	6	6	6	5	6	6	4
HUN	4	4	4	6	2	1	1	2	1
IDN	4	4	4	4	4	6	1	1	1
IND	5	4	1	1	1	1	1	1	1
IRN	4	6	6	6	6	5	4	4	6
IRQ	4	6	6	6	4	4	6	4	4
ISR	1	1	2	1	1	2	2	1	1
JAM	3	6	6	1	1	2	1	3	2
JOR	6	4	6	6	4	5	4	6	6
KEN	5	4	5	5	6	5	4	4	4
KHM	6	6	5	4	4	4	4	4	4
KOR	4	4	4	4	1	1	1	1	1
KWT	6	6	6	6	4	6	4	6	6

Continuation of Table

Classifications (cont.)

LAO	4	6	4	5	4	4	4	4	4
LBN	6	4	4	6	4	5	5	4	3
LBR	5	6	6	6	6	4	6	1	1
LBY	4	6	6	6	6	6	4	6	6
LKA	2	1	4	4	4	1	4	4	4
LSO	4	6	6	4	4	5	4	1	1
MAR	4	5	4	4	6	5	4	4	4
MDG	6	6	6	6	6	2	6	6	5
MDV	6	4	4	4	4	4	4	4	4
MEX	4	4	6	5	5	1	2	3	1
MLI	4	5	4	4	4	1	1	1	4
MLT	1	1	2	1	1	1	1	1	1
MMR	5	4	5	6	4	4	4	4	4
MNG	4	4	4	6	3	2	1	1	1
MOZ	4	5	6	4	4	4	4	4	4
MRT	5	6	6	5	4	6	4	6	4
MUS	1	3	1	1	1	1	1	1	1
MWI	4	6	5	6	6	6	4	4	1
MYS	4	4	4	4	4	5	4	4	4
NAM	5	5	6	6	5	2	1	1	1
NER	6	4	6	6	6	6	2	4	1
NGA	4	6	6	4	6	5	4	4	4
NIC	4	6	6	6	1	1	1	4	4
NPL	5	5	4	4	4	4	4	4	4
OMN	4	4	4	6	4	4	6	6	6

Continuation of Table

Classifications (cont.)

PAK	5	4	4	4	4	5	4	5	4
PAN	5	4	5	6	1	2	1	1	1
PER	4	6	3	3	4	5	1	1	1
PHL	4	4	6	5	1	2	4	4	1
PNG	6	3	2	3	1	3	2	4	4
POL	4	6	4	6	1	1	1	1	1
PRK	4	4	4	6	6	5	5	5	4
PRY	4	4	6	4	5	3	1	1	1
PSE	4	5	6	6	4	6	4	4	4
QAT	5	6	6	6	4	4	4	4	6
ROU	4	4	4	6	1	3	1	3	1
RWA	6	4	6	6	6	4	4	4	4
SAU	4	6	6	6	6	6	4	4	4
SDN	4	6	6	6	4	4	4	4	4
SEN	5	6	6	3	3	2	1	1	1
SGP	4	4	4	4	4	5	4	4	4
SLB	4	4	3	1	1	6	4	4	1
SLE	5	5	5	6	6	6	4	1	3
SLV	4	6	6	5	4	4	1	1	1
SOM	6	6	6	6	6	6	5	5	5
STP	5	4	6	6	2	2	1	1	1
SUR	1	6	6	6	6	2	1	1	3
SWZ	4	6	6	4	4	5	4	4	4
SYC	4	4	4	4	4	4	6	4	4
SYR	4	4	6	6	4	6	4	4	6

Continuation of Table

Classifications (cont.)									
TCD	6	6	4	5	6	5	4	4	6
TGO	6	6	6	5	6	6	6	4	4
THA	4	4	4	4	4	6	1	4	4
TTO	1	1	3	3	1	1	1	1	3
TUN	4	4	5	4	4	4	4	4	4
TZA	5	6	6	4	5	5	4	4	4
UGA	6	6	6	4	4	4	4	4	4
URY	4	4	6	1	1	3	1	1	1
VEN	1	3	3	3	3	3	6	4	6
VNM	5	4	4	4	4	4	4	4	4
VUT	4	6	1	1	2	2	2	1	2
ZAF	5	5	6	6	5	2	1	1	2
ZMB	6	6	6	6	6	5	1	1	4
ZWE	6	6	6	4	6	6	6	4	4

End of Table

Table A2.3: State Classification

	1971	1976	1981	1986	1991	1996	2001	2006	2011
AFG	6	4	5	6	4	6	5	5	4
ALB	5	5	5	4	3	3	3	1	1
ARE	6	5	6	5	5	5	6	6	5
ARG	3	6	4	2	1	2	1	1	2
BDI	5	5	6	5	4	4	4	1	3
BEN	4	5	5	4	1	1	1	1	1

Continuation of Table

Classifications (cont.)

BFA	4	3	5	5	3	3	3	3	3
BGR	5	5	5	4	1	2	1	1	1
BHR	5	6	6	5	5	5	5	4	5
BOL	5	4	4	1	1	1	1	1	1
BRA	3	3	3	2	1	1	1	1	2
BTN	6	5	5	5	5	5	3	3	3
BWA	1	1	1	1	1	1	1	1	1
CAF	5	6	6	6	4	3	4	3	4
CHL	4	5	6	3	1	1	1	1	1
CHN	5	5	5	5	5	5	5	5	5
CIV	5	6	6	6	6	4	4	3	3
CMR	6	5	5	4	4	3	3	3	3
COD	6	6	5	6	4	4	3	3	3
COG	6	5	6	6	4	4	3	3	4
COL	1	1	1	1	1	2	1	1	1
CRI	1	1	2	1	1	1	1	1	1
CUB	5	5	5	6	6	5	5	5	5
CYP	2	1	1	1	1	1	1	2	2
DOM	3	3	3	4	3	1	1	1	1
DZA	5	5	5	4	4	3	3	3	3
ECU	3	3	1	1	1	2	1	3	3
EGY	5	5	5	5	5	5	3	3	3
ETH	4	5	6	6	3	4	3	3	3
FJI	1	1	2	3	3	3	3	3	3
GAB	5	6	6	6	3	4	4	4	3

Continuation of Table

Classifications (cont.)

GHA	4	4	4	5	3	3	1	1	1
GIN	5	5	5	5	3	3	3	3	3
GMB	1	2	2	1	4	3	4	4	3
GNQ	5	6	6	6	3	5	5	6	6
GTM	3	3	4	3	3	1	1	1	1
GUY	3	4	6	6	3	1	1	1	1
HND	3	3	4	3	1	1	1	1	1
HTI	5	5	6	4	4	3	4	4	3
HUN	5	5	5	4	1	1	1	1	1
IDN	5	5	5	5	5	4	1	1	1
IND	1	1	1	1	1	1	1	1	1
IRN	5	6	6	6	6	3	3	5	6
IRQ	5	6	6	6	5	5	6	3	3
ISR	1	1	1	1	1	1	1	1	1
JAM	2	2	2	1	1	1	1	2	1
JOR	6	5	6	4	3	3	3	4	4
KEN	5	5	5	5	4	3	3	1	1
KHM	4	6	5	3	3	3	3	3	3
KOR	3	5	3	3	1	1	1	1	1
KWT	6	6	6	6	5	6	5	6	6
LAO	3	6	5	5	5	5	5	5	5
LBN	4	3	3	4	5	5	3	1	2
LBR	5	6	6	4	4	3	4	1	1
LBY	5	6	6	6	6	6	5	6	4
LKA	1	1	3	3	3	3	3	3	3

Continuation of Table

Classifications (cont.)

LSO	3	6	6	5	3	3	1	1	1
MAR	5	5	5	5	6	5	5	5	3
MDG	4	6	6	6	4	1	2	4	3
MEX	5	3	4	3	3	3	1	2	1
MLI	5	5	5	5	3	3	3	1	3
MMR	5	5	5	4	3	3	3	5	3
MNG	5	5	5	4	4	1	1	1	1
MRT	5	6	6	5	5	6	3	4	3
MUS	1	2	1	1	1	1	1	1	1
MWI	5	6	5	6	4	2	3	1	1
MYS	3	3	3	3	3	3	3	3	3
NER	4	5	6	4	4	4	3	3	1
NGA	5	4	4	3	4	3	3	3	3
NIC	5	4	4	4	1	1	1	1	1
NPL	5	5	3	3	3	3	3	1	1
OMN	5	5	5	6	5	5	6	6	6
PAK	3	3	3	3	1	3	3	3	1
PAN	5	5	3	4	1	1	1	1	1
PER	5	4	2	2	3	3	1	1	1
PHL	3	5	6	3	1	1	1	1	1
POL	5	6	5	4	1	1	1	1	1
PRK	5	5	5	6	6	5	5	5	5
PRY	5	5	6	3	3	2	1	1	1
QAT	5	6	6	6	5	5	5	5	6
ROU	5	5	5	4	3	2	1	2	1

Continuation of Table

Classifications (cont.)									
RWA	4	5	6	6	6	3	3	3	3
SAU	5	6	6	6	6	6	5	5	5
SDN	5	6	4	4	5	5	3	3	3
SEN	5	4	4	4	4	3	1	1	1
SGP	3	3	3	3	3	3	3	3	3
SLE	5	5	5	6	6	4	3	3	2
SLV	3	4	4	1	1	1	1	1	1
SOM	6	6	6	6	4	4	3	3	3
SWZ	5	6	6	5	5	5	5	5	5
SYR	5	5	6	6	5	6	5	5	6
TCD	6	4	3	3	4	3	3	3	4
TGO	6	6	6	5	4	4	4	3	3
THA	3	3	3	3	3	2	1	3	3
TTO	3	3	2	2	1	1	1	1	2
TUN	5	5	5	5	3	3	3	3	3
TZA	5	6	6	5	3	3	3	3	3
UGA	6	4	4	5	3	3	3	3	3
URY	3	5	4	1	1	2	1	1	1
VEN	1	2	2	2	2	2	2	3	4
ZAF	3	3	4	4	3	1	1	1	1
ZMB	4	6	6	6	2	3	3	3	1

End of Table

PUBLICATIONS