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## The Political U: New Evidence on Democracy and Income

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## DISCUSSION PAPER SERIES

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# The Political U: New Evidence on Democracy and Income

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## ABSTRACT

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# The Political U: New Evidence on Democracy and Income\*

This paper throws new light on the relationship between income and democracy. Using data for 162 countries over 1960-2018, we show that the causal relationship between political and economic development is U-shaped: “intermediate” political regimes significantly lead to inferior economic performance vis-à-vis both “democracies” and “autocracies.” Our results suggest “intermediate” regimes decrease long run GDP per capita by about 20 percent. These effects are mainly driven by political instability, while other potential mechanisms, such as education, investment and inequality, lack comparable empirical support. These findings are robust to, among others, using night-lights instead of GDP, different democracy measures and estimators.

**JEL Classification:** C33, D72, F15, O43, P16

**Keywords:** democracy, income, growth, political development, economic development, non-linearity

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## 1. Introduction

The relationship between economic and political development has long been at the very core of economics, in general, and of political economy even more so. Classical economists, Adam Smith and Karl Marx among them, viewed pursuing a greater understanding of this relationship as the central goal of the discipline. With the Keynesian revolution, interest in such topics declined among economists but did not among political scientists. In a seminal paper, Lipset (1959) launches the “modernization theory” literature centered on the links between economic and political development. Economists only returned to these questions in the 1990s and an enormous economics literature has since emerged: today there seems to be little support for the view that economic development leads to democracy, which is the central tenet of modernization theory (Acemoglu et al., 2008, 2009), but there is robust evidence supporting the view that democratic regimes exhibit better economic performance than non-democracies (Acemoglu et al., 2019). In short, economists have established a new important stylized fact in that the relationship between democracy and income per capita is strong yet asymmetrical: democracy does cause economic growth, but not the other way around.

Our central contention in this paper is that this stylized fact rests upon an overly crude definition of democracy that does not reflect work by political scientists over the last forty years or so. By overly crude we mean binary. Political scientists have long been preoccupied with the emergence of hybrid or intermediate regimes, that is, of political regimes that are neither perfect democracies nor perfect autocracies. Diamond (2002) refers to these as “hybrid” regimes, Epstein et al. (2006) and Fearon (2011) denote them as “partial democracies,” Bogaards (2009) and Croissant and Merkel (2019) call them “defective democracies,” and Zakaria (1997) label them “illiberal democracies,” to name a few. Yet most papers in economics still favor binary indicators of democracy that crudely contrast democracies and autocracies without allowing much nuance between these extremes. Notable examples include, among others, Giavazzi and Tabellini (2005), Papaioannou and Siourounis (2008),

and Acemoglu et al. (2008, 2019).<sup>1</sup> In this paper, we put forward a simple trichotomous classification of political regimes (and show robust empirical support for it) that we believe can further bridge frontier economics and political science research.

The idea of a non-linear relationship between income and democracy is not completely new to economists. Colagrossi et al. (2020) review 188 papers (from which they take more than 2000 estimates) and find that democracy has a positive and direct effect on economic growth, which is unaffected by publication bias. More importantly for our purposes, they find that the possibility of a non-linear relationship between income and democracy is investigated in only 10% of the papers in this literature. They also report these non-linear effects are seldom found to be statistically significant. Moreover, when economists have talked before about a non-linear relation between income and democracy, one finds that it lacks empirical support and/or it is the opposite of what we argue here. For instance, Barro (1996) suggests an inverted-U relationship: “the results indicate that the middle level of democracy is the most favorable to growth, the lowest level comes second, and the highest level comes third” (p. 14) that is the contrary to what we propose.

It is also worth noting that the latest theoretical literature in economics acknowledges the importance of hybrid political regimes. For example, Bidner et al. (2014) present a model of political transitions based on what they call a “minimalist” conception of the democratic state that matches several stylized facts regarding new democracies and hybrid regimes. Acemoglu and Robinson (2008) study the mechanisms leading to state capture by elites that gives rise to a discrepancy between *de jure* and *de facto* democracies. Mukand and Rodrik (2020) develop a rich taxonomy of political regimes in which democratic transitions result from a settlement between the elite and the majority. And Acemoglu and Robinson (2022) explain state capacity as the outcome of political competition between elites and civil society that lead to three different equilibria: despotic, weak and inclusive states. This theoretical literature characterizes intermediate regimes by their relatively higher levels

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<sup>1</sup> There are a few exceptions that use continuous measures of democracy, such as Madsen et al. (2015), which does not consider non-linearities, and Almeida and Ferreira (2002) and Gründler and Krieger (2016), which consider non-linearities but find no statistical support for them.

of instability. Such instability induces myopic behavior aimed at grabbing rents in the short term and disregarding long-term effects: political instability is thus considered a key theoretical channel linking democracy and income. In short, while the recent economics theoretical literature acknowledges intermediate political regimes, the vast majority of the economics empirical literature still does not.

Our main hypothesis is summarized by the idea of a Political U. We argue and provide supporting evidence that the relationship between political and economic development is causal and U-shaped. More specifically, that the economic performance of “intermediate” regimes is significantly inferior to that of both “democracies” and “autocracies.” Our baseline results indicate “intermediate” regimes decrease long run GDP per capita by about 20 percent compared to both “democracies” and “autocracies.” These hybrid regimes are intermediary between autocracies and democracies, and as such better reflect recent political science research. It is a concept of great current interest and relevance because almost all populist regimes today are classified as intermediate, hybrid or mixed regimes (Guriev and Papaioannou, 2022).<sup>2</sup>

Concerns about measurement error are commonly used to justify the dummy variable approach to political regimes. The bulk of the literature uses the Polity index (Marshall and Gurr, 2020). In this paper, we take advantage of the new Varieties of Democracy (V-DEM) dataset, which brings substantial improvements to the measurement of political regimes (Maerz et al., 2021; Lührmann et al., 2018). However, irrespective of which data source one uses as measure of democracy, we find that both the V-DEM and the Polity indexes relate to per capita income in similar ways, namely, they both support a non-linear U-shaped relationship between political and economic development.

Figure 1 shows the predictions from a simple specification in which GDP per capita (in logarithms, multiplied by 100) is regressed on continuous measures of democracy (from V-DEM and Polity) and their squared terms.<sup>3</sup> The figures on the left show only the conditional means and their

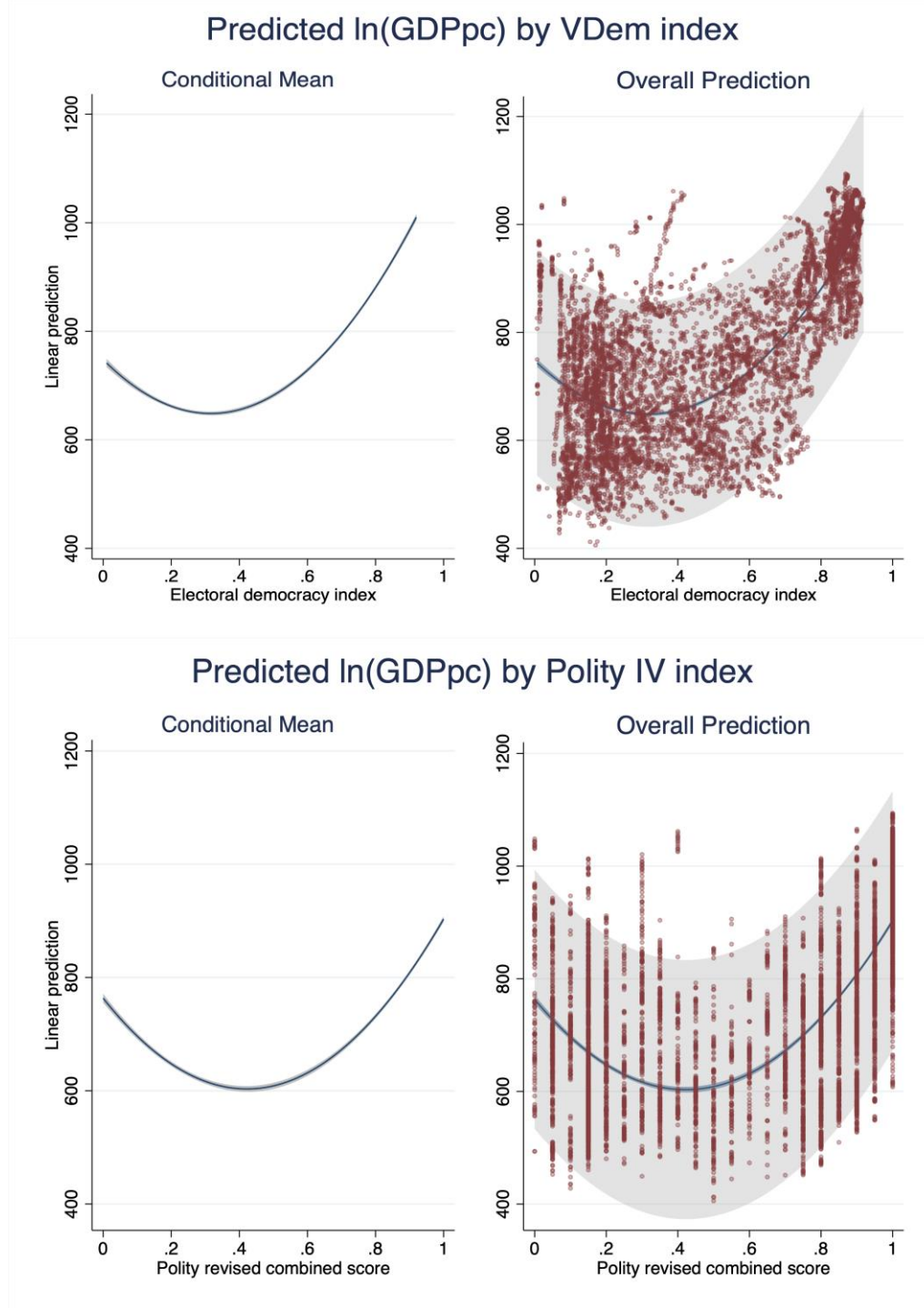
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<sup>2</sup> It is also remarkable that in September 2022 a resolution by the European Parliament has classified Hungary as an electoral autocracy, thus neither purely autocratic nor purely democratic.

<sup>3</sup> We also obtain this non-monotonicity when relaxing the standard quadratic functional form and adopting, for example, fractional polynomials of order 3 (Appendix A). The non-linear relationship is also supported by the trichotomous

confidence intervals, while the ones on the right add the overall predictions and their (much broader) confidence intervals. Both confidence intervals are shown at the 95% level.

**Figure 1** Predicted values of GDP per capita for different continuous Democracy indexes



classification we favor in this paper (section 4 below) and by a data-driven cluster analysis classification that also delivers a similar trichotomous outcome (Appendix B).



Figure 1 reveals that intermediate regimes generate worse economic outcomes. Note that the minimum value is to the left of the average (and of the median) value of both democracy indexes. Dichotomous classifications would hence place this minimum under non-democracies, leading to democracies performing better than non-democracies. The trichotomous approach we adopt in this paper locates this minimum under intermediate regimes instead. In contrast with the dichotomous approach, there is no conflict between discrete, in this case trichotomous, and continuous specifications, as they both attribute the worst economic performance to intermediate regimes. Consequently, the traditional differences between the approaches followed by economists and by political scientists are sharply reduced. The main objective of this paper is to verify whether econometric analysis supports the facts displayed in Figure 1.

We find that the Political U is quantitatively important: we estimate that (stable) autocracies achieve about 20 percent higher GDP per capita than an “intermediate regime” in the long run (25 years) while democracies achieve a similar estimated figure of about 20 percent higher long run GDP per capita. This estimate is in line with the ones Acemoglu et al. (2019) produce based on a binary democracy indicator.

The Political U is a simple idea and its most powerful potential criticism is equally simple: what if dictators lie? What if autocrats are more likely to systematically manipulate GDP figures? Even compared to concerns about endogeneity, outliers, estimator choice, measurement of democracy and cross-time heterogeneity (all of which we address below), we think this is potentially the most severe criticism. In a recent paper, Martinez (2022) argues that dictators systematically lie about GDP figures and estimates that “autocracies overstate yearly GDP growth by approximately 35%.” We deal with this issue here by using night lights instead of GDP and show that our results are equally supportive of the Political U hypothesis.

As for the potential mechanisms that govern the non-monotonic relationship between democracy and income, we find evidence supporting social unrest or political instability as the key

channel.<sup>4</sup> Further, we find evidence that productivity is also an important channel. Somewhat surprisingly, other potential channels such as education, investment, inequality and structural reforms, seem to lack similar empirical support.<sup>5</sup>

The rest of the paper is organized as follows. Section 2 presents our conceptual framework to guide the econometric analysis. Section 3 introduces our estimation methods, data, and measurement efforts including different ways to generate our trichotomous classification of political regimes. Section 4 discusses our econometric results centered on a U-shaped relationship between political and economic development. Section 5 concludes.

## **2. Theoretical considerations**

The objective of this section is to lay down the main theoretical considerations informing our investigation. Specifically, we first discuss the difficulties in identifying the relationship between economic and political development. We note non-linearities have been investigated before but not given the importance we show they deserve in the present paper. One reason for that is that taking them into account allows for a much clearer and more theoretically sound account of the main determinants of the democracy-income relationship. In our reading of the literature, as discussed in this section, the main channel is political instability, with other important candidates (such as investment, human capital, inequality and reforms) playing intermediate roles. Below we show that the literature so far has provided support for most indirect channels but not for this main mechanism. We show that one of the benefits of the Political U approach to thinking about this matter is that it supports as main direct channel social unrest or political instability.

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<sup>4</sup> Here we show that countries not only do get stuck in “intermediate regimes” but also that the probabilities of transition out of it are low and of similar size either towards autocracy or towards democracy (cf. Table 7 below).

<sup>5</sup> Most of the available results regarding underlying mechanisms support a huge number of factors except those that the theoretical literature identifies as the key ones. The frontier paper is Acemoglu et al. (2019) and they note “In all specifications we find that democracy increases the likelihood of economic reforms, tax revenue as a percentage of GDP, and enrollment in primary and secondary education and reduces child mortality (although for some of these variables, the 2SLS estimates become considerably larger). We also obtain evidence of positive effects of democracy on investment and openness to trade and negative estimates on social unrest, but these estimates are not precise in all specifications. Finally, we find no evidence of an impact of democracy on TFP” (2019, p. 89).

Properly identifying the effect of democracy on economic growth is a difficult task. There are at least two fundamental problems. First, there are a large number of unobserved structural (time invariant or slowly moving) country characteristics that may affect both democracy and growth, ranging from religion to culture, to geography. Second, political regime changes may be induced by economic dynamics prior to such changes. Acemoglu et al. (2019) clear most of the concerns related to omitted time invariant variables and reverse causality. Their analysis establishes a robust positive long run effect of democracy, or better democratizations, on GDP per capita. Their approach tackles the main methodological concerns by using a fixed effects panel estimation with a dynamic structure for GDP. We show below that our main findings also obtain using their approach but our analysis moves the research into some of the new territories they explicitly cite as important areas for ‘future inquiry’, namely non-linear dynamics and multiple regime types (Acemoglu et al., 2019, p. 97).

Until recently, the empirical analysis of the democracy-growth nexus has been largely inconclusive. Pioneering work by Barro (1996, 2000) found democracy to be an obstacle to economic growth. Subsequently, results varied depending on the definition of democracy used, the time period covered and the geographical sample. In their recent survey of a large set of studies, Colagrossi et al., (2020) illustrate the evolution of econometric specifications. Early studies mainly rely on pooled regression approaches. Time invariant effects are captured by a host of indicators, ranging from colonial origin, regional effects, and initial income levels. In such approaches, results are still dominated by cross-country variations. Finally, the focus on different time periods makes practically impossible to compare results. For all these reasons, a summary of the large empirical literature, using meta-analysis techniques, depicts a blurred picture.

Even though the seminal work by Barro (1996) emphasized the non-linearity of the democracy-growth nexus, most of the empirical literature on democracy and growth has focused on a linear relationship, either using a continuous measure of democracy without polynomial terms or adopting a dichotomous classification of political regimes, identifying the two alternative states of democracy

and non-democracy.<sup>6</sup> By construction, a dichotomous classification rules out the possibility of a non-linear relationship. By contrast, the political literature, in at least the last three decades, has emphasized the importance of varieties of regimes, identifying intermediate states, clearly distinguishable from pure autocracies and pure democracies.

Starting in the 1990s, the world witnessed a widespread process of democratization, but with sharply different forms. In more recent times, growing populism and the so-called democratic recession have also spread in established democracies and advanced economies. Political scientists have coined various terms to identify political regimes that cannot be simply classified as pure autocracies or pure democracies. Zakaria (1997) uses the term “illiberal democracies,” while Levitsky and Way (2010) “competitive authoritarianism.” Mukand and Rodrik (2020) develop a formal model to explain the forces leading to different forms of democracy once a country exits its state of autocracy. The different gradations of political regimes arise from the different weights of the three dimensions in the various regimes: property rights, political rights and civil rights. Liberal democracy is the only regime in which all three rights are guaranteed, whereas in electoral democracies political rights and civil rights are less protected, at least to some extent.

A finer distinction of political regimes, beyond the simple autocracy versus democracy classification, suggests that in many instances the *de jure* regime does not correspond to the *de facto* regime. In this respect, particularly relevant is the phenomenon of state capture or captured democracy, which has been often found in the experience of democratization in Africa, but also in Latin America. Acemoglu and Robinson (2008) define “captured democracy” as a situation in which elites control the government and determine policies and allocation of resources beneficial for them. They develop an analytical framework in which in democracy elites have incentives to invest a significant amount of resources to influence, and then capture, the state. Acemoglu and Robinson

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<sup>6</sup> Among the exceptions, Rodrik and Wacziarg (2005) considered the possibility that growth effects depend on the intensity of political change, distinguishing small and large democratizations.

(2022) explain the accumulation of state capacity as the outcome of a political competition between elites and civil society leading to three different equilibria: despotic, weak and inclusive states.

A number of authors focus on the role of rent-seeking. Rent-seeking shortens planning horizons and diverts resources from productive uses, with important implications for productivity. Another key factor responsible for shortening economic horizons is political instability. Campos and Coricelli (2012) argue that hybrid regimes are subject to the risk of competition for grabbing rents and capturing the state through a fight between heterogeneous elites. In this hybrid state, politicians and the private sector have typically a short-term horizon and thus divert resources to rent-seeking activities, away from productive uses (Tornell and Lane, 1999). Campos and Coricelli (2012) provide evidence of non-linearity between growth and reforms and throw light on its key mechanisms for transition countries in the 1990s. Vasilev and Libman (2020) advance a similar view, focusing on the struggle between fragmented elites in competitive authoritarian regimes. They discuss this mechanism at the subnational level in resource rich countries. Similarly, Collier and Hoeffler (2009) emphasize the increasing rent-seeking activities in new democracies, in which checks and balances are still weak. Besley and Masayuki (2007) highlight major differences within autocracies, emphasizing those elements that can make autocracies efficient.

A common feature of these views on the drawbacks of hybrid regimes is related to their high degree of instability, which induces a myopic behavior aimed at grabbing rents in the short term, disregarding long-term effects. Epstein et al. (2006) note that the relevance of partial democracy as an independent regime is indeed supported by the fact that starting from that state it is equally probable to move to full democracy or reverse to autocracy. Furthermore, even over rather long time intervals, there are countries that remain in a state of partial democracy. Rather than being a typical transitory state in the move from autocracy to democracy, intermediate regimes display a much higher degree of instability.

Through different channels, both established autocracies and democracies limit the scope for this “short-termism.” In established autocracies, supporting homogeneous elites, facing a long-term

tenure, perceive that the magnitude of the rents they can appropriate is an increasing function of the growth of the economy. Therefore, they may favor growth-enhancing policies. In established democracies, checks and balances reduce the expected return on rent-seeking activities.

Therefore, despite a wide variety of experiences, one can identify common features in an intermediate political category, covering both competitive autocracies and weak democracies. According to Epstein et al. (2006), “We also learn that the frontier of this line of inquiry has shifted away from the study of autocracies and democracies and toward the study of partial democracies. As we show here, the behavior of these systems largely determines the level, rate, and properties of democratization. While thus influential, partial democracies, being highly heterogeneous, are poorly understood. The study of democratization, we therefore conclude, should place them at its focus” (page 552). Ansell and Samuels (2015) emphasize the importance of elites heterogeneity and show both theoretically and empirically that most democratizations lead to an initial movement from autocracy to partial democracy.

Related to the Political U is the extensive work by Besley and Persson (2011) on state capacity. Their focus is on the architecture of the state, which encompasses “the institutional capabilities of the state to carry out various policies that deliver benefits and services to firms and households” (Besley and Persson 2011, page 6). State capacity has two main dimensions, fiscal and legal capacity, which are highly correlated with incomes per capita. Relevant for our study, the theoretical framework developed by Besley and Persson defines three fundamental types of states: redistributive states, common interest states and weak states. Redistributive states use political power to implement policies that benefit the ruling elite. They are relatively stable and thus invest in state capacity, which in turn raises the efficiency of the economy. Common interest states, through an effective system of checks and balances, ensure protection of the interest of electoral losers and thus the spread of benefits and services over the population. They are thus characterized by a high degree of cohesiveness, which ensures stability. By contrast, weak states have low cohesiveness and high instability, given by high political turnover. Instability reduces the incentives to invest in state capacity. Therefore, weak states

display the worse economic performance. This classification emerges from the combination of two main characteristics: cohesiveness and stability. In Besley and Persson (2011), even though the three categories of states cut across different political regimes, they have significant connections with the trichotomous approach we propose in this paper. Indeed, the characteristics of the weak states should in principle correlate with the intermediate category of political regime, characterized by some degree of openness in the selection of the executive in a context of underdeveloped democratic institutions. Therefore, the intermediate regime lacks strong checks and balances and has limited scope for policies geared to maximizing common interests.

In summary, in this paper we investigate the possible non-monotonicity in the relationship between democracy and growth by focusing on a trichotomous classification, in line with the political science literature. We expect that the forces affecting the potential non-monotonicity arise because of the power of interest groups to capture the state, irrespective of the *de jure* political regime. Furthermore, the political instability typical of hybrid regimes is likely to lead to myopic behavior, with negative effects on economic growth.

Even though allowing for a non-monotonic relationship between democracy and income reduces the potential conflicts between continuous and dichotomous measures of democracy, we share some of the concerns raised by the recent political economic literature (e.g. Acemoglu et al., 2019) on the risks of defining too many categories, which in the end would dilute the key elements of political regimes. However, drawing from the political science literature, we believe that there are common traits that clearly distinguish an intermediate regime from either autocracy or democracy. More importantly, we argue that the trichotomous classification helps us to better identify the democracy-growth nexus and provide a clear understanding of the key potential mechanisms governing their relationship, while retaining the benefits of a parsimonious classification of political regimes. Therefore, our analysis complements rather than contradicts the existing literature.

### **3. Measurement issues and data description**

The objective of this section is to discuss how we measure political regimes and to show the (non-linear) contours of the relationship between political and economic development. Firstly, we critically discuss the two most widely used measures of democracy in econometric analyses, namely Polity and V-DEM; next we present descriptive statistics focusing on the relationship between economic and political development; and finally, we explain how we measure democracy in this paper and how our measure compares with other well-known approaches.

On a theoretical level, economists have increasingly converged with political scientists on the appreciation and understanding of democratic political institutions. On an empirical level, however, political scientists have tended to separate out democracies from autocracies and to use more continuous measures of both, while economists tend to conflate the two (democracies and autocracies defined on a single scale) but tend to use a simpler dichotomous, dummy variable approach.

Conceptually, we believe there is little divergence between Dahl and Rodrik, some of the most prominent thinkers on these issues in political science and economics, respectively. Dahl (1998) asks what political institutions does “large-scale democracy” require? His answers rests on the following six factors: (1) elected officials, (2), free, fair, and frequent elections, (3) freedom of expression, (4) alternative sources of information, (5) associational autonomy (e.g. party and union membership), and (6) inclusive citizenship. In his conceptualization, Rodrik (2000) argues that democracy is a multi-dimensional “meta-institution,” which encompasses among other aspects: elected representatives, civil liberties and political rights, checks and balances, organized opposition, independent judiciary, apolitical bureaucracy, and rule of law. The convergence between these views is clear.

These conceptualizations provide the organizing framework for the main available exercises in measuring democratic political institutions. This has a long tradition that goes back to the early 1970s (e.g., Gastil indexes with Freedom House) but here we will focus on the latest developments, specifically we will contrast the Polity and V-DEM efforts. The Polity dataset is still perhaps the most



widely used measure although we believe V-DEM will shortly surpass it as it is newer, with a much longer and more extensive coverage (years and countries), and it has a much more extensively documented resource. As it will shortly become apparent, they both draw heavily on the Dahl and Rodrik conceptualizations above.

One can think of the Polity measure as one closer than V-DEM to political science concerns. It originally provided two separate measures, one for democracy and another for autocracy, which have been only recently combined albeit with reluctance and this has been admittedly driven by users (that is, not by the creators of the dataset). Following its latest version, Polity 5 (Marshall and Gurr, 2020, p. 13-17), their measure of democracy (called DEMOC which stands for Institutionalized Democracy) is based on three key interdependent elements. The first relates to institutions and procedures through which citizens can effectively express their preferences about different policies and leaders. The second refers to the existence of institutionalized constraints on the exercise of power by the executive. And the third is the broad guarantee of civil liberties and political rights. The authors claim other important aspects “such as the rule of law, systems of checks and balances, freedom of the press, and so on are means to, or specific manifestations of, these general principles” (p. 14). The Polity 5 DEMOC measure uses an additive eleven-point scale ranging from 0 to 10 which is derived based on their coding of four underlying components: the “competitiveness of political participation”, “the openness of executive recruitment,” “the competitiveness of executive recruitment,” and the “constraints on the chief executive.”

The Polity 5 measure of Autocracy (AUTOC) differs in a basic way because it uses five components instead of four (2018, Polity 5 codebook, p. 14). The Polity 5 AUTOC measure is also an additive eleven-point scale ranging from 0 to 10, which is derived based on their coding of “the competitiveness of political participation”, of “the openness of executive recruitment,” of “the competitiveness of executive recruitment,” of “constraints on the chief executive,” and of “regulation of participation.”

The overall measure of political institutions from the Polity database that is perhaps the one most used in empirical analysis is their combined score, generated in two versions, one called Polity and the other Polity2. The Polity score is computed by subtracting the AUTOC score from the DEMOC score with the resulting polity scale ranging from 10 (strongly democratic) to -10 (strongly autocratic). The Polity2 variable is simply the Polity variable corrected or smoothed “in order to facilitate the use of the POLITY regime measure in time-series analyses” (p.17). It should be noted that the Polity score is also used to generate and study a trichotomous classification of political regimes with “anocracies” (or intermediate regimes) defined as those scoring between -5 and +5 (with autocracies below -5 and democracies above +5).

Marshall and Gurr warn that the “the POLITY score was added to the Polity IV data series in recognition of its common usage by users in quantitative research and in the overriding interest of maintaining uniformity among users in this application. The simple combination of the original DEMOC and AUTOC index values in a unitary POLITY scale, in many ways, runs contrary to the original theory stated by Eckstein and Gurr in *Patterns of Authority* (1975) and, so, should be treated and interpreted with due caution. Its primary utility is in investigative research which should be augmented by more detailed analysis.” (2020, p. 16-17). Interestingly, in its latest version, Polity 5 explicitly introduces a trichotomous classification, distinguishing three political regimes: autocracy, anocracy and democracy.

The V-DEM dataset is more extensive in terms of years and countries coverage, richer in terms of varieties of democracy measures provided, and arguably better documented. The data creators are also careful to avoid aggregating measures along the same scale that are generated from different set of underlying components (which is an issue with Polity’s DEMOC and AUTOC as discussed above).

Here we focus on the dimension they call “electoral democracy” (2021, V-DEM codebook, p. 43). Differently from Polity, V-DEM provides direct measures of “electoral democracy” as the key dimension of democracy (Polity confounds this with other dimensions) thus requiring less manipulation than Polity, making replication more straightforward. The creators of V-Dem argue this

measure intends to capture the extent to which “the ideal of electoral democracy is achieved in its fullest sense.” The key principles reflected in this measure are that of (a) electorally making rulers responsive to citizens, through electoral competition for the electorate’s approval under extensive suffrage; (b) political and civil society organizations operate freely; (c) elections are clean, not fraudulent nor marred by systematic irregularities; (d) elections affect the composition of the chief executive, and (e) between elections, there is freedom of expression and an independent media.

The V-DEM electoral democracy variable is constructed from a weighted average of their five underlying indexes measuring “freedom of association”, “clean elections,” “freedom of expression,” “freely elected officials” and “free suffrage,” plus a “five-way multiplicative interaction between those indices.” The rationale they offer is that this yields a compromise between “the two most well-known aggregation formulas in the literature, both allowing partial “compensation” in one sub-component for lack of polyarchy in the others, but also punishing countries not strong in one sub-component according to the “weakest link” argument” (p. 43).

One of the main intended contributions of our paper is to depart from a dichotomous or binary classification of democracy. This is both to better reflect recent theoretical developments in political science that highlight the importance of intermediate or hybrid regimes (Campos and Coricelli 2012) as well as to capture the emergence and rise of such intermediate regimes across the world in the last 20 years or so (e.g., those falling under “populist regimes”, cf. Guriev and Papaioannou, 2022). Ultimately, our goal is to accommodate (and test, of course) the possibility that the relationship between political and economic development is non-linear.

In order to do so, we construct a measure or country-year classification of democratic political institutions that is based on V-DEM but tries as much as possible to follow the most recent economic literature on the issue. More specifically, although Acemoglu et al. (2019) base their dichotomous democracy measure on Polity and Freedom House (not on V-DEM), for comparability matters, we try to follow their aggregation procedure as much as possible.

We adopt a trichotomic classification of political regimes. Using the Polity2 measure described above which ranges from -10 to +10 we generate: a first group such that  $-10 \leq \text{Polity} < -5$  and covering the bottom 34.15% of the country-year observations; a second group such that  $-5 \leq \text{Polity} \leq +5$  and covering the middle 24.77%; a third group such that  $+5 < \text{Polity} \leq +10$  and covering the top 41.08%. With V-DEM, a continuous democracy index between 0 and 1, the same weights of these three clusters can be obtained by setting two thresholds at 0.204 and 0.467. We may generate our trichotomous measure of democracy with no need to external or additional sources because of the high V-DEM coverage. However, in order to ensure consistency with the classifications of other papers (e.g. Acemoglu et al., 2019) we follow this literature and supplement available information with Freedom House (FH) categories.

Finally, we code a country  $c$  as *Democracy* in year  $t$  (i.e.,  $D_{ct} = 2$ ) if *none* of the following conditions is satisfied: (i)  $\text{V-DEM} \leq 0.467$ ; (ii)  $\text{Polity IV} \leq +5$ ; and (iii) FH worse than “Free”. We code the country as *Autocracy* (i.e.,  $D_{ct} = 0$ ) if *at least one* of the following conditions is satisfied: (i) FH is “Not Free” and neither  $\text{Polity} > +5$  nor  $\text{V-DEM} > 0.467$ ; (ii) both  $\text{Polity IV} < -5$  and  $\text{V-DEM} \leq 0.204$ , while FH is missing or different from “Free.” And we code the country as *Intermediate Regime* (i.e.,  $D_{ct} = 1$ ) otherwise.

The trichotomic classification of political regimes we generate using the criteria described above covers 170 countries from 1960 to 2018 for a total of 9,920 country-year observations. Note that it is possible to extend this classification to earlier years but at the cost of fewer countries and, perhaps more important, of comparability with other studies. Yet another way our trichotomous classification can be generated is using hierarchical cluster analysis: a trichotomic clustering emerges showing that hybrid regimes vis-à-vis both autocracies and democracies tend to have relatively higher levels of: political corruption (i.e., corruption in the public sector, executive, legislative, and judiciary), clientelism (i.e., distribution of resources in exchange for political support), social unrest and political instability, and socio-economic exclusion (see Appendix B for details).

Another crucial feature of our trichotomic classification is that it can be derived exclusively in terms of political institutions. In other words, this trichotomic clustering emerges independently of and without taking into account its economic implications (chiefly, the U-shaped relationship between political and economic development). For instance, it can be generated from V-DEM data detailing the social groups that support the current political regime. According to this data, *democracies* are the most strongly supported by urban and rural working and middle classes, *autocracies* are the most strongly supported by the military, the aristocracy and foreign governments or former colonial power, and *intermediate regimes* are the most strongly supported by local elites, ethnic and religious groups.

How does our classification compare with that in other studies? Let us focus this comparison on one of the most recent and most influential studies, namely Acemoglu et al. (2019). We consider this paper to be the frontier and carry out a detailed comparison with their classification. Acemoglu et al. (2019) focus on the 1960 to 2010 period, so we constrain our comparison accordingly. In their sample, they classify 4825 country-year observations as non-democracies and 3430 as democracies. According to our classification, out of their 4825 non-democracies we have 2986 as autocracies (that is 61% of their total), 1823 as intermediate regimes and 16 as democracies.<sup>7</sup> Out of the 3430 country-year observations they classify as democracies, our approach classifies as democracies 2324 (i.e. about 67% of their total) and as intermediate regimes 1106 (and none as autocracies). The two classifications compare well and the use of a trichotomic approach does not contradict and actually enhances the dichotomous approach prevalent in the literature.

Within our sample, 405 observations (4.1 percent of the total) are identified as transition years (that is, years in which we observe a change of regime using our trichotomous classification). More precisely, we identify 264 episodes of democratization and 141 reversals. Importantly, the vast majority of these are transitions from or to hybrid regimes and this provides support to the view that intermediate is the most unstable regime of the three. Indeed, we only identify 6 transitions (of a total

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<sup>7</sup> These are Argentina (1964-1965); Cyprus (1961-1962; 1968-1973), Estonia (1991), Latvia (1991), Lithuania (1991-1992), Mongolia (1992), and Slovenia (1991).

of 405) by countries transitioning directly from autocracy to democracy, and none directly from democracy to autocracy. Interestingly, 14.3 percent of the democratization episodes take place in the year of independence (e.g., from colonialism)<sup>8</sup> or in one of the three years after independence, while only 8.4 percent of reversals take place in the same time window.

We calculate an average of 2.4 transitions per country in the 1960-2018 period. Of which, 35 countries in our sample (20.6 percent of the total) have no transitions and approximately 27 percent of the countries show more than 3 transitions. The countries with the highest number of transitions are Argentina (9), Bolivia (8), Lesotho and Bangladesh (7). From a total of 170 countries in our sample, a substantial 96 experienced both democratizations and reversals within the 1960-2018 period. On the other hand, 37 countries experienced only democratic transitions without reversals and only 2 countries experienced only reversals (Laos and Syria). These compare well to those from previous studies that use a dichotomous classification of democracy.

In conclusion, we believe that the V-DEM data is superior to the much more commonly used Polity data for the various reasons discussed above but chiefly conceptual soundness and empirical coverage. Therefore, we prefer to integrate the classification procedure with the V-DEM data. We could use the continuous version of V-DEM or the categorical Polity but such choice would make our results less comparable to those from the related economics literature that mostly uses dichotomous measures of democracy (a dummy variable approach broadly justified in terms of measurement error concerns). Hence, we choose to generate a simple trichotomous classification of political regimes. We think this trichotomous classification can help bridge the economics and political science traditions. This classification can be generated in various ways (using somehow arbitrary thresholds as we did or using cluster analysis as shown in Appendix B) and compares well with available dichotomous classifications as discussed above. In the next section, we use our new trichotomous measure of political regimes to investigate the democracy-income link.

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<sup>8</sup> The source for years of independence by country is Besley et al. (2021).

## 4. Empirical Results

In this section, we present our main results on the relationship between political and economic development using the data discussed in the previous section. We use yearly data for 162 developing and developed countries covering the period from 1960 to 2018.<sup>9</sup> Our main finding is that of a Political U: we argue that the causal relationship from political to economic development is U-shaped. In other words, below we show that “intermediate regimes” lead to significantly inferior economic performance compared to that led by both “democracies” and “autocracies.” We start with specifications that are heavy on time invariant and slow-moving country characteristics and then move on to the methods and specifications favored by the frontier papers in this literature (chiefly Acemoglu et al., 2019) but noting that the results between these strategies are similar, albeit perhaps unsurprisingly so. We then show that our findings withstand a battery of sensitivity checks, chiefly using night-lights (instead of per capita GDP), an instrumental-variables strategy using regional waves of democratization, and time heterogeneity. Third and finally, we present evidence regarding the possible explanations, mechanisms or channels for the Political U and we find strongest evidence for the social unrest channel. We also note that other plausible mechanisms — such as education, investment, inequality and structural reforms — seem to lack comparably robust empirical support and that our results point out a significant role for productivity that is missing in most of the empirical literature. We show evidence that transition probabilities are low across the board but significantly higher when out of the intermediate regime, which supports the view of these as the relatively least stable of them.

Table 1 shows our first set of estimates using the pooled OLS estimator with specifications that include a range of time-invariant country characteristics. Specifically, Table 1 reports the estimated coefficients for the following model specification:

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<sup>9</sup> More specifically, out of the 170 countries for which we can generate our trichotomic measure of political regimes we use 162 of them in the regressions because the following 8 countries have severe data availability issues: North Korea, Taiwan, Afghanistan, Somalia, Myanmar, Serbia & Montenegro, United Arab Emirates, and São Tomé e Príncipe.

$$y_{ct} = \alpha + \theta\beta_1 Autocracy_{ct} + \beta_2 Democracy_{ct} + \sum_{i=1}^p \gamma_i x_c^{(i)} + \delta_t + \varepsilon_{ct} \quad (1)$$

where  $y_{ct}$  is the log of GDP per capita in country  $c$  at time  $t$ , and  $Autocracy_{ct}$  and  $Democracy_{ct}$  are two variables generated from our original trichotomous measure of democracy. In particular,  $Autocracy_{ct}$  is a dummy equal to 1 if country  $c$  has been coded as an autocracy at time  $t$  (and 0 otherwise);  $Democracy_{ct}$  is a dummy equal to 1 if country  $c$  has been coded as a democracy at time  $t$  (and 0 otherwise); while the ‘intermediate or hybrid regime’ is the omitted category. In addition,  $x_c^{(i)}$  for  $i = 1, \dots, p$  is a set of time-invariant country characteristics, including legal origins, ethnic and religious fractionalization, colonial history, geographical regions, and initial per capita GDP. Appendix C shows basic statistics, overall and for each of the three regime types we consider. A full set of year fixed effects  $\delta_t$  is also included starting from column 2.

This exercise should be understood in light of what is considered best practice in the literature, specifically, the extensive use of country and year fixed effects. In this light, one goal of our time invariant characteristics is to try to unpack what these fixed effects might be picking up, how successfully they are doing so and of course also to verify the extent of support from the data to our Political U hypothesis.

In the first column of Table 1, in what is clearly a barebones specification that does not contain any country, region or year fixed effects, but just dummies for democracies and autocracies (with “intermediate regimes” the omitted variable), one can see evidence that democracies show much superior economic performance compared to intermediate regimes and indeed to autocracies, given that the coefficient on the latter is not statistically significant at conventional levels. The simple addition of year fixed effects in column 2 is sufficient to change this last result and turn the coefficient on autocracies to statistical significance at conventional levels. This is important for two reasons. One is that it provides clear support for our Political U hypothesis. The second is that it suggests the



**Table 1** Effect of Democracy and Autocracy on (Log) GDP per Capita – controlling for country slow-moving characteristics

Dep.Var.: (Log) GDP per Capita	Pooled OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Autocracy	5.174 [3.499]	8.217** [3.744]	9.867*** [3.651]	16.032*** [3.971]	13.127*** [3.783]	16.570*** [2.218]	14.787*** [2.180]	15.635*** [2.025]
Democracy	210.329*** [3.110]	209.483*** [3.116]	184.274*** [3.160]	205.165*** [3.513]	152.642*** [3.555]	31.065*** [2.374]	31.908*** [2.343]	39.627*** [2.209]
English Legal Origin			-19.373*** [3.033]		37.885*** [3.744]	29.176*** [2.193]	34.306*** [2.210]	12.857*** [2.978]
Socialist Legal Origin			-4.721 [3.989]		-23.208*** [6.693]	-38.493*** [3.902]	-61.378*** [4.645]	-112.528*** [11.072]
Scandinavian Legal Origin			137.115*** [7.263]		173.438*** [13.567]	68.119*** [8.276]	70.287*** [7.979]	50.031*** [8.308]
German Legal Origin			127.462*** [7.511]		116.915*** [7.686]	51.630*** [4.604]	52.226*** [4.392]	44.081*** [4.623]
Religion: Protestant, %pop				0.396*** [0.073]	-1.055*** [0.135]	-0.779*** [0.084]	-0.623*** [0.083]	-0.490*** [0.092]
Religion: Muslim, %pop				-0.331*** [0.050]	-0.394*** [0.051]	0.053* [0.030]	-0.028 [0.042]	-0.376*** [0.053]
Religion: Other, %pop				-1.037*** [0.050]	-1.205*** [0.061]	-0.087** [0.038]	-0.078* [0.040]	0.010 [0.046]
Religion Fractionalization					37.958*** [8.122]	20.093*** [4.896]	28.672*** [4.808]	1.699 [5.109]
Ethnic Fractionalization					-177.906*** [6.256]	-112.332*** [3.733]	-65.454*** [3.993]	-77.675*** [4.230]
Colony						-28.579*** [2.302]	-11.765*** [2.548]	-1.466 [3.090]
GDP per capita in 1960, ln						1.304*** [0.012]	1.012*** [0.017]	0.997*** [0.018]
Year F.E.	NO	YES	YES	YES	YES	YES	YES	YES
Region F.E.	NO	NO	NO	NO	NO	NO	YES	(absorbed)
Region × initial regime F.E.	NO	NO	NO	NO	NO	NO	NO	YES
Observations	7826	7826	7826	6960	6514	6270	6270	6270
r <sup>2</sup>	0.41	0.41	0.46	0.46	0.57	0.86	0.88	0.90

This table reports the estimation results of the model specification represented by equation (1). It uses the trichotomous classification of political regimes described in Section 3. The reported coefficients are multiplied by 100 to ease their interpretation. *Legal Origin: French* and *Omitted Religion: Catholic* are the omitted categories chosen as the benchmark for the *Legal Origin* and *Religion* categories, respectively. In column (7), 7 regions are considered (World Bank classification): Africa; East Asia and the Pacific; Eastern Europe and Central Asia; Western Europe and other developed countries; Latin America and the Caribbean; the Middle East, and the North of Africa; South Asia. In column (8), following Acemoglu et al. (2019, Appendix A9.3), we introduce *region × initial regime* classification (in this case we have 34 region × regime cells). Initial regimes are based on country characteristics in 1960 (including: British colonies, French colonies, civil dictatorships, military dictatorships, mixed and presidential democracies, parliamentary democracies, royal dictatorships, and socialist regimes). Standard errors in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

possibility that the effect of political regimes varies over time. It also reveals that there are some (unobservable) time factors positively affecting the probability of being an autocracy while negatively affecting GDP per capita.

We next enlarge this basic specification with legal origins and religious affiliation measures in the expectation of capturing an additional set of important country specific characteristics that may have bearings on the democracy-income relationship. One might expect that the Socialist legal origin will be associated with worse economic development outcomes than the others (with French legal origin as the omitted category). One may also hypothesize along similar lines for Muslim religious affiliation (with Catholic as the omitted category). In column 3 we add to the specification in column 2 only legal origins, in column 4 we add only religious affiliation, and in column 5 we add both plus measures of ethnic and religious fractionalization. Our baseline results do not change as there is still strong evidence for the Political U. It is important to notice that the effect of democracy on economic performance is still more than ten times larger than that of autocracy (both with respect to intermediate regimes) which makes it perhaps not too difficult to reconcile it with the prevailing view (cf. Acemoglu et al., 2019) of a linear relationship between political and economic development. This size discrepancy will change when we add GDP per capita in 1960. We also account for whether or not the country is a former colony, which we report in column 6. Cervellati et al. (2014) argue one should expect important heterogeneous effects related to colonial history and early institutions. Indeed, they find significant but heterogeneous effects of income on democracy, more specifically, they find negative effects from economic to political development (the opposite of what we are studying here) for former colonies and positive for non-colonies. In column 6 we add the “colony” dummy variable from Cervellati et al. (2014) and find that it does not change our main Political U result. However, the inclusion of information on whether the country was a former colony in column 6 sharply reduces the coefficient on democracy and makes it much more comparable in size to that on autocracy. This provides even stronger support for the non-linearity that as we argue here fundamentally characterizes the income-democracy relationship. Column 7 adds region fixed effects,

coded according to the World Bank classification, and our basic results remain strong.

In column 8, we follow Acemoglu et al. (2019, Appendix A9.3) and introduce an interaction between geographic region and “initial regimes”. Acemoglu et al. (2019) operationalize initial regimes using country characteristics in 1960 (including: British colonies, French colonies, civil dictatorships, military dictatorships, mixed and presidential democracies, parliamentary democracies, royal dictatorships and socialist regimes.) This yields 34 region  $\times$  regime cells. In a nutshell, it does not change our main results as the support for the Political U remains. Appendix D shows that these results hold when using only the standard Polity classification instead of our trichotomic classification of democracy.

In order to investigate whether our Political U also receives support if we use the econometric approach most favored in the literature, Table 2 presents the results from our “trichotomous” classification of political regimes to the setting of Acemoglu et al. (2019). They propose a dynamic panel model for GDP, which includes autoregressive dynamics and both country and year fixed effects, the former to absorb the impact of time-invariant country characteristics and the second to try to absorb the impact of time-variant characteristics other than per capita GDP. Specifically, Table 2 reports the estimated coefficients from the following model specification:

$$y_{ct} = \beta_1 Autocracy_{ct} + \beta_2 Democracy_{ct} + \sum_{j=1}^l \theta_j y_{ct-j} + \alpha_c + \delta_t + \varepsilon_{ct} \quad (2)$$

where time-invariant country characteristics  $x_c^{(i)}$  are now completely absorbed by a set of country fixed effects  $\alpha_c$ , and  $l$  lags of  $y_{ct}$  control for the dynamic pattern of GDP per capita exactly as in the model specification adopted by Acemoglu et al. (2019). Table 2 reports Within and Arellano-Bond estimates (in addition to these two, Acemoglu et al. (2019) report HHK estimates which we show in Appendix D).

**Table 2** Effect of Democracy and Autocracy on (Log) GDP per Capita – lags, country and year fixed effects

Dep.Var.: (Log) GDP per Capita	WITHIN ESTIMATES				ARELLANO AND BOND ESTIMATES			
	(1-lags)	(2-lags)	(4-lags)	(8-lags)	(1-lags)	(2-lags)	(4-lags)	(8-lags)
Autocracy	0.597*	0.654**	0.636**	0.883***	0.693	0.571	0.785**	1.272***
	(0.313)	(0.251)	(0.252)	(0.291)	(0.448)	(0.381)	(0.374)	(0.413)
Democracy	0.475	0.595**	0.631**	0.653**	0.895	0.762	1.037**	1.112**
	(0.329)	(0.263)	(0.263)	(0.285)	(0.610)	(0.463)	(0.440)	(0.468)
log GDP first lag	0.975***	1.287***	1.256***	1.253***	0.949***	1.253***	1.232***	1.227***
	(0.005)	(0.037)	(0.036)	(0.037)	(0.007)	(0.040)	(0.038)	(0.037)
log GDP second lag		-0.316**	-0.220**	-0.228**		-0.299***	-0.209***	-0.220***
		(0.036)	(0.045)	(0.043)		(0.039)	(0.044)	(0.042)
log GDP third lag			-0.018	-0.009			-0.016	-0.007
			(0.027)	(0.026)			(0.026)	(0.026)
log GDP fourth lag			-0.050***	-0.063***			-0.054***	-0.060***
			(0.018)	(0.024)			(0.019)	(0.023)
p-value, lags 5–8				0.686				0.714
Long-run effect of autocracy	23.975*	22.555**	19.511**	23.357***	13.557	12.369	16.733**	24.641***
	(12.905)	(8.907)	(7.916)	(7.618)	(8.379)	(8.127)	(7.597)	(7.314)
Long-run effect of democracy	19.044	20.542**	19.338**	17.273**	17.506	16.494	22.122**	21.544**
	(12.517)	(8.739)	(7.809)	(7.305)	(11.733)	(10.092)	(9.205)	(9.046)
Effect of autocracy after 25 years	11.216*	14.917**	14.875**	19.058***	9.905	10.169	14.772**	22.290***
	(5.850)	(5.842)	(5.999)	(6.104)	(6.230)	(6.737)	(6.915)	(6.822)
Effect of democracy after 25 years	8.910	13.586**	14.742**	14.094**	12.790	13.560	19.530**	19.489**
	(6.046)	(5.865)	(5.990)	(5.901)	(8.602)	(8.256)	(8.169)	(7.880)
Persistence of GDP process	0.975***	0.971***	0.967***	0.962***	0.949***	0.954***	0.953***	0.948***
	(0.005)	(0.004)	(0.004)	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)
AR2 test p-value					0.00	0.13	0.93	1.00
Observations	7671	7513	7193	6553	7509	7351	7031	6391
Countries in sample	162	162	162	162	162	162	162	162

This table reports the estimation results of the model specification represented by equation (2). It uses the trichotomous classification of political regimes described in Section 3. The reported coefficients of Autocracy and Democracy are multiplied by 100 to ease their interpretation. Columns 1–4 report the *within estimator* results. Columns 5–8 report *Arellano-Bond GMM* results. Columns 4 and 8 include eight lags of the dependent variable as controls, but for lags 5–8 only the p-value of a test for joint significance is reported. The *AR2 test p-value* is the p-value for a test of serial correlation in the residuals of the GDP series. Following Acemoglu et al. (2019) long-run effects and the effects over the next 25 years are also reported in the table (see footnote 12 for a description of their computation). Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

There are various results worth highlighting.<sup>10</sup> Column 1 shows the results for a single lag of per capita GDP. The value of this coefficient is significantly less than 1 which indicates support for the assumption guaranteeing that the dynamic panel estimators are consistent and with well-behaved limit distributions is that GDP and democracy follow stationary processes, conditional on year and country fixed effects. More lags of per capita GDP are added in the columns 2 to 4 which yield a richer dynamic (with first and second lags now with opposite signs throughout). As reported at the bottom panel of the Table, the aggregate or overall extent of the “persistence of the GDP process” is almost identical to that found in column 1. Moreover, this also holds with respect to the second half of the table (columns 5 to 8) in which we report Arellano-Bond GMM results that address the well-known concern about the “Nickell bias” that follows the use of the within estimator in dynamic model specifications. Note that in columns 4 and 8 we include four more lags of GDP for a grand total of eight lags but we do not report these coefficients, just the p-value for their test of joint significance, which indicates they do not jointly affect GDP. The other key results remain unaffected.

Differently from our results in Table 1, in column 1 of Table 2 only the coefficient on autocracy is statistically significant. The one on democracy is not. In Table 2 moving from column 1 (that is, adding more GDP lags) substantially change this as now the coefficients of both autocracy and democracy are positive and statistically significant (with column 3 being the preferred specification for comparison purposes). This indicates that these two “extreme” regimes perform significantly better than the omitted intermediary political regime category. That constitutes further evidence in favor of a Political U.

From these estimates in Table 2, we can also derive the long-run effect (or the effect over the next 25 years so that they are all more comparable) of both autocracy and democracy.<sup>11</sup> These show

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<sup>10</sup> For ease of interpretation, throughout the paper, the reported coefficient on democracy is multiplied by 100. We report heteroskedasticity-robust standard errors throughout.

<sup>11</sup> In line with Acemoglu et al. (2019), long-run effects and the effects over the next 25 years we report, are computed under the assumption that the transition to democracy (or to autocracy) is permanent, compared to countries that permanently remain within an intermediate or hybrid regime. The effects over the next 25 years can be computed iteratively based on the estimated dynamic process and the estimated coefficients on Autocracy and Democracy. For example, if  $\beta$  is the coefficient on Democracy (i.e., its immediate impact on log GDP per capita) and  $\gamma_j$  is the coefficient on the  $j$ -th lag of log GDP per capita, then the effect of permanent democratization on log GDP per capita is:  $\beta + \gamma_1 \cdot \beta$

a permanent transition to democracy increases GDP per capita by 19.33 percent in the long run and that to autocracy increases GDP per capita by 19.51 percent in the long run, using the estimates in column 3 based on the within estimator. If instead we use the equivalent GMM results (column 7), the effects are still sizeable and not very different in terms of their absolute magnitudes (that is, still around 20 percent), but this time the democracy effect is larger than the one from autocracy (22.12 percent from democracy over the long-run versus 16.73 percent from autocracy). Similar conclusions can be reached focusing on the estimates for “the next 25 years.”<sup>12</sup>

#### ***4.1 Sensitivity analysis: Night-lights, instruments, sub-periods, and mechanisms***

We show above those two different econometric approaches (one stressing slowly moving characteristics and the other GDP lags and year-country fixed-effects) both yield strong support for the possibility we hypothesize here that the relationship between economic and political development is actually U-shaped, and not simply linear. Our results show that the economic performance of both democracies and autocracies is significantly superior to that of hybrid regimes. In this section we subject these findings to a sequence of robustness checks.

The first possibility we investigate is motivated by Martinez (2022) who uses night-lights data, instead of GDP, to argue that “autocracies overstate yearly GDP growth by as much as 35%.” This is a potentially fatal criticism of our Political U hypothesis: if autocracies overstate GDP and one can use a suitably “corrected” measure of economic activity, then the gap in performance between autocracies and democracies must increase in favor of the latter. Indeed, it may increase to a point in which the economic performance of autocracies becomes substantially lower than that of democracies. This would obviously dilute the support for a U-shaped relationship and, by the same

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after one year;  $\beta + \gamma_1 \cdot (\beta + \gamma_1 \cdot \beta) + \gamma_2 \cdot \beta$  after two years; and so on recursively until year  $t+25$ . On the other hand, the cumulative long-run effect can be simply obtained dividing  $\beta$  by  $(1 - \sum_{j=1}^p \gamma_j)$ , where  $p$  is the number of lags included on the right-hand side of the model specification. The same applies for permanent transitions to autocracy.

<sup>12</sup> Even though permanent shifts from intermediate regimes to either democracy or autocracy lead to similar long run benefits, it should be noted that in our sample the average life of autocracies (about 18.5) is shorter than the average life of democracies (about 24.2 years). Therefore, a large number of transitions from intermediate regimes to autocracies are eventually reversed, without turning into long-term effects.

reasoning, strengthen the support for the notion of a linear relation between economic and political development.

There has been a considerable amount of work on night-lights data with one of the seminal papers being Henderson et al. (2012) and recent surveys of this rapidly growing area of research provided by Donaldson and Storeygard (2016) and Gibson et al. (2020). The night-lights data is collected by satellite and as such has important limitations in terms of country and, more importantly, time coverage (i.e., data is not available before the 1990s). For our objectives here, we can use the night-lights data for the period 1992-2018 and compare the baseline results obtained with GDP per capita with those obtained with night-lights. Before doing that, Figure 2 shows that GDP per capita and light intensity are highly correlated (correlation = 0.74) and, more importantly for our purposes, without any clear distortions due to different political regimes.

**Figure 2** Night-lights and GDP per capita in the different regime types (trichotomous classification)

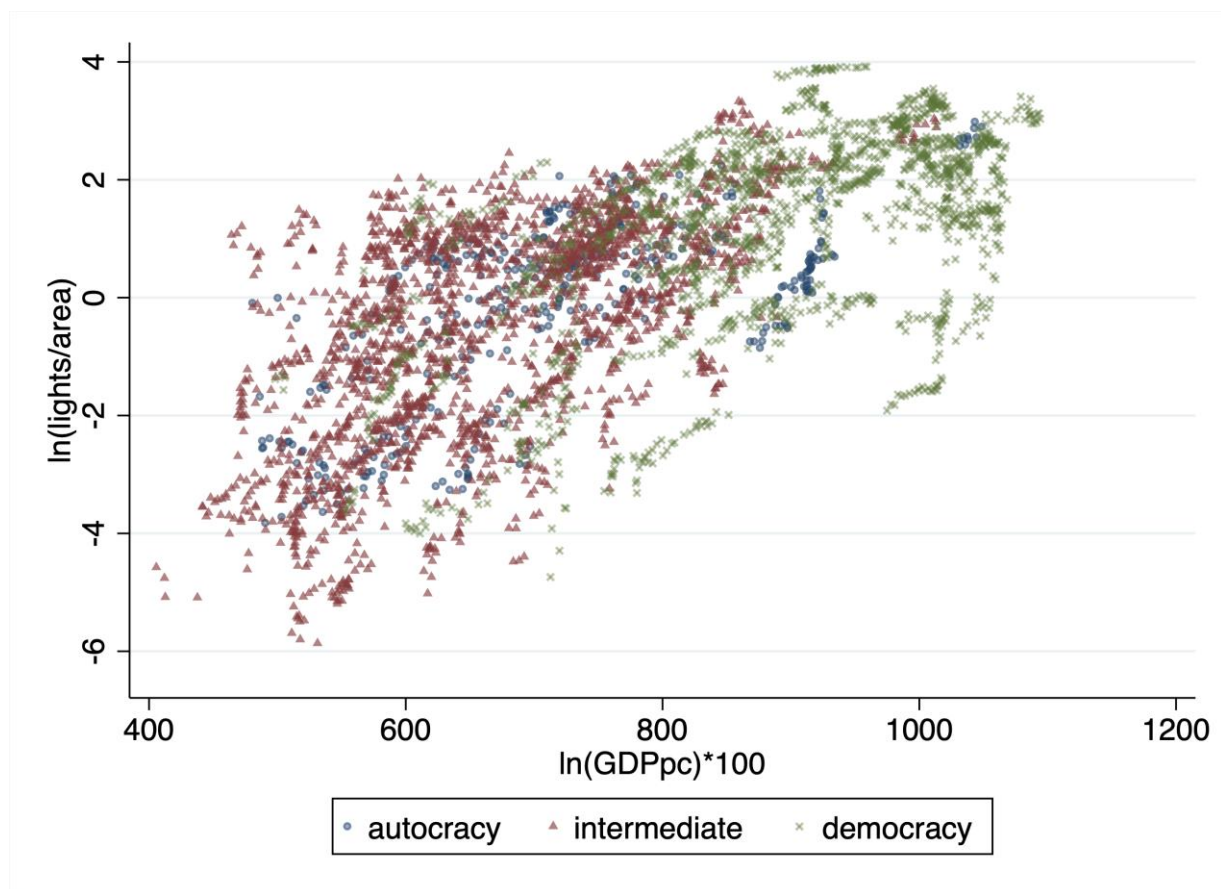
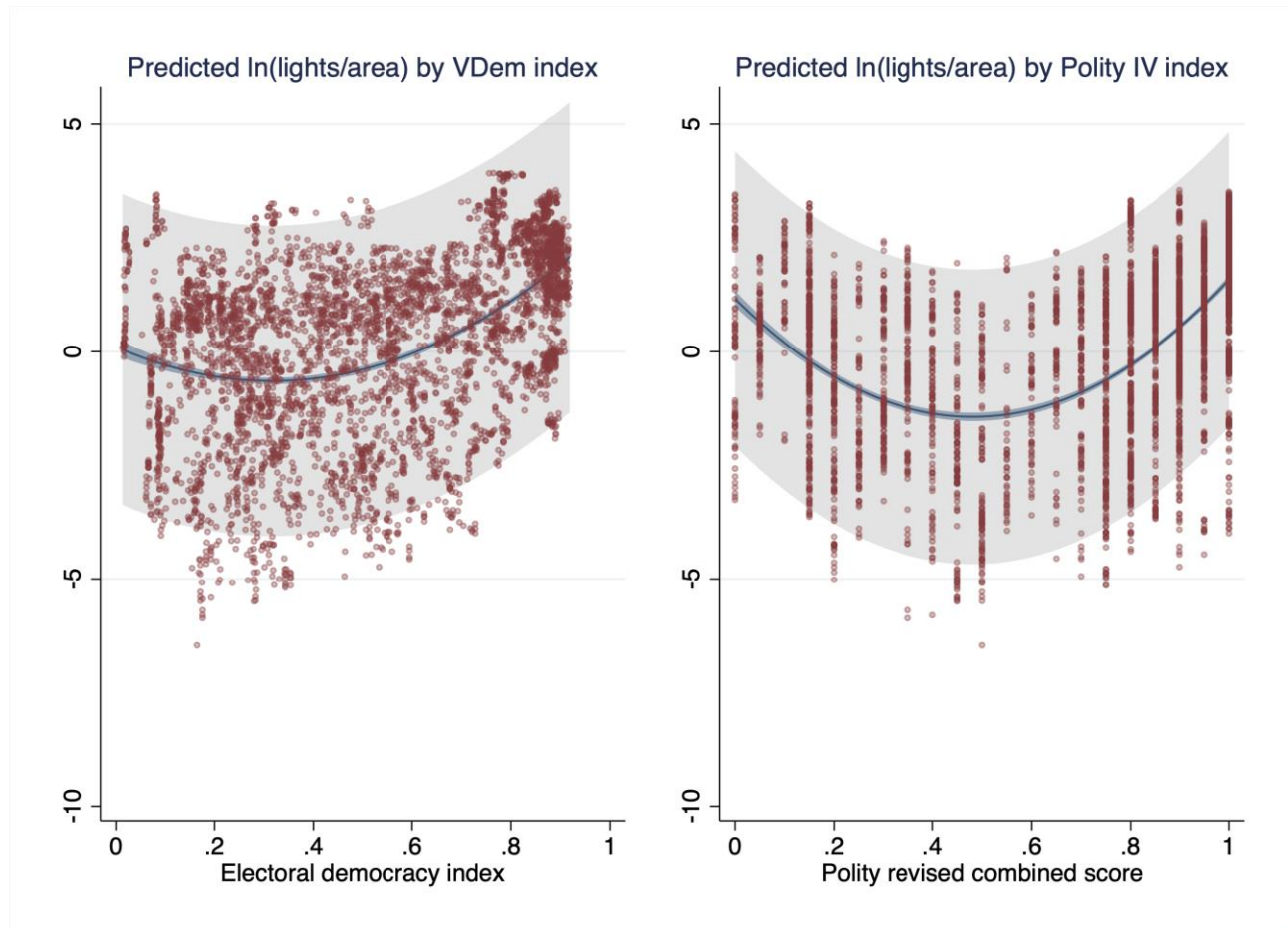


Table 3 revisits our econometric specification using slow-moving country characteristics (legal origins, religious fractionalization, initial per capita GDP, etc.) but instead of measuring economic performance in GDP terms, we turn our attention to the effects of political regimes on economic performance measured by night-lights. The main message from the Table is that the support for the Political U hypothesis does not seem at all affected by this change. Indeed, the sequence of results we report remains the same in the sense that the effect of democracy is substantially larger than that of autocracy (both in comparison to hybrid regimes) and it remains so until we introduce initial per capita GDP and information about whether the country was a colony at any point in the past. Once these are accounted for, the relative effects of democracy and autocracy become much more comparable in size. Finally, note the support for the Political U hypothesis also does not seem affected by whether we measure democracy using V-DEM or Polity and economic activity as night-lights, as shown in Figure 3 below.

**Figure 3** Predicted values of night-lights for different continuous democracy indexes





**Table 3** Effect of Democracy and Autocracy on Night Lights [1992-2018] – controlling for country slow-moving characteristics

Dep.Var.: lnNTL	Pooled OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Autocracy	56.846*** [8.615]	71.584*** [8.222]	60.010*** [8.205]	110.570*** [9.420]	51.246*** [9.186]	21.729** [8.508]	43.520*** [8.633]	46.968*** [8.772]
Democracy	172.928*** [5.751]	172.760*** [5.466]	160.042*** [5.676]	211.932*** [6.519]	128.675*** [6.670]	32.903*** [6.534]	51.284*** [6.165]	36.544*** [5.843]
English Legal Origin			-24.085*** [6.056]		63.922*** [7.187]	79.370*** [6.427]	51.588*** [6.471]	-44.225*** [8.628]
Socialist Legal Origin			47.804*** [6.698]		-26.882** [11.970]	-18.835* [10.594]	-138.619*** [13.474]	-338.657*** [29.660]
Scandinavian Legal Origin			18.017 [15.970]		290.735*** [27.610]	211.659*** [24.793]	214.903*** [23.250]	87.230*** [23.757]
German Legal Origin			146.443*** [15.255]		136.217*** [15.065]	69.260*** [13.279]	77.556*** [12.484]	23.678* [13.237]
Religion: Protestant, %pop				-1.369*** [0.152]	-3.641** [0.267]	-3.833*** [0.245]	-3.103*** [0.234]	-2.245*** [0.257]
Religion: Muslim, %pop				-0.167* [0.099]	-0.099 [0.099]	0.022 [0.087]	-0.787*** [0.119]	-1.084*** [0.150]
Religion: Other, %pop				-0.842*** [0.098]	-1.143*** [0.119]	-0.293*** [0.112]	-0.367*** [0.114]	-0.142 [0.132]
Religion Fractionalization					143.234*** [15.321]	111.228*** [13.876]	164.492*** [13.310]	60.602*** [13.920]
Ethnic Fractionalization					-274.887*** [12.244]	-209.428*** [11.068]	-134.699*** [11.423]	-91.736*** [11.861]
Colony						-57.221*** [6.404]	-23.099*** [6.854]	-23.633*** [8.154]
GDP per capita in 1960, ln						0.971*** [0.032]	0.644*** [0.045]	0.916*** [0.047]
Year F.E.	NO	YES	YES	YES	YES	YES	YES	YES
Region F.E.	NO	NO	NO	NO	NO	NO	YES	(absorbed)
Region × initial regime F.E.	NO	NO	NO	NO	NO	NO	NO	YES
Observations	4460	4460	4433	3735	3442	3172	3172	3172
r2	0.17	0.26	0.29	0.32	0.45	0.60	0.67	0.73

This table reports the estimation results of the model specification represented by equation (1). It uses the trichotomous classification of political regimes described in Section 3. The reported coefficients of Autocracy and Democracy are multiplied by 100 to ease their interpretation. The dependent variable (lnNTL) is the natural logarithm of the area-weighted average of a country's cell-level night-time-light digital number (Martinez, 2022). Lights data covering the period 1992-2018 are aggregated by Martinez (2022) starting from data on night-time light provided by the National Oceanic and Atmospheric Administration (NOAA). These data are then extended to 2018 using harmonized NTL data from DMSP-OLS and VIIRS instruments provided by Li et al. (2020). For additional information about other explanatory variables see Table 1. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

In Table 4 we present results from an instrumental-variables strategy using regional waves of democratization. Our intention here is to address potential issues with the estimates above.<sup>13</sup> More specifically, so far, we have focused on GDP dynamics and time invariant characteristics. In this section we first try to deal with time-varying omitted variables that may affect GDP and democracy simultaneously. The IV strategy should also help alleviating measurement error for democracy and offers a complementary approach (*vis-à-vis* GDP lags and country-year fixed effects) to dealing with endogenous selection into democracy. In selecting instruments, we follow closely Acemoglu et al. (2019) in favoring “regional waves of democratization.”<sup>14</sup> After showing compelling further evidence of their occurrence and that they are unexplained by regional economic shocks, they note that there remains a heated debated on its drivers and yet the “most reasonable hypothesis is that this regional pattern reflects the diffusion of the demand for democracy (or, more generally, dissatisfaction with a given regime) across countries within a region, which tend to have similar histories, political cultures, practical problems, and close informational ties” (Acemoglu et al. 2019, p. 80). The IV strategy is to exploit such regional waves of democratization and transitions to non-democracy as a key source of exogenous variation.

We report three sets of results in table 4: regional democratization waves over the whole period 1960-2018, regional democratization waves accounting for differences in political history, and regional democratization waves accounting for differences in political history up to 2010 which is around the time of the global financial crisis and also last year covered by Acemoglu et al. (2019) (their sample is 1960 to 2010). As it can be seen in Table 4, irrespective of the choice of instruments,

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<sup>13</sup> We also re-estimate this specification trying to address potential criticisms to the validity of these estimates based on the presence of time-varying economic and political factors that may simultaneously impact GDP and political regimes. Table D.5 in the Appendix has these results with various sets of covariates (isolating post-Soviet countries, differential GDP trends, accounting for changes in the demographic structure and social unrest before political regime transitions, among others) and it shows none of these qualitatively affect our conclusions.

<sup>14</sup> Specifically, in Columns 1-2 we instrument Democracy (and Autocracy) by using the lags of Democracy waves (and Autocracy waves) in the same region of a given country. Democracy waves (and Autocracy waves) are obtained as the average value of Democracy (or Autocracy) in the region after excluding the own-country observation. In Columns 3-6 we follow the same approach after grouping country not only by region but also by their political history, i.e. their initial regime (based on the first available observation with our sample). In Columns 5-6 we exclude years after 2010 (for comparison with Acemoglu et al., 2019).

**Table 4** Effect of Democracy and Autocracy on (Log) GDP per Capita – IV Estimates using regional waves of democratization

Instrumental variables:	Democratization waves by region (1960 to 2018)		Democratization waves by region and similar political history (1960 to 2018)		Democratization waves by region and similar political history (up to 2010)	
	(1)	(2)	(3)	(4)	(5)	(6)
Dep.Var.: (Log) GDP per Capita	A. 2SLS Estimates with Fixed Effects					
Autocracy	12.730*** (4.570)	13.189*** (4.879)	11.182** (5.468)	8.527** (4.157)	5.334** (2.465)	5.260** (2.146)
Democracy	15.019** (5.857)	12.044** (5.486)	13.807** (5.799)	11.188** (4.510)	6.304** (2.514)	5.482** (2.215)
log GDP first lag	1.229*** (0.036)	1.209*** (0.042)	1.232*** (0.037)	1.223*** (0.040)	1.231*** (0.038)	1.218*** (0.042)
log GDP second lag	-0.212*** (0.042)	-0.212*** (0.042)	-0.212*** (0.042)	-0.216*** (0.042)	-0.208*** (0.046)	-0.212*** (0.045)
log GDP third lag	-0.015 (0.029)	-0.008 (0.026)	-0.015 (0.028)	-0.008 (0.026)	-0.024 (0.030)	-0.011 (0.029)
log GDP fourth lag	-0.064*** (0.023)	-0.053** (0.025)	-0.063*** (0.022)	-0.056** (0.024)	-0.048** (0.020)	-0.062** (0.026)
p-value, lags 5–8		0.850		0.859		0.587
Hansen p-value	0.18	0.47	0.78	0.94	0.53	0.62
Observations	7193	6553	7193	6553	6122	5486
Countries in sample	162	162	162	162	161	161
Exc. Instruments F-stat.	5.10	2.66	3.45	3.34	3.95	3.02
B. First-Stage Estimates for Democracy						
Democracy wave t-1	0.175* (0.095)	0.186** (0.091)	0.185** (0.089)	0.152* (0.083)	0.240** (0.105)	0.268** (0.105)
Democracy wave t-2	0.024 (0.031)	0.013 (0.033)	0.045 (0.035)	0.071** (0.036)	0.044 (0.098)	0.120* (0.071)
Democracy wave t-3	-0.026 (0.070)	-0.008 (0.073)	-0.048 (0.064)	-0.032 (0.069)	0.047 (0.050)	-0.000 (0.090)
Democracy wave t-4	0.249** (0.100)	0.074* (0.044)	0.229** (0.114)	0.109** (0.052)	0.143* (0.078)	0.064 (0.060)
Additional democracy waves (lags 5–8)	NO	YES	NO	YES	NO	YES
C. First-Stage Estimates for Autocracy						
Democracy wave t-1	-0.496*** (0.102)	-0.401*** (0.097)	-0.449*** (0.095)	-0.379*** (0.088)	-0.712*** (0.120)	-0.713*** (0.120)
Democracy wave t-2	0.112*** (0.036)	0.085*** (0.031)	0.087** (0.042)	0.076** (0.037)	0.087** (0.036)	0.097** (0.047)
Democracy wave t-3	0.051 (0.037)	0.048 (0.034)	-0.042 (0.047)	-0.048 (0.045)	0.088 (0.058)	0.131* (0.067)
Democracy wave t-4	0.104 (0.096)	0.009 (0.041)	0.138 (0.090)	0.030 (0.035)	0.181** (0.078)	0.108 (0.068)
Additional democracy waves (lags 5–8)	NO	YES	NO	YES	NO	YES

This table reports the IV estimates of the model specification represented by equation (2). It uses the trichotomous classification of political regimes described in Section 3. The reported coefficients of Autocracy and Democracy are multiplied by 100 to ease their interpretation. Panel A presents 2SLS estimates instrumenting Autocracy and Democracy with up to four lags of regional democracy waves (see footnote 13). It also reports the p-value of a Hansen overidentification test and the excluded (excl.)-instruments F statistic. Panel B and Panel C present the corresponding first-stage estimates for Democracy and Autocracy respectively. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

the IV results show that the effects of both democracy and autocracy are positive (greater than that of the omitted “intermediary political regimes” category) and statistically significant thus supporting our Political U hypothesis. The Hansen test and the F-test suggest that either misspecification or weak instruments are not a serious concern.

Table 5 re-estimates the specifications in Table 2 above but instead of doing it for the whole 1960 to 2018 time window, we estimate them for rolling 40 year windows, that is for 1961-2000, 1966-2005, 1971-2010, 1976-2015, and 1981-2018 (Appendix D shows we obtain similar results for 30 windows instead). The first lesson to be taken from this table is that there remains strong support for our Political U hypothesis. The second important result is that there seems to be evidence that the effect of autocracy on GDP is stronger in the early periods, while that of democracy seems stronger in the latter or more recent parts of time window. This provides an initial explanation for the non-monotonicity in the income-democracy relationship but, of course, this needs a deeper understanding of the channels.

Following Colagrossi et al. (2020) one possible reason why time matters for the relationship between political regimes and economic growth is that in some subperiods (e.g. in the 1960s) a number of countries experienced democratic transitions (or reversals) because of the start of their decolonization phase, so that empirical evidence may be strongly affected by economic turmoil characterizing these periods. Indeed, in Section 3 we noted that within our panel a relevant number of democratization episodes (mostly from autocracies to hybrid regimes) take place in the years after independence. To check whether our main results are unaffected by this feature, we rerun our regressions excluding the year of independence as well as three years after independence. The results reported in the Appendix D confirm the negative performance of intermediate regimes with respect to both autocracies and democracies.

Similarly, we can also exclude that the relatively good performance of autocracies (with respect to intermediate regimes) is driven by outliers (Appendix E). For instance, as China is always identified as an autocracy within our dataset, its performance is less influential in our setting given

**Table 5** Effect of Democracy and Autocracy on (Log) GDP per Capita — Rolling 40-year subperiods

Dep.Var.: (Log) GDP per Capita	ARELLANO AND BOND ESTIMATES				WITHIN ESTIMATES			
	1-lag (1)	2-lags (2)	4-lags (3)	8-lags (4)	1-lag (5)	2-lags (6)	4-lags (7)	8-lags (8)
<b>A. 1961-2000 period</b>								
Autocracy	2.345*** (0.606)	2.030*** (0.504)	2.075*** (0.485)	2.832*** (0.566)	1.338*** (0.399)	1.280*** (0.319)	1.243*** (0.317)	1.626*** (0.373)
Democracy	0.924 (0.804)	1.016 (0.634)	1.368** (0.631)	1.357* (0.709)	0.530 (0.413)	0.765** (0.361)	0.821** (0.363)	0.772* (0.398)
<b>B. 1966-2005 period</b>								
Autocracy	2.261*** (0.579)	1.905*** (0.492)	1.865*** (0.469)	2.349*** (0.504)	1.631*** (0.381)	1.461*** (0.313)	1.311*** (0.298)	1.381*** (0.336)
Democracy	1.434* (0.795)	1.326** (0.613)	1.526** (0.599)	1.626** (0.649)	0.761* (0.394)	0.816** (0.325)	0.832** (0.323)	0.779** (0.343)
<b>C. 1971-2010 period</b>								
Autocracy	1.613*** (0.537)	1.393*** (0.454)	1.459*** (0.447)	1.703*** (0.491)	1.331*** (0.387)	1.246*** (0.312)	1.131*** (0.299)	1.129*** (0.344)
Democracy	1.311* (0.699)	1.130** (0.539)	1.317** (0.512)	1.465*** (0.559)	0.757** (0.369)	0.767** (0.303)	0.780** (0.304)	0.771** (0.321)
<b>D. 1976-2015 period</b>								
Autocracy	0.895* (0.528)	0.871* (0.456)	1.031** (0.456)	1.254** (0.500)	0.902** (0.411)	0.889*** (0.326)	0.793** (0.317)	0.789** (0.363)
Democracy	1.504** (0.654)	1.228** (0.499)	1.439*** (0.473)	1.595*** (0.507)	0.783** (0.362)	0.755*** (0.289)	0.774*** (0.289)	0.805*** (0.305)
<b>E. 1981-2018 period</b>								
Autocracy	0.407 (0.555)	0.433 (0.487)	0.587 (0.492)	0.753 (0.528)	0.585 (0.467)	0.660* (0.390)	0.537 (0.392)	0.573 (0.438)
Democracy	1.308** (0.604)	0.991** (0.452)	1.287*** (0.429)	1.418*** (0.445)	0.906** (0.348)	0.835*** (0.274)	0.897*** (0.279)	0.994*** (0.297)

This table reports the estimation results of the model specification represented by equation (2). It uses the trichotomous classification of political regimes described in Section 3. The reported coefficients of Autocracy and Democracy are multiplied by 100 to ease their interpretation. Panels from A to E report the coefficients estimated within different 40-years time windows. Columns 1–4 report the *Arellano-Bond GMM* results. Columns 5–8 report *within estimator* results. Each column includes as controls the number of lags of the dependent variable reported in the corresponding column label. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

also the use of country fixed-effect estimators.<sup>15</sup> Still regarding potential outliers, we identify Singapore as the country always classified in an intermediate regime that systematically delivered much superior economic outcomes. Of course, its exclusion strengthens, as opposed to weakens, our Political U result. More in general, we find that our main findings are confirmed when excluding influential observations detected recurring to difference in fits (*dfits*), i.e. the (scaled) difference between predictions of the dependent variable with and without the *i*-th observation in the regression (see Appendix E.2).<sup>16</sup>

Table 6 reports results for the possible mechanisms or channels in the non-monotonic democracy-income relationship. The main message is that in terms of potential mechanisms, we find strongest evidence for social unrest; while other possible channels, such as education, investment, inequality and structural reforms, lack comparably robust empirical support (appendix F has additional results).

Let us comment on each of these in turn. A key explanation for the Political U seems to be the role of social unrest or political instability. Table 6 shows that the probability of riots and anti-government demonstrations is significantly higher in “intermediate political regimes” than in either democracies or autocracies. We also find that the probability of cabinet purges and of revolutions is significantly lower in democracies than in autocracies and intermediate regimes, while the probability of general strikes is lower in autocracies than in democracies and intermediate regimes. Last but not least, we find that more political polarization is higher in autocracies than in intermediate regimes, and lower in democracies, and these results seem driven by the post 2010 years. Importantly, this whole set of results is robust to whether we cut off the time window at year 2010 despite the caveat regarding on the last finding.

Although we do not find direct economic costs of autocracies, our results point to various direct

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<sup>15</sup> See also Figure E.1 in Appendix E for the position of China over time with respect to continuous measures of democracy, showing that economic growth does not go hand in hand with relevant political transitions. Moreover, excluding China from our main regression does not change our main results (results are available upon request).

<sup>16</sup> Symmetrically trimming 5 percent of the observations from the tails of the GDP per capita distribution also does not affect our results (available upon request).

**Table 6** Effect of Democracy and Autocracy on Potential Mechanisms

<b>A. Period 1960-2018</b>										
Dep.Var.:	Labor Productivity	TFP	Human Capital Index	Primary-School Enrollment	Secondary-School Enrollment	Probability of Riots	Probability of Revolutions	Probability of Anti-Government Demonstr.	Probability of General Strikes	Probability of Purges
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Autocracy	0.430 (0.285)	0.654** (0.288)	0.000 (0.000)	-1.019*** (0.276)	-0.195 (0.756)	-5.732*** (1.668)	0.418 (1.669)	-4.543** (1.858)	-5.786*** (1.257)	0.270 (1.315)
Democracy	0.368 (0.262)	0.375 (0.315)	-0.000 (0.000)	0.241 (0.241)	0.098 (0.472)	-7.446*** (2.311)	-5.460*** (1.699)	-8.931*** (2.313)	1.305 (2.301)	-8.418*** (1.443)
Lagged dependent variable var. (4 lags)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Lagged GDP per capita (4 lags)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6562	6294	4515	3325	6784	6784	6784	6784	6784	6784
Countries in sample	156	137	156	149	162	162	162	162	162	162
<b>B. Period 1960-2010</b>										
Autocracy	0.683** (0.295)	0.913*** (0.307)	-0.000 (0.000)	-1.041*** (0.311)	-0.034 (0.828)	-5.807*** (1.816)	-0.678 (1.823)	-4.696** (1.957)	-6.483*** (1.360)	1.278 (1.295)
Democracy	0.490* (0.284)	0.596* (0.323)	-0.000 (0.000)	0.369 (0.272)	0.237 (0.568)	-7.931*** (2.894)	-8.090*** (1.963)	-10.808*** (2.908)	1.317 (2.449)	-8.033*** (1.467)
Lagged dependent variable var. (4 lags)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Lagged GDP per capita (4 lags)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	5402	4114	5260	3687	2696	5593	5593	5593	5593	5593
Countries in sample	156	114	137	154	146	161	161	161	161	161

This table reports the estimation results of the model specification represented by equation (2). It uses the trichotomous classification of political regimes described in Section 3. In all specifications we control for both four lags of GDP per capita and four lags of the dependent variable. Dependent variable in the header: (1) *Labor productivity* is proxied with GDP per person employed (in logarithm); (2) *TFP* is TFP at constant national prices (2017=1) in logarithm; (3) *Human Capital Index*; (4) *Primary School Enrollment*, in logarithm; (5) *Secondary School Enrollment*, in logarithm; (6) *Riots*: any violent demonstration or clash of more than 100 citizens involving the use of physical force; (7) *Revolutions*: any illegal or forced change in the top government elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government; (8) *Anti-government Demonstrations*: any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature; (9) *General Strikes*: any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority. (10) *Purges*: any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

political costs of autocracies that we believe can lead indirectly to important economic costs in the long-run. Specifically, we find that clientelism (Table F.2) and political polarization (Table F.3) are significantly higher in autocracies than in democracies or intermediate regimes. We also show that in democracies there is significantly less political violence (Table F.3), less corruption (Table F.2), as well as a significantly lower probability of social unrest (Table F.2.) The latter is an index of social unrest like the one constructed in Acemoglu et al. (2019), more specifically, a dummy variable capturing the yearly occurrence of a riot or of a revolution. These results show democracies offer a much more stable economic environment in that they entail significantly less riots, anti-government demonstrations, government purges and revolutions (Table 6). We also report evidence that autocracies are significantly less likely to carry out structural reforms (Table F.2) and deliver primary school enrolment (Table 6).

Table 6 also shows that there is little support for education as a channel in the non-monotonic democracy-income relationship. Using a human capital index,<sup>17</sup> enrolment in primary or secondary education does not provide evidence for or against our hypothesis of non-monotonicity. In Appendix F, we also show that there is no conclusive evidence for significant differentiation in investment levels across the three regimes. Inequality is also relatively stable across the three regimes, once one controls for lagged GDP.

As for productivity, we note that there are important differences driven by the time period considered for analysis. The bottom panel of column 2 in Table 6 shows that for the period up to 2010, there is strong evidence that total factor productivity is significantly higher in both autocracies and democracies than in intermediate regimes. The evidence is less compelling when we add the years after the global financial crisis, 2010-2018, in the sense that now TFP is significantly higher only in autocracies. Column 1 shows that this important time differentiation also obtains for productivity measured as labor productivity (GDP per worker). In Appendix F, we also show that

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<sup>17</sup> The Human Capital Index is from Penn World Tables (version 10).



higher TFP in autocracies does not necessarily capture innovation, as confirmed by the negative impact of autocracy on applications for patent registration by residents. Despite data availability issues, these suggest that higher levels of TFP within autocracies may mainly be due to a change of productive efficiency (catching up or imitation) rather than technological progress.

A novel and important dimension of our main finding is that it may help dispel the common view of “intermediate regimes” as a temporary passing stage. Behind this belief is a chronology of democratization as a process in which countries transit from autocracy to democracy, successfully or not. In this widespread view, countries seldom get stuck in the middle (Boese and Eberhardt, 2021). Yet, our results show that this is actually often the case. Table 7 shows that countries not only do get stuck in “intermediate regimes” but the probabilities of transition out of it are of similar size in both directions, either towards autocracy or towards democracy. Our finding is in line with recent political science research (e.g., Gates et al 2006; Knutsen and Nygård, 2015). Knutsen and Nygård argue that the fact that “semi-democracies are particularly unstable political regimes should be regarded as one of the few stylized facts of comparative politics” (2015, p. 668).

Table 7 presents the estimated marginal effects from a Probit model of the propensity to democratize (top panel) or revert to autocracy (bottom panel) based on past dynamics of GDP. In the top panel, the sample comprises the countries that were not at intermediate regimes at time  $t-1$ . In the bottom panel, the sample comprises the countries that were at intermediate regimes at time  $t-1$ . For each sample we estimate the probability of a transition based on past levels of GDP and year effects. The main message from these results is that after periods of recession or economic decline there is a higher probability of transition towards both autocracies and democracies (i.e., away from intermediate regimes). These results are qualitatively similar to those provided by Acemoglu et al. (2019) in an appendix. They find that higher GDP growth in previous years, the lower is the probability of both democratization and of reversals. Our findings are in line with these but we consider transitions towards the two “extreme” categories (autocracies and democracies). They also find that GDP negatively affects the probability of reversals, while it has not significant effects on

**Table 7** Marginal effects of GDP lags on the propensity to democratization or autocratization

<i>A. Probability of transition to full democracy</i>					
	(1)	(2)	(3)	(4)	(5)
Change in GDP at t-1		-0.062*	-0.074*	-0.083*	-0.074*
		(0.028)	(0.033)	(0.034)	(0.034)
Change in GDP at t-2			0.028	0.036	0.032
			(0.040)	(0.045)	(0.043)
Change in GDP at t-3				0.014	0.022
				(0.030)	(0.029)
GDP level effect	-0.016	0.011***	0.012***	0.012***	
	(0.030)	(0.002)	(0.002)	(0.002)	
Observations	3389	3338	3296	3242	3242
<i>B. Probability of transition to full autocracy</i>					
	(1)	(2)	(3)	(4)	(5)
Change in GDP at t-1		-0.096*	-0.117**	-0.144**	-0.190***
		(0.039)	(0.045)	(0.046)	(0.054)
Change in GDP at t-2			0.040	0.014	0.018
			(0.053)	(0.056)	(0.064)
Change in GDP at t-3				0.057	0.016
				(0.053)	(0.056)
GDP level effect	-0.016***	-0.014***	-0.015***	-0.014***	
	(0.002)	(0.002)	(0.002)	(0.002)	
Observations	2990	2969	2878	2779	2779

This table presents the estimated marginal effects derived from a Probit model of the propensity to democratization (top panel) or autocratization (bottom panel) based on past dynamics of GDP. It uses the trichotomous classification of political regimes described in Section 3. In both the top panel and the bottom panel, the sample comprises the countries that were intermediate regimes at time  $t-1$ . For each sample we estimate the probability of a transition based on past levels of GDP and year effects. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

the probability of democratization. By contrast, we find that GDP not only reduces the probability of transitions towards autocracies but also increases the probability of transition towards democracies. Finally, these findings also contribute to explain the results we obtain with IV estimates where the relevant coefficients are somewhat higher than in our baseline estimations. This suggests that endogeneity and reverse causality, even if they occur, are likely to go in the opposite direction. Indeed, if GDP negatively affects the probability of moving to autocracies, we should find lower levels of GDP in autocracies (when not controlling for endogeneity) which is not the case.

## **5. Conclusion**

The objective of this paper is to further our understanding of the relationship between economic and political development. Economists have provided a huge number of important insights into this matter in the last three decades or so. A key and well-established stylized fact in this literature is that the relationship between democracy and income per capita is robust yet unbalanced: democracy does cause economic growth, but the relationship the other way around does not enjoy the same level and depth of econometric support. The vast majority of the economics literature favors a binary approach to measuring democracy despite political scientists having moved away from such choice, as they tend to use continuous measures of democracy. In this paper, we use new improved measures of democracy to propose a trichotomous classification of political regimes that allow us to assess the strength of the Political U hypothesis we put forward and uncover a set of mechanisms or channels that is hopefully more in line with those often highlighted in the theoretical literature.

Our main hypothesis is summarized by the idea of a Political U. We argue that the relationship between political and economic development is causal and U-shaped. More specifically, that the economic performance of “intermediate” regimes is significantly inferior to that of both “democracies” and “autocracies.” To test this hypothesis, we use a new much improved data source on democracy. We discuss above the main drawbacks of the most used measure (Polity2) and argue that the V-DEM data is superior chiefly because of its conceptual soundness and empirical coverage.

However, our main results do not depend on our choice of preferred measure of political regime. The Political U is found using the Polity measure, or using continuous measures of political regime rather than our preferred trichotomic classification.

Therefore, our main finding is that of broad empirical support for a Political U. We also find that the estimated effect is quantitatively important: we estimate that an autocracy achieves about 20 percent higher GDP per capita than an “intermediate regime” in the long run (25 years) while a democracy achieves a similar estimated figure of about 20 percent higher long run GDP per capita. This is comparable to the figure Acemoglu et al. (2019) produce based on a binary indicator of democracy.

Finally, regarding the potential mechanisms governing the democracy-income relationship, we find evidence supporting political instability as a key mechanism, while other potential channels such as education, investment, inequality and structural reforms, seem to lack similarly robust empirical backing. We also find that democracies and stable autocracies display significantly higher productivity levels, and that this is specially so before 2010 which is here understood as the period before the global financial crisis.

These results are robust to changes in estimator choice, measurement of democracy, outliers and cross-time heterogeneity. The instrumental variables estimates we report are also taken as evidence against endogeneity and reverse causality concerns. Fundamentally, and unfortunately because we do believe in the superiority of democratic regimes over all others, our results also show that a Political U obtains when we take into account the possibility that autocrats manipulate economic statistics, by using night-lights.

We offer three main suggestions for future research. One is that, although we believe our paper provides interesting insights into the mechanisms that explain the relationship from political to economic development, we leave the task of further identification and quantification of these channels for future research as we think there is still a lot of theoretical and econometric work to be done in this regard. A second suggestion we put forward is in terms of further investigating the underlying components as well as the different dimensions of democracy. On the latter, we show that the results

we present in this paper for electoral democracy also obtain and indeed are even stronger for the other dimensions of democracy (in Appendix G we show the Political U obtains for liberal, participatory, deliberative and egalitarian democracy; in addition to electoral democracy.) Yet we believe there is sufficient scope for this important matter to be investigated more systematically in the future. A third and last potentially useful line for future research we suggest is to investigate the relevance of the Political U for the current waves of populism across the globe and democratic backsliding even in long established democracies. Indeed, according to our classification, these experiences would be defined as intermediate regimes, thus potentially leading to severe adverse political and economic effects.

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## **APPENDICES**

## Appendix A

**Table A.1** Effect of Democracy on (Log) GDP per Capita – Nonlinearity (quadratic functions)

	(1)	(2)
VDem	-627.345*** [20.729]	
VDem <sup>2</sup>	991.737*** [20.757]	
Polity		-758.858*** [19.790]
Polity <sup>2</sup>		898.676*** [17.864]
Constant	747.738*** [3.983]	763.367*** [3.974]
Observations	7812	7301
r <sup>2</sup>	0.53	0.44

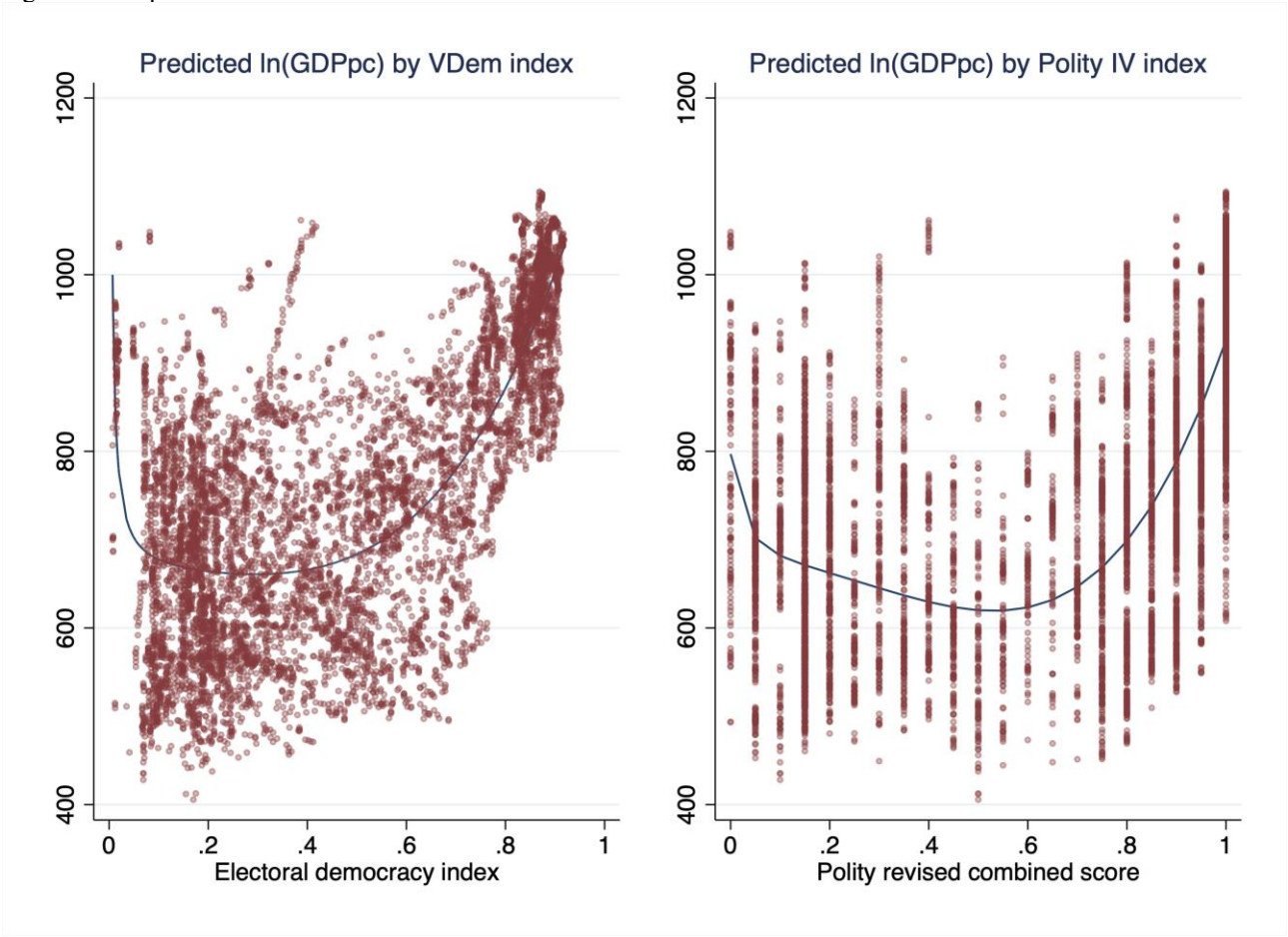
This table reports the estimation results of a simple model specification containing a democracy index, its squared term, and a constant term as the explanatory variables. The dependent variable is (log) GDP per capita. For the democracy index we recur alternatively to the V-Dem Electoral Democracy index (VDem) and the Polity IV index (Polity). Standard errors in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels. Figure 1 in the main text is generated based on these estimations.

**Table A.2** Effect of Democracy on (Log) GDP per Capita – Nonlinearity (fractional polynomial functions)

	(1)	(2)
1/VDem	2.421*** [0.149]	
VDem <sup>3</sup>	523.988*** [6.863]	
VDem <sup>3</sup> * ln(VDem)	471.793*** [41.174]	
Polity <sup>-2</sup>		0.312*** [0.024]
Polity <sup>3</sup>		177.524*** [3.554]
Polity <sup>3</sup> * ln(Polity)		836.538*** [27.032]
Constant	654.003*** [2.433]	672.687*** [2.880]
Observations	7812	7301
r <sup>2</sup>	0.54	0.48

This table reports the estimation results of a *fractional polynomial* regression containing polynomial functions of a democracy index and a constant term as the explanatory variables. The dependent variable is (log) GDP per capita. For the democracy index we recur alternatively to the V-Dem Electoral Democracy index (VDem) and the Polity IV index (Polity). The table reports the best-fitting polynomials for each single democracy index  $x$  searched up to the degree 3 from among  $\{x^3, x^2, 1/x, \ln(x), x, x^2, x^3\}$ . Fractional polynomials increase the flexibility provided by the family of conventional polynomial models since they allow logarithms, noninteger powers, and their interactions (Royston and Altman, 1994; Royston and Sauerbrei, 2008). Standard errors in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels. Figure A.1 in this Appendix is generated based on these estimations.

**Figure A.1** Predicted values (conditional means) of GDP per capita from the estimation of *fractional polynomial* regressions reported in table A.2



## Appendix B

### B.1 Principal Component Analysis

Variables of interest:

- Polity (POLITY)
- Electoral democracy index (VDEM)
- Liberal component index (VDEM)
- Participatory component index (VDEM)
- Deliberative component index (VDEM)
- Clientelism Index (VDEM)
- Exclusion by Socio-Economic Group (VDEM)
- Exclusion by Urban-Rural Location index (VDEM)
- Exclusion by Social Group index (VDEM)
- Political corruption index (VDEM)

*Note: **Exclusion** is when individuals are denied access to services or participation in governed spaces (spaces that are part of the public space and the government should regulate, while excluding private spaces and organizations except when exclusion in those private spheres is linked to exclusion in the public sphere) based on their identity or belonging to a particular group.*

Based on the PCA we can reduce the “dimensionality” of the data into 2 dimensions (principal components). Together, they explain 85% of the variability of the input variables.

Factor Loadings reveal that **Dimension 1** is positively correlated with all the main dimensions of democracy (based on Polity and VDem) and is also associated to lower levels of corruption clientelism, and lower levels of socio-economic exclusion.

Factor Loadings reveal that **Dimension 2** is still positively correlated with all the main dimensions of democracy (although the participatory is the more relevant, here) but is also associated to higher levels of corruption and clientelism, and higher levels of socio-economic exclusion.

**Table B.1** Factor Loadings from PCA

Variable	Principal Components/Dimensions	
	Dimension1	Dimension2
Polity (POLITY)	0.31	0.41
Electoral democracy index (VDEM)	0.35	0.25
Liberal component index (VDEM)	0.35	0.20
Participatory component index (VDEM)	0.31	0.37
Deliberative component index (VDEM)	0.33	0.27
Clientelism Index (VDEM)	-0.29	0.33
Exclusion by Socio-Economic Group (VDEM)	-0.31	0.38
Exclusion by Urban-Rural Location index (VDEM)	-0.31	0.32
Exclusion by Social Group index (VDEM)	-0.33	0.19
Political corruption index (VDEM)	-0.28	0.37

Dimension1 seems to capture a ‘balanced’ democratization, while Dimension2 seems to capture an ‘unbalanced’ democratization, where higher democratic participation is not shared by all the population.

We can compare these two dimensions with variables from other sources that are not included in the PCA because of the lower number of observations:

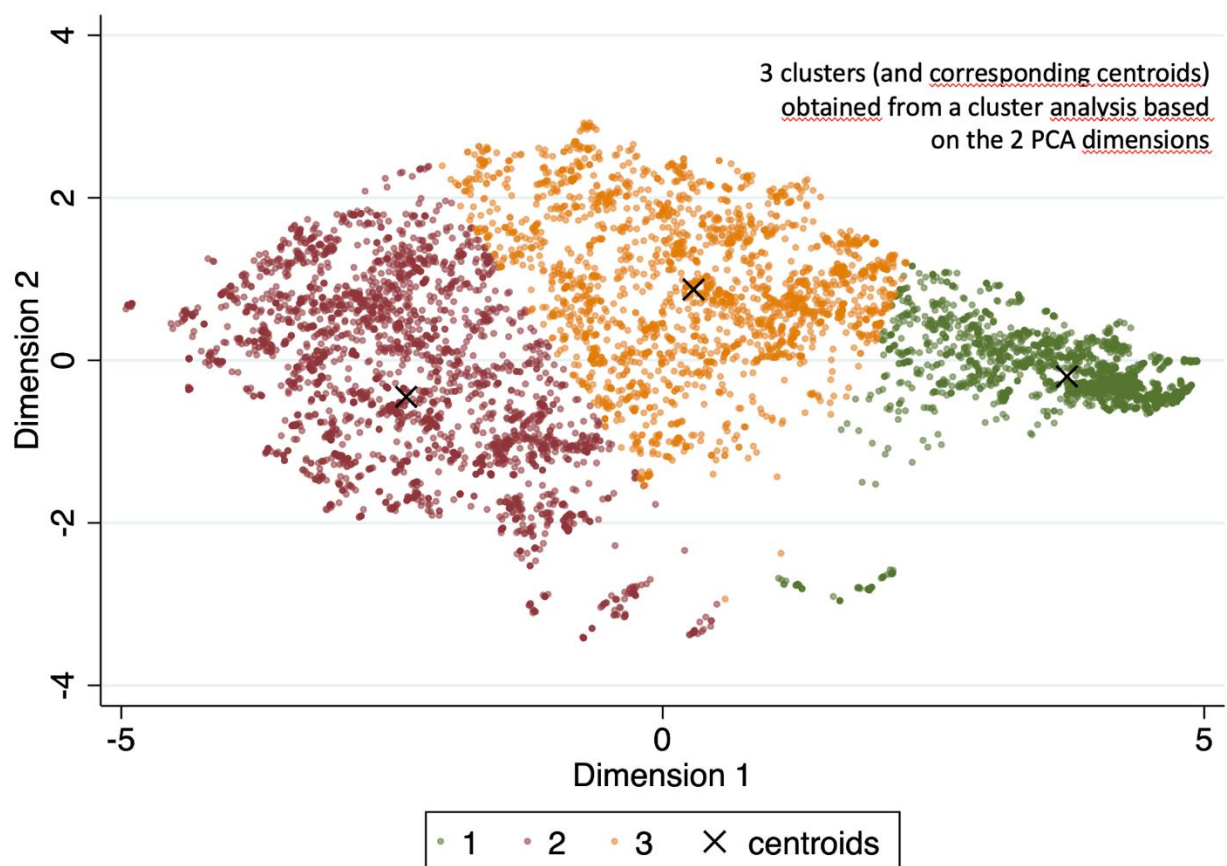
**Table B.2** Correlation matrix including PCA dimensions and other country-year variables

	Dimension1	Dimension2	Political stability	Control of corruption	Government effectiveness	State Fragility Index (-)
Dimension1	1.00					
Dimension2	0.00	1.00				
Political stability	0.64	-0.42	1.00			
Control of corruption	0.78	-0.45	0.74	1.00		
Government effectiveness	0.80	-0.42	0.72	0.93	1.00	
State Fragility Index (-)	0.80	-0.44	0.81	0.88	0.91	1.00

High levels of Dimension2 are associated to lower political stability, lower control of corruption, lower government effectiveness, and higher state fragility.

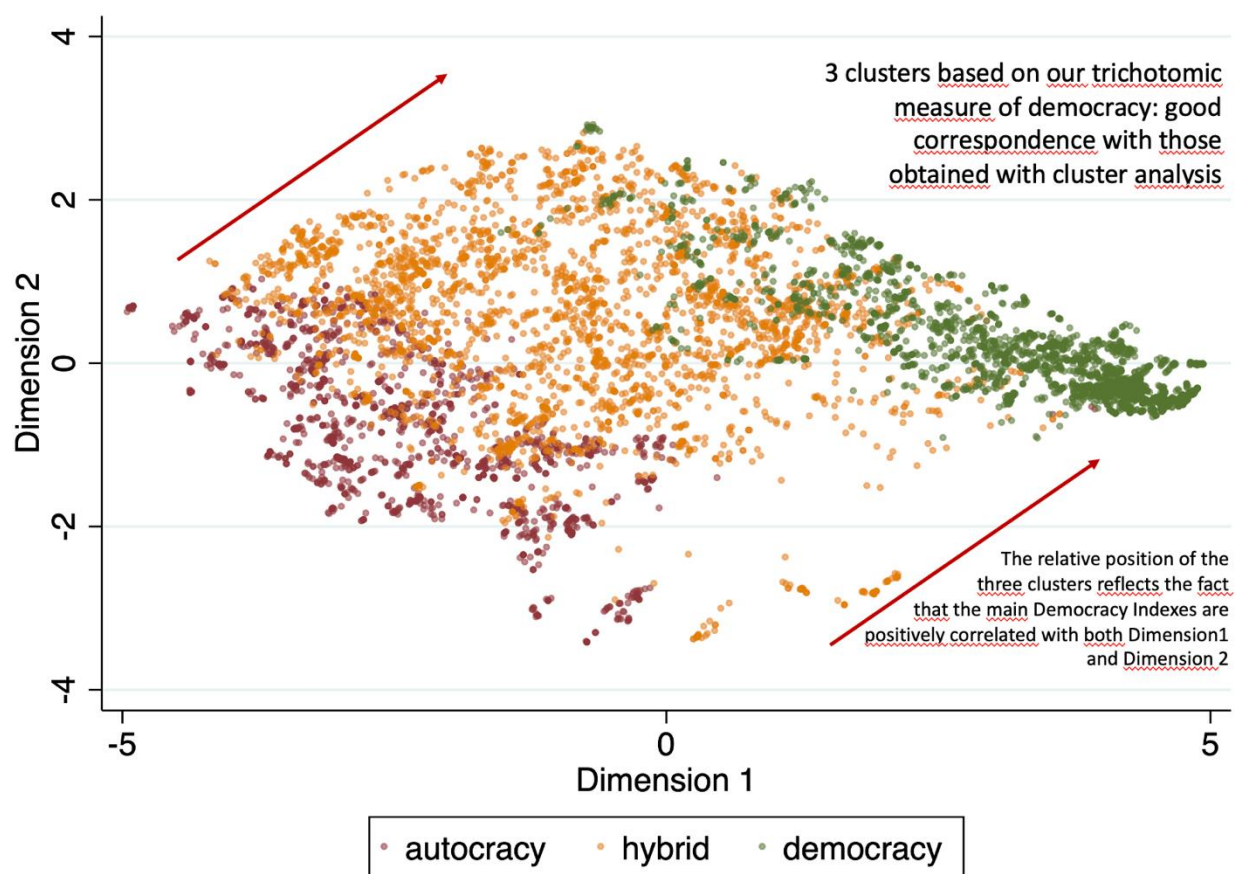
From a cluster analysis based on these 2 PCA dimensions we obtain the 3 clusters shown in the following figure.

**Figure B.1** Cluster analysis based on 2 PCA dimensions



The three clusters are consistent with our trichotomic measure of democracy, which is characterized by a similar positioning with respect to the 2 PCA dimensions (see the figure below).

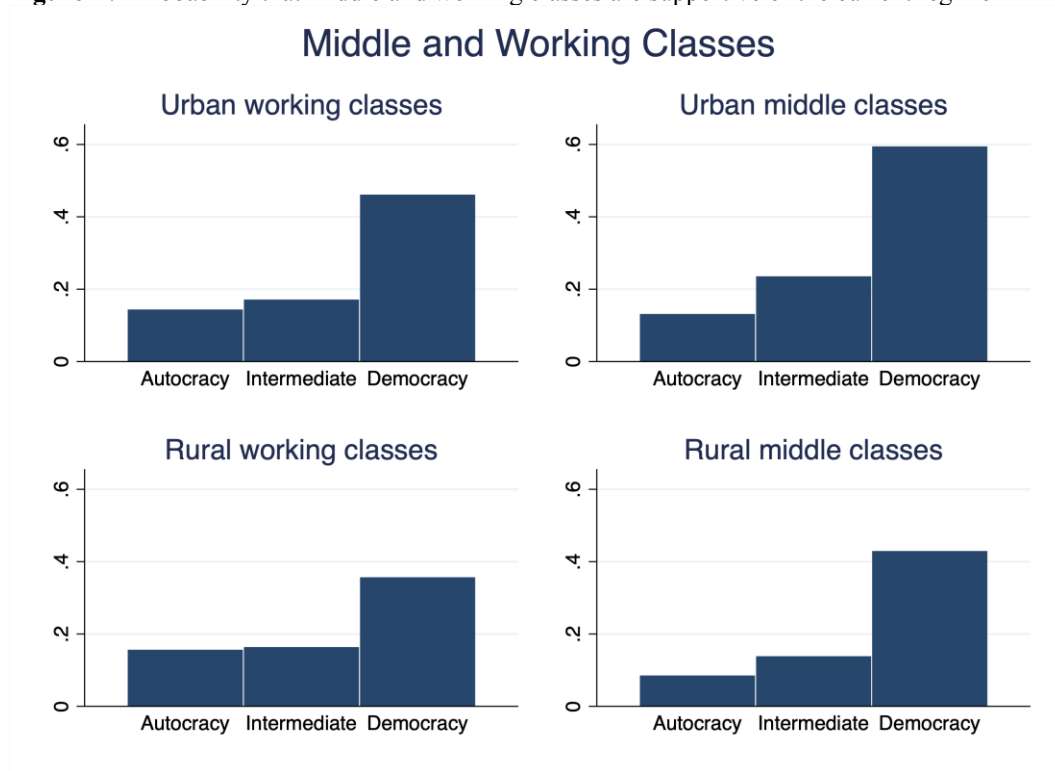
**Figure B.2** Relative position of the 2 PCA dimensions within the trichotomous classification of Democracy



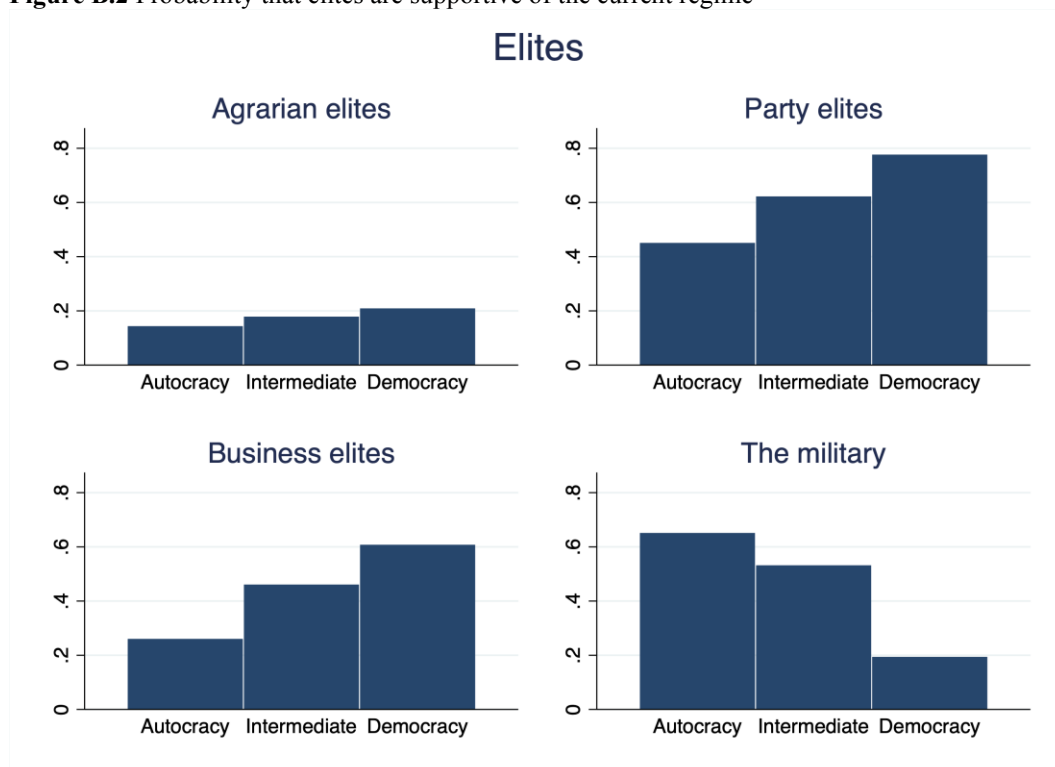
## B.2 Heterogeneity of supportive groups by regime type

Figures B.1-B.4 represent the probability that specific groups, as classified within the VDem dataset, are identified among the groups supportive of each regime type within the trichotomous classification.

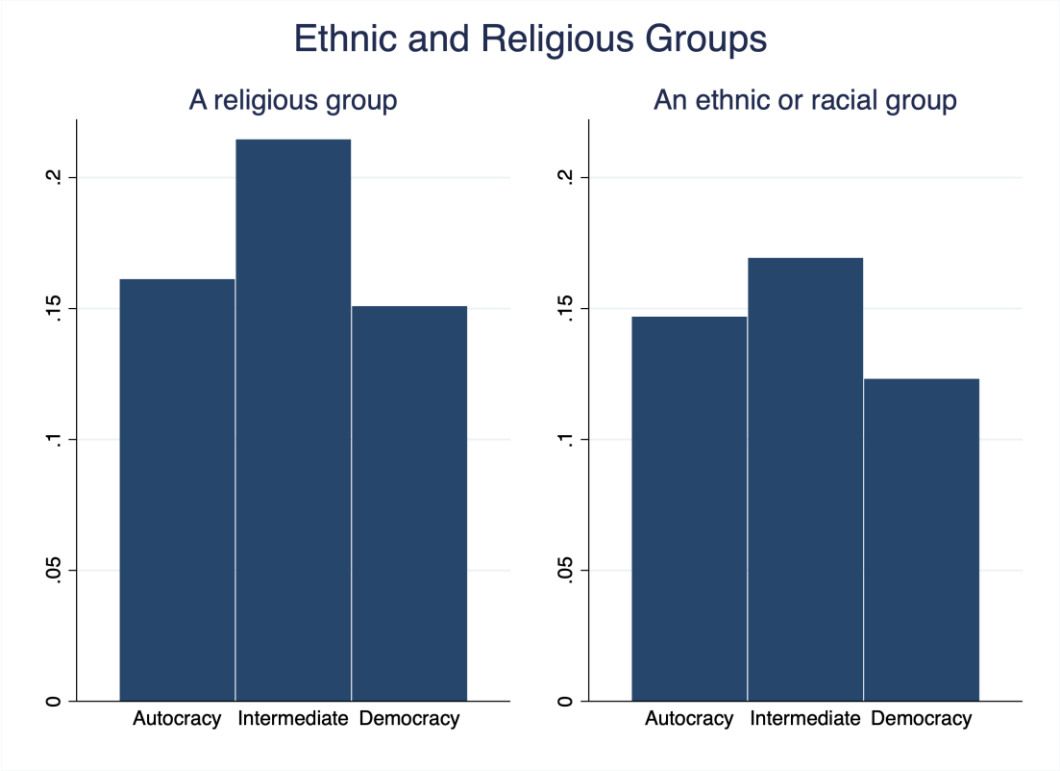
**Figure B.1** Probability that middle and working classes are supportive of the current regime



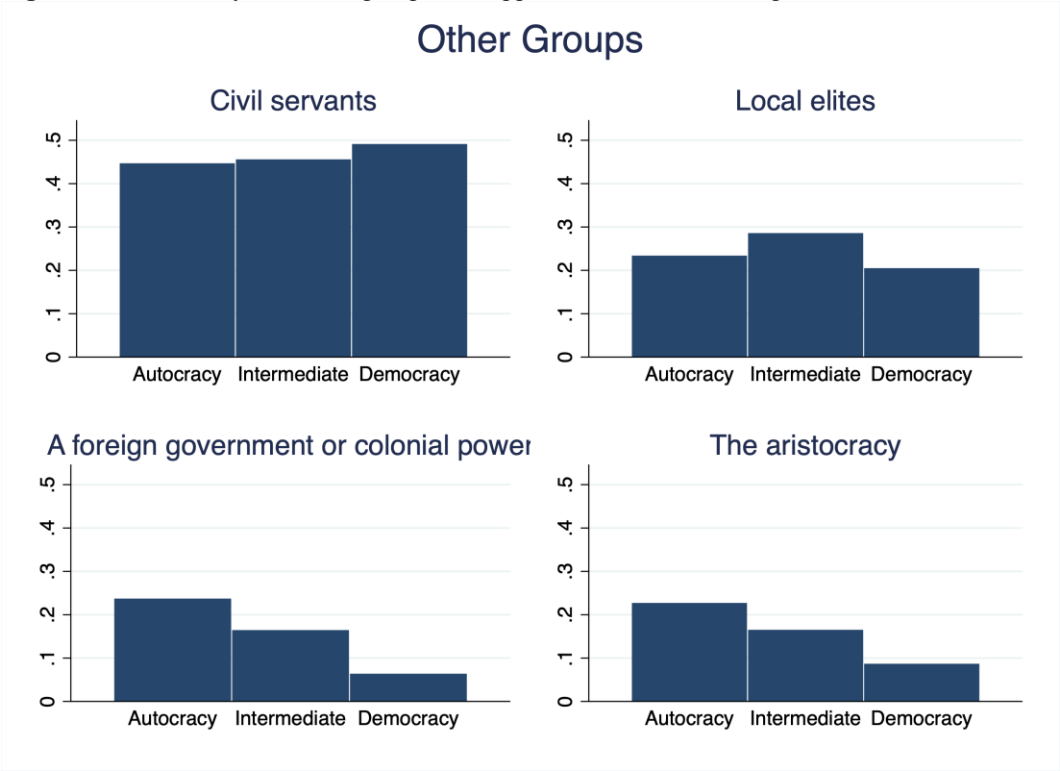
**Figure B.2** Probability that elites are supportive of the current regime



**Figure B.3** Probability that ethnic and religious groups are supportive of the current regime



**Figure B.4** Probability that other groups are supportive of the current regime





### B.3 Transitions across political regimes

In the 1960-2018 period, we identify regimes for 170 countries for a total of 9,920 country-year observations. Within our sample, 405 observations (4.1 percent of the total) are identified as transition years (changes of regime within our trichotomous classification). Precisely, we identify 264 episodes of democratization and 141 reversals. Most of them are transitions from or to intermediate regimes. Indeed, only 6 transitions are characterized by countries skipping directly from autocracy to democracy.

**Table B.3** Types of transition

Type of transition	Frequency	Percent
Democratization:		
from intermediate regime to democracy	100	24.7
from autocracy to intermediate regime	158	39.0
from autocracy to democracy	6	1.5
Reversal:		
from intermediate regime to autocracy	87	21.5
from democracy to intermediate regime	54	13.3
from democracy to autocracy	0	0.0
Total	405	100.0

On average, we have 2.4 transitions per country in the 1960-2018 period. 35 countries (20.6 percent of the total) have no transitions. Around 27 percent of the countries have more than 3 transitions. The countries with the highest number of transitions are Argentina (9), Bolivia (8), Lesotho and Bangladesh (7). 96 countries experience both democratizations and reversals within the 1960-2018 period. 37 countries experience democratization transitions without any reversals. 2 countries experience only reversals (Lao People's Dem.Rep and Syrian Arab Republic).

**Table B.4** Transitions by country

Number of transitions by country	Number of countries	Percent
0	35	20.6
1	30	17.7
2	30	17.7
3	28	16.5
4	20	11.8
5	18	10.6
6	5	2.9
7	2	1.2
8	1	0.6
9	1	0.6
	170	100.0

**Table B.5** Probability of transitions within 1, 5, 10, and 15 years

Probability of transitions [t → t+1]					Probability of transitions [t → t+5]				
time t	time t+1			Total	time t	time t+5			Total
	Autocracy	Intermediate	Democracy			Autocracy	Intermediate	Democracy	
Autocracy	95.1	4.8	0.2	100.0	Autocracy	79.5	18.1	2.5	100.0
Intermediate	2.8	94.8	2.4	100.0	Intermediate	10.6	81.0	8.5	100.0
Democracy	0.0	1.9	98.1	100.0	Democracy	0.5	6.0	93.5	100.0

Probability of transitions [t → t+10]					Probability of transitions [t → t+15]				
time t	time t+10			Total	time t	time t+15			Total
	Autocracy	Intermediate	Democracy			Autocracy	Intermediate	Democracy	
Autocracy	65.9	27.8	6.4	100.0	Autocracy	53.3	35.8	11.0	100.0
Intermediate	14.4	73.1	12.5	100.0	Intermediate	15.7	68.2	16.2	100.0
Democracy	0.8	8.0	91.3	100.0	Democracy	1.1	9.0	89.9	100.0

## Appendix C

**Table C.1** List of variables

Variable	Description	Source
<i>Country-Year characteristics</i>		
(Log) GDP per Capita	GDP per capita (constant 2000 US\$) in logarithm	Our computation on data obtained from the World Bank Development Indicators
Regime Type	Trichotomous classification of regime type: {Autocracy; Intermediate Regime; Democracy}. See Section ... for a detailed explanation of how this measure is generated	Our index combines information from V-Dem, Polity, and Freedom House databases
Labor productivity	GDP per number of persons engaged (constant 2000 US\$) in logarithm	World Bank Development Indicators for GDP (constant 2000 US\$) and Penn World Table version 10.0 for number of persons engaged
Log (TFP)	TFP at constant national prices (2017=1)	Penn World Table version 10.0
Human Capital Index	Human capital index, based on years of schooling and returns to education; see Human capital in PWT9.	Penn World Table version 10.0
Log of Primary-School Enrollment	School enrollment, primary (% gross) in logarithm	Our computation on data obtained from the World Bank Development Indicators
Log of Secondary-School Enrollment	School enrollment, secondary (% gross) in logarithm	Our computation on data obtained from the World Bank Development Indicators
Gross Fixed Capital Formation per capita (log)	Gross fixed capital formation (constant 2015 US\$) in logarithm	Our computation on data obtained from the World Bank Development Indicators
Patent applications by residents (log)	Patent applications by residents per 1,000,000 inhabitants, in logarithm	Our computation on data obtained from the World Bank Development Indicators
Patent applications by non-residents (log)	Patent applications by non-residents per 1,000,000 inhabitants, in logarithm	Our computation on data obtained from the World Bank Development Indicators
Top 1% Share (based on Income or Wealth)	The top 1 percent's share of net personal wealth, or pre-tax national income, or fiscal income (depending on the measure with the most available observations by country)	Our computation on data obtained from the World Inequality Database
Top 10% Share (based on Income or Wealth)	The top 10 percent's share of net personal wealth, or pre-tax national income, or fiscal income (depending on the measure with the most available observations by country)	Our computation on data obtained from the World Inequality Database
Probability of Riots	Dummy variable equal to 100 in case of any violent demonstration or clash of more than 100 citizens involving the use of physical force; and 0 otherwise.	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive
Probability of Revolutions	Dummy variable equal to 100 in case of any illegal or forced change in the top government elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government; and 0 otherwise.	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive
Probability of Anti-Government Demonstrations	Dummy variable equal to 100 in case of any peaceful public gathering of at least 100 people for the primary purpose of	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive

	displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature; and 0 otherwise.	
Probability of General Strikes	Dummy variable equal to 100 in case of any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority; and 0 otherwise.	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive
Probability of Purges	Dummy variable equal to 100 in case of any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition; and 0 otherwise.	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive
Probability of Unrest	Dummy variable equal to 100 in case of riots or revolutions (see definitions above); and 0 otherwise.	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive
Probability of Major Government Crises	Dummy variable equal to 100 in case of any rapidly developing situation that threatens to bring the downfall of the present regime - excluding situations of revolt aimed at such overthrow; and 0 otherwise.	Our computation on data obtained from the Cross-National Time-Series (CNTS) Data Archive
Market reforms	A measure of economic reforms coded by Giuliano et al. (2013; normalized between 0 and 100)	Acemoglu et al. (2019)
Clientelism	The V-Dem Clientelism Index measures to what extent politics are based on clientelistic relationships. The index (on a scale from 0 to 1) is formed by taking the reversed point estimates (so that higher scores = more clientelism) from a Bayesian factor analysis model of the indicators for vote-buying, particularistic vs. public goods, and whether party linkages are programmatic or clientelistic.	V-Dem database
Corruption	The V-Dem Political Corruption Index measures how pervasive political corruption is. The corruption index, which runs from 0 (less corrupt) to 1 (more corrupt), is arrived at by taking the average of (a) public sector corruption index; (b) executive corruption index; (c) the indicator for legislative corruption; and (d) the indicator for judicial corruption. These four different government spheres are weighted equally in the resulting index.	V-Dem database
<i>Country characteristics</i>		
Legal Origin	The {French, English, Socialist, Scandinavian, German} legal origin dummy variables are from La Porta et al. (1998).	Data obtained from Besley et al. (2021). Original Source: La Porta et al. (1998)
Religion (% pop.)	{Catholics, Protestants, Muslims, Others} as percentage of population in 1980.	Data obtained from The QOG Standard Dataset 2019. Original Source: La Porta et al. (1999).

Religion Fractionalization	This variable reflects probability that two randomly selected people from a given country will not belong to the same religious group. The higher the number, the more fractionalized society.	Data obtained from The QOG Standard Dataset 2019. Original Source: Alesina et al. (2003).
Ethnic Fractionalization	This variable reflects the probability that two randomly selected people from a given country will belong to different ethnic and “ethnoreligious” groups. The variable thus ranges from 0 (perfectly homogeneous) to 1 (highly fragmented). The values are assumed to be constant for all years.	Data obtained from The QOG Standard Dataset 2019. Original Source: Fearon (2003).
Colony	Dummy variable that takes value 1 if the country is a former colony, and 0 if a country has never been colonized (using the colony coding in the CEPII dataset).	Cervellati et al. (2014).
GDP per capita in 1960, ln	Angus Maddison’s GDP per capita estimates for 1960, in logarithm	Acemoglu et al. (2019)

**Table C.2** Descriptive statistics

	N	Mean	Median	St.Dev.	Min	Max	Average values by regime		
							Autocratic	Hybrid	Democratic
(Log) GDP per Capita	7,826	749.17	739.65	155.55	405.67	1,094.00	680.66	675.48	885.81
French Legal Origin	7,826	0.48	0.00	0.50	0.00	1.00	0.54	0.55	0.37
English Legal Origin	7,826	0.30	0.00	0.46	0.00	1.00	0.23	0.32	0.32
Socialist Legal Origin	7,826	0.15	0.00	0.35	0.00	1.00	0.23	0.13	0.12
Scandinavian Legal Origin	7,826	0.04	0.00	0.19	0.00	1.00	0.00	0.00	0.11
German Legal Origin	7,826	0.03	0.00	0.18	0.00	1.00	0.00	0.01	0.09
Religion: Catholic, %pop	6,960	34.85	18.70	36.75	0.00	97.30	25.46	33.85	42.18
Religion: Protestant, %pop	6,960	13.42	2.70	21.42	0.00	97.80	7.67	9.22	22.14
Religion: Muslim, %pop	6,960	20.85	1.40	33.53	0.00	99.90	34.18	27.71	4.01
Religion: Other, %pop	6,960	30.89	20.80	30.34	0.00	98.60	32.68	29.22	31.67
Religion Fractionalization	7,802	0.43	0.44	0.24	0.00	0.86	0.43	0.44	0.43
Ethnic Fractionalization	7,301	0.48	0.50	0.26	0.00	1.00	0.52	0.56	0.34
Colony	7,826	0.70	1.00	0.46	0.00	1.00	0.69	0.81	0.58
GDP per capita in 1960, ln	7,237	756.45	762.66	89.88	597.13	1,039.85	724.66	722.58	824.90
Labor productivity	7,177	855.44	861.24	151.12	513.36	1,147.03	788.35	782.23	978.52
(Log) TFP	5,418	-7.60	-4.61	26.42	-160.81	181.28	-1.03	-8.19	-9.60
Human Capital Index	6,823	2.12	2.04	0.74	1.01	4.15	1.56	1.86	2.71
Log of Primary-School Enrollment	5,815	453.61	461.56	30.60	104.05	510.98	441.95	451.27	462.64
Log of Secondary-School Enrollment	4,957	394.13	425.31	82.27	-167.80	509.95	337.74	371.87	443.42
Gross Fixed Capital Formation per capita (log)	5,292	678.89	678.66	162.41	-55.23	1,002.54	600.90	594.65	792.82
Patent applications by residents (log)	3,428	324.15	333.83	207.16	-394.12	812.16	227.54	228.16	418.74
Patent applications by non-residents (log)	3,242	282.11	298.09	233.93	-455.79	809.53	145.70	153.79	402.61
Top 1% Share (based on Income or Wealth)	4,379	0.24	0.25	0.12	0.02	0.57	0.27	0.30	0.18
Top 10% Share (based on Income or Wealth)	4,328	0.55	0.60	0.17	0.17	0.91	0.58	0.63	0.46
Probability of Riots	7,418	21.31	0.00	40.95	0.00	100.00	12.89	27.14	19.54
Probability of Revolutions	7,418	12.73	0.00	33.33	0.00	100.00	16.11	18.61	3.72
Probability of Anti-Government Demonstr.	7,418	26.71	0.00	44.25	0.00	100.00	14.25	31.18	28.97
Probability of General Strikes	7,418	9.60	0.00	29.46	0.00	100.00	3.41	9.80	13.12
Probability of Purges	7,418	6.00	0.00	23.75	0.00	100.00	9.05	8.46	1.24
Probability of Unrest	7,449	30.47	0.00	46.03	0.00	100.00	25.84	39.92	22.02
Probability of Major Government Crises	7,418	12.51	0.00	33.09	0.00	100.00	6.20	14.54	13.94
Market reforms	5,130	40.44	39.15	27.15	0.00	100.00	19.86	38.60	57.69
Clientelism	7,727	0.48	0.51	0.26	0.02	0.98	0.60	0.61	0.24
Corruption	7,702	0.48	0.50	0.30	0.00	0.97	0.59	0.64	0.21

## Appendix D

**Table D.1** Effect of Democracy and Autocracy (Polity classification) on (Log) GDP per Capita – controlling for country slow-moving characteristics

Pooled OLS								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Autocracy	12.284*** [4.253]	8.424* [4.445]	11.745*** [4.253]	18.464*** [4.687]	12.078*** [4.220]	15.281*** [2.317]	14.514*** [2.261]	16.833*** [2.105]
Democracy	171.669*** [3.817]	170.343*** [3.838]	145.781*** [3.716]	158.223*** [4.123]	99.554*** [3.856]	9.409*** [2.264]	7.990*** [2.199]	14.618*** [2.078]
English Legal Origin			-12.015*** [3.445]		39.295*** [4.080]	31.006*** [2.246]	35.055*** [2.260]	11.840*** [3.029]
Socialist Legal Origin			-5.975 [4.650]		-30.755*** [7.183]	-41.586*** [3.930]	-60.706*** [4.718]	-116.296*** [11.189]
Scandinavian Legal Origin			186.095*** [8.673]		166.021*** [14.704]	61.579*** [8.371]	62.416*** [8.096]	45.915*** [8.435]
German Legal Origin			173.806*** [8.157]		135.483*** [8.243]	52.741*** [4.638]	52.704*** [4.439]	43.808*** [4.697]
Religion: Protestant, %pop				0.860*** [0.087]	-0.541*** [0.146]	-0.666*** [0.084]	-0.527*** [0.084]	-0.441*** [0.093]
Religion: Muslim, %pop				-0.505*** [0.057]	-0.528*** [0.056]	0.005 [0.031]	-0.023 [0.043]	-0.388*** [0.054]
Religion: Other, %pop				-0.843*** [0.057]	-1.063*** [0.066]	-0.042 [0.039]	-0.022 [0.040]	0.045 [0.047]
Religion Fractionalization					33.765*** [8.856]	15.350*** [5.003]	23.859*** [4.907]	0.961 [5.207]
Ethnic Fractionalization					-218.498*** [6.661]	-119.367*** [3.769]	-72.630*** [4.065]	-85.453*** [4.327]
Colony						-32.362*** [2.324]	-13.710*** [2.579]	-1.312 [3.131]
GDP per capita in 1960, ln						1.359*** [0.012]	1.062*** [0.017]	1.040*** [0.018]
Year F.E.	NO	YES	YES	YES	YES	YES	YES	YES
Region F.E.	NO	NO	NO	NO	NO	NO	YES	(absorbed)
Region*initial regime F.E.	NO	NO	NO	NO	NO	NO	NO	YES
Observations	7301	7301	7301	6624	6420	6192	6192	6192
r <sup>2</sup>	0.28	0.28	0.36	0.33	0.50	0.86	0.88	0.90

This table reports the estimation results of the model specification represented by equation (1) in the main text. It uses the trichotomous classification of political regimes based on Polity IV only: (a) Autocracy if  $-10 \leq \text{Polity} < -5$ ; (b) Anocracy if  $-5 \leq \text{Polity} \leq +5$ ; (c) Democracy if  $+5 < \text{Polity} \leq +10$ . The reported coefficients are multiplied by 100 to ease their interpretation. See Table 1 in the main text for a description of the other explanatory variables. Standard errors in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Following Acemoglu et al. (2019), we report an additional robustness check, based on Hahn, Hausman, and Kuersteiner (2001). The relevant political regime coefficients are still positive, and their p-value slightly higher than 0.10. Even if the hypothesis of a zero-coefficient cannot be rejected here (at a 90% confidence interval), the 4-lags specification reveals that, with a 90% probability, the coefficient is approximatively in the interval  $[-0.02; +1.00]$ , and that the probability of a positive coefficient is higher than 90 percent. Similar conclusions are reached with 8-lags.

**Table D.2** HKK estimates

Dep.Var.: (Log) GDP per Capita	HHK ESTIMATES			
	(1-lags)	(2-lags)	(4-lags)	(8-lags)
Autocracy	0.468 (0.345)	0.513* (0.310)	0.473 (0.298)	0.478 (0.321)
Democracy	0.353 (0.402)	0.490 (0.317)	0.595** (0.299)	0.583* (0.316)
log GDP first lag	0.966*** (0.005)	1.278*** (0.035)	1.231*** (0.035)	1.242*** (0.031)
log GDP second lag		-0.312*** (0.033)	-0.167*** (0.046)	-0.182*** (0.038)
log GDP third lag			-0.049 (0.031)	-0.037 (0.029)
log GDP fourth lag			-0.052** (0.021)	-0.056** (0.028)
p-value, lags 5–8				0.177
Long-run effect of autocracy	13.865 (9.875)	15.391* (8.891)	12.886* (7.824)	12.172 (7.889)
Long-run effect of democracy	10.475 (11.794)	14.701 (9.421)	16.230** (8.150)	14.858* (7.847)
Effect of autocracy after 25 years	7.986 (5.791)	10.967* (6.389)	10.485* (6.342)	10.447 (6.690)
Effect of democracy after 25 years	6.033 (6.819)	10.476 (6.660)	13.207** (6.520)	12.753* (6.681)
Persistence of GDP process	0.966*** (0.005)	0.967*** (0.005)	0.963*** (0.005)	0.961*** (0.007)
Observations	7509	7351	7031	6391
Countries in sample	162	162	162	162

This table reports the estimation results of the model specification represented by equation (2) in the main text. It uses the trichotomous classification of political regimes described in Section 3. The reported coefficients are multiplied by 100 to ease their interpretation. Following Acemoglu et al. (2019), the results of this table are obtained using the HHK estimator proposed by Hahn et al. (2001). Standard errors in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.



**Table D.3(a)** Effect of Democracy and Autocracy on (Log) GDP per Capita — sub-periods analysis: rolling 30-year periods

Dep.Var.: (Log) GDP per Capita	WITHIN ESTIMATES				ARELLANO AND BOND ESTIMATES			
	(1-lags)	(2-lags)	(4-lags)	(8-lags)	(1-lags)	(2-lags)	(4-lags)	(8-lags)
<b>1961-1990 period:</b>								
Autocracy	0.499 (0.473)	0.639 (0.408)	0.740* (0.413)	1.134** (0.434)	1.087* (0.656)	0.995* (0.570)	1.386** (0.560)	2.308*** (0.542)
Democracy	0.019 (0.522)	0.407 (0.485)	0.315 (0.484)	-0.184 (0.561)	0.768 (1.126)	1.466 (1.030)	1.562 (1.047)	0.643 (1.056)
<b>1966-1995 period:</b>								
Autocracy	2.012*** (0.491)	1.687*** (0.386)	1.473*** (0.361)	1.540*** (0.391)	2.800*** (0.759)	2.303*** (0.610)	2.132*** (0.566)	2.774*** (0.642)
Democracy	0.598 (0.506)	0.760* (0.437)	0.810* (0.441)	0.660 (0.482)	1.185 (0.965)	1.388* (0.797)	1.479* (0.816)	1.378 (0.928)
<b>1971-2000 period:</b>								
Autocracy	2.286*** (0.471)	2.021*** (0.387)	1.798*** (0.362)	1.700*** (0.409)	3.087*** (0.686)	2.677*** (0.572)	2.538*** (0.535)	2.802*** (0.598)
Democracy	0.788 (0.477)	0.882** (0.410)	0.914** (0.407)	0.841** (0.420)	1.091 (0.831)	1.099* (0.658)	1.327** (0.639)	1.489** (0.715)
<b>1976-2005 period:</b>								
Autocracy	1.913*** (0.464)	1.810*** (0.382)	1.589*** (0.352)	1.441*** (0.402)	2.587*** (0.645)	2.411*** (0.569)	2.333*** (0.552)	2.369*** (0.593)
Democracy	0.949** (0.460)	0.942** (0.366)	0.934** (0.356)	0.904** (0.362)	1.923** (0.838)	1.683*** (0.644)	1.852*** (0.613)	1.988*** (0.655)
<b>1981-2010 period:</b>								
Autocracy	1.247** (0.529)	1.323*** (0.443)	1.135** (0.439)	1.154** (0.500)	1.352** (0.614)	1.332** (0.547)	1.351** (0.571)	1.501** (0.628)
Democracy	1.066*** (0.396)	0.993*** (0.316)	1.035*** (0.313)	1.136*** (0.327)	1.654** (0.695)	1.346** (0.537)	1.647*** (0.502)	1.782*** (0.527)
<b>1986-2015 period:</b>								
Autocracy	0.652 (0.552)	0.645 (0.461)	0.424 (0.476)	0.293 (0.553)	0.528 (0.662)	0.642 (0.587)	0.883 (0.608)	0.903 (0.679)
Democracy	1.070** (0.452)	0.927*** (0.350)	0.923*** (0.336)	0.991*** (0.347)	1.728*** (0.655)	1.432*** (0.527)	1.816*** (0.534)	1.800*** (0.545)
<b>1991-2018 period:</b>								
Autocracy	-0.436 (0.960)	-0.380 (0.814)	-0.774 (0.804)	-0.888 (0.887)	-0.421 (1.100)	-0.377 (0.932)	-0.179 (0.915)	-0.463 (1.057)
Democracy	0.755 (0.603)	0.582 (0.428)	0.561 (0.411)	0.608 (0.407)	1.627** (0.824)	1.458** (0.626)	1.553** (0.630)	1.485** (0.625)

**Table D.3(b)** Effect of Democracy and Autocracy on (Log) GDP per Capita — sub-periods analysis: 1960-2010 period, for comparison with ANRR

Dep.Var.: (Log) GDP per Capita	(1-lags)	(2-lags)	(4-lags)	(8-lags)	(1-lags)	(2-lags)	(4-lags)	(8-lags)
<b>1960-2010 period:</b>								
Autocracy	0.836** (0.337)	0.867*** (0.272)	0.837*** (0.271)	1.145*** (0.319)	1.293** (0.502)	1.100*** (0.424)	1.239*** (0.423)	1.789*** (0.476)
Democracy	0.564 (0.343)	0.683** (0.284)	0.709** (0.284)	0.724** (0.308)	1.126 (0.691)	1.024* (0.533)	1.303** (0.510)	1.361** (0.550)

**Table D.3(c)** Effect of Democracy and Autocracy on (Log) GDP per Capita — sub-periods analysis: excluding 2009 (outlier year that affected some countries more than others, independently from the regime)

Dep.Var.: (Log) GDP per Capita	(1-lags)	(2-lags)	(4-lags)	(8-lags)	(1-lags)	(2-lags)	(4-lags)	(8-lags)
<b>Excluding 2009:</b>								
Autocracy	0.634** (0.312)	0.680*** (0.249)	0.665*** (0.250)	0.923*** (0.288)	1.495*** (0.498)	1.273*** (0.427)	1.386*** (0.424)	1.940*** (0.475)
Democracy	0.541 (0.335)	0.665** (0.268)	0.707*** (0.268)	0.730** (0.289)	1.154* (0.660)	1.026** (0.515)	1.253** (0.498)	1.304** (0.538)

Table D.3(a)-D.3(b) report the estimation results of the model specification represented by equation (2). The only differences with Table 2 are due to the sub-periods considered in each table, as reported in the headers. For the sake of brevity, only the coefficients of Autocracy and Democracy are reported (multiplied by 100 to ease their interpretation). Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table D.4** Effect of Democracy and Autocracy on (Log) GDP per Capita – Excluding years of independence and 3 years after independence

Dep.Var.: (Log) GDP per Capita	WITHIN ESTIMATES				ARELLANO AND BOND ESTIMATES			
	(1-lags)	(2-lags)	(4-lags)	(8-lags)	(1-lags)	(2-lags)	(4-lags)	(8-lags)
Autocracy	0.461 (0.313)	0.639** (0.260)	0.645** (0.259)	0.845*** (0.294)	0.372 (0.428)	0.859** (0.397)	0.835** (0.404)	1.242*** (0.467)
Democracy	0.380 (0.326)	0.549** (0.273)	0.627** (0.276)	0.506* (0.289)	1.002 (0.621)	1.288** (0.506)	1.179** (0.461)	0.967** (0.471)
log GDP first lag	0.975*** (0.005)	1.242*** (0.040)	1.222*** (0.039)	1.238*** (0.039)	0.953*** (0.007)	1.200*** (0.039)	1.191*** (0.039)	1.194*** (0.038)
log GDP second lag		-0.271*** (0.039)	-0.202*** (0.047)	-0.227*** (0.043)		-0.248*** (0.039)	-0.193*** (0.046)	-0.211*** (0.042)
log GDP third lag			-0.003 (0.027)	0.002 (0.025)			-0.004 (0.025)	0.004 (0.025)
log GDP fourth lag			-0.047** (0.018)	-0.055** (0.027)			-0.043** (0.020)	-0.049* (0.026)
p-value, lags 5–8				0.903				0.956
Long-run effect of autocracy	18.135 (12.523)	22.127** (9.311)	20.853** (8.513)	22.481*** (7.553)	7.934 (8.824)	17.591** (7.729)	17.302** (8.096)	20.807*** (7.236)
Long-run effect of democracy	14.963 (12.127)	19.002** (8.930)	20.271** (8.509)	13.451* (7.298)	21.384* (12.655)	26.365*** (9.505)	24.428*** (8.843)	16.199** (7.627)
Effect of autocracy after 25 years	8.603 (5.826)	14.072** (5.884)	14.725** (6.089)	17.792*** (6.004)	5.545 (6.267)	14.363** (6.473)	14.753** (7.118)	19.155*** (6.990)
Effect of democracy after 25 years	7.098 (5.963)	12.084** (5.845)	14.314** (6.144)	10.645* (5.815)	14.945* (8.989)	21.526*** (8.059)	20.829*** (7.773)	14.914** (6.936)
Persistence of GDP process	0.975*** (0.005)	0.971*** (0.004)	0.969*** (0.005)	0.962*** (0.007)	0.953*** (0.007)	0.951*** (0.007)	0.952*** (0.007)	0.940*** (0.007)
AR2 test p-value					0.00	0.40	0.74	0.99
Observations	7397	7209	6839	6143	7209	7023	6661	5972
Countries in sample	162	162	162	162	162	162	162	162

This table reports the estimation results of the model specification represented by equation (2) in the main text. The only difference with Table 2 is due to the exclusion of specific country-year observations, namely years of independence and 3 years after independence for each country. The years of independence by country are obtained from Besley et al. (2021). The reported coefficients of Autocracy and Democracy are multiplied by 100 to ease their interpretation. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table D.5** Effect of Democracy and Autocracy on (Log) GDP per Capita – controlling for (time variant) covariates

	COVARIATES INCLUDED						
	Baseline	GDP in 1960 Quintiles * Year Effects	Post-Soviet Dummies	Lags of Unrest	Lags of Demogr. Structure	Region * Year Effects	Region * Initial Regime * Year Effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WITHIN ESTIMATES							
Autocracy	0.636** (0.252)	0.635** (0.274)	0.533** (0.248)	0.677** (0.260)	0.569** (0.253)	0.522** (0.257)	0.485* (0.270)
Democracy	0.631** (0.263)	0.633** (0.304)	0.654** (0.270)	0.429 (0.264)	0.404 (0.268)	0.576** (0.249)	0.546** (0.265)
Long-run effect of autocracy	19.511** (7.916)	20.892** (9.369)	16.753** (8.025)	21.568** (8.720)	14.256** (6.482)	13.770** (6.911)	12.356* (6.943)
Long-run effect of democracy	19.338** (7.809)	20.828** (9.832)	20.550** (8.081)	13.652* (8.202)	10.126 (6.522)	15.183** (6.488)	13.909** (6.540)
Effect of autocracy after 25 years	14.875** (5.999)	15.065** (6.701)	12.573** (5.969)	15.467** (6.209)	11.823** (5.361)	10.765** (5.443)	9.836* (5.594)
Effect of democracy after 25 years	14.742** (5.990)	15.019** (7.147)	15.423** (6.149)	9.790 (5.969)	8.398 (5.449)	11.869** (5.087)	11.072** (5.262)
Persistence of GDP process	0.967*** (0.004)	0.970*** (0.004)	0.968*** (0.004)	0.969*** (0.005)	0.960*** (0.005)	0.962*** (0.004)	0.961*** (0.004)
Observations	7193	6652	7193	6802	7193	7193	7193
Countries in sample	162	149	162	162	162	162	162
ARELLANO AND BOND ESTIMATES							
Autocracy	0.622** (0.313)	0.754** (0.323)	0.506 (0.308)	0.490 (0.342)	0.525* (0.309)	0.281 (0.324)	0.316 (0.319)
Democracy	0.646** (0.326)	0.701* (0.382)	0.690** (0.346)	0.465 (0.331)	0.410 (0.319)	0.558* (0.308)	0.693** (0.337)
Long-run effect of autocracy	13.596** (6.541)	17.308** (7.264)	11.253* (6.691)	10.838 (7.347)	9.615* (5.482)	5.300 (6.149)	5.931 (5.974)
Long-run effect of democracy	14.117** (6.715)	16.090* (8.389)	15.333** (7.088)	10.302 (6.911)	7.511 (5.562)	10.527* (5.564)	13.002** (6.093)
Effect of autocracy after 25 years	11.839** (5.816)	14.583** (6.200)	9.726* (5.858)	9.108 (6.324)	8.794* (5.077)	4.676 (5.440)	5.251 (5.327)
Effect of democracy after 25 years	12.293** (5.965)	13.556* (7.224)	13.252** (6.303)	8.657 (5.979)	6.870 (5.160)	9.289* (4.998)	11.512** (5.487)
Persistence of GDP process	0.954*** (0.005)	0.956*** (0.005)	0.955*** (0.005)	0.955*** (0.006)	0.945*** (0.006)	0.947*** (0.006)	0.947*** (0.005)
Observations	7031	6503	7031	6640	7031	7031	7031
Countries in sample	162	149	162	162	162	162	162

This table reports the estimation results of the model specification represented by equation (2) in the main text. The only difference with Table 2 is due to the inclusion of specific time variant covariates, as reported in the header of each single column. In the top panel, *within estimator* results are reported. In the bottom panel, *Arellano-Bond GMM* results are reported. The reported coefficients of Autocracy and Democracy are multiplied by 100 to ease their interpretation. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Appendix E. Potential Outliers

### E.1. The location of specific countries

Figure E.1 The location of China (in green)

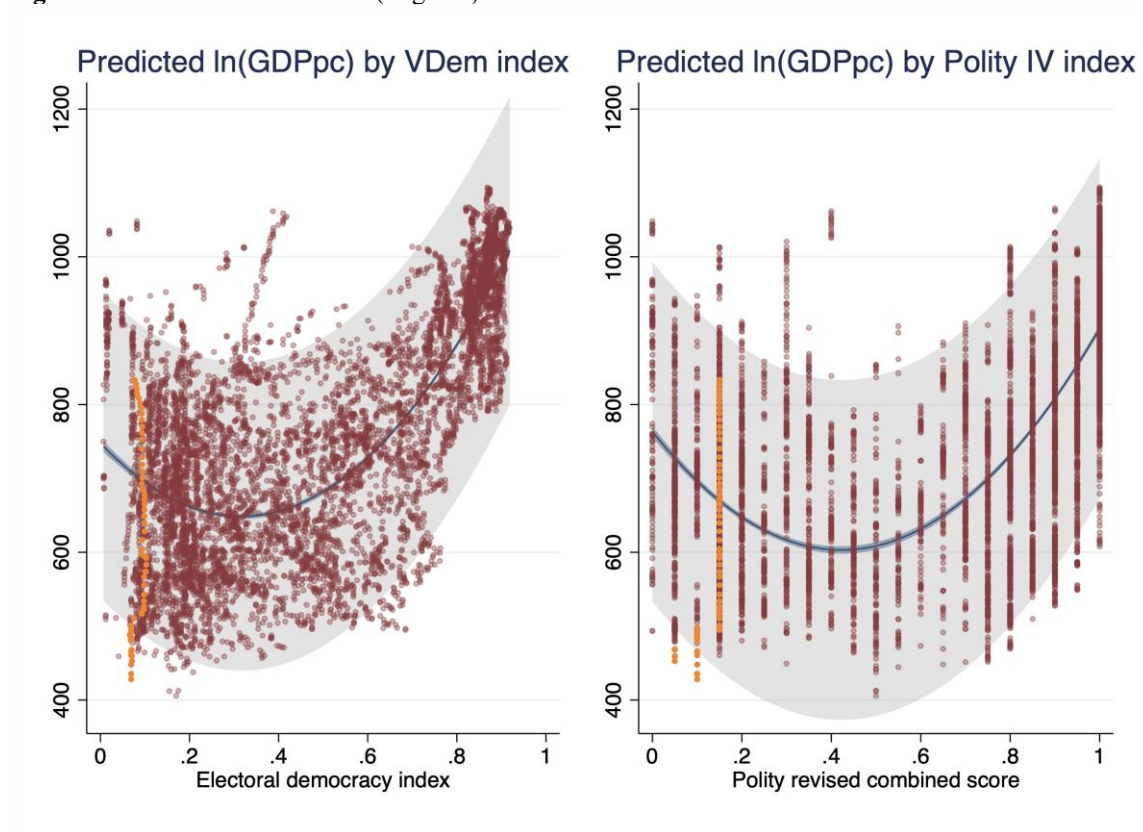
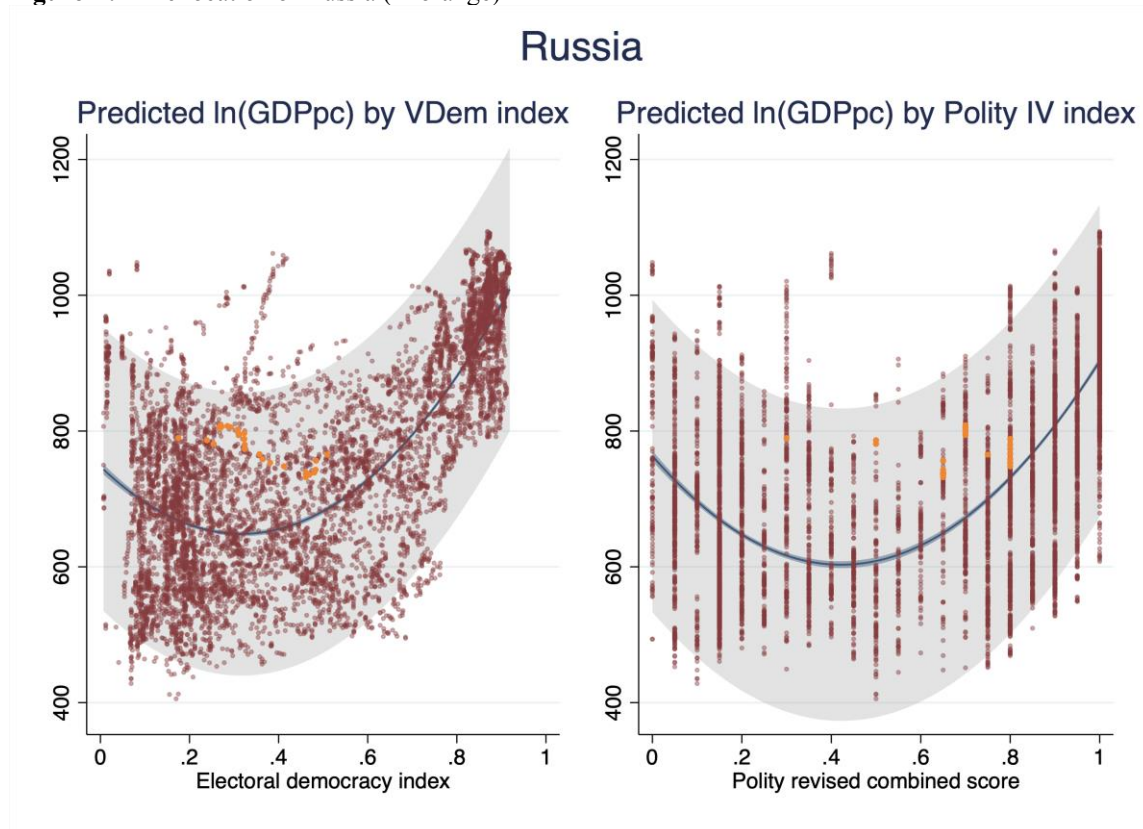
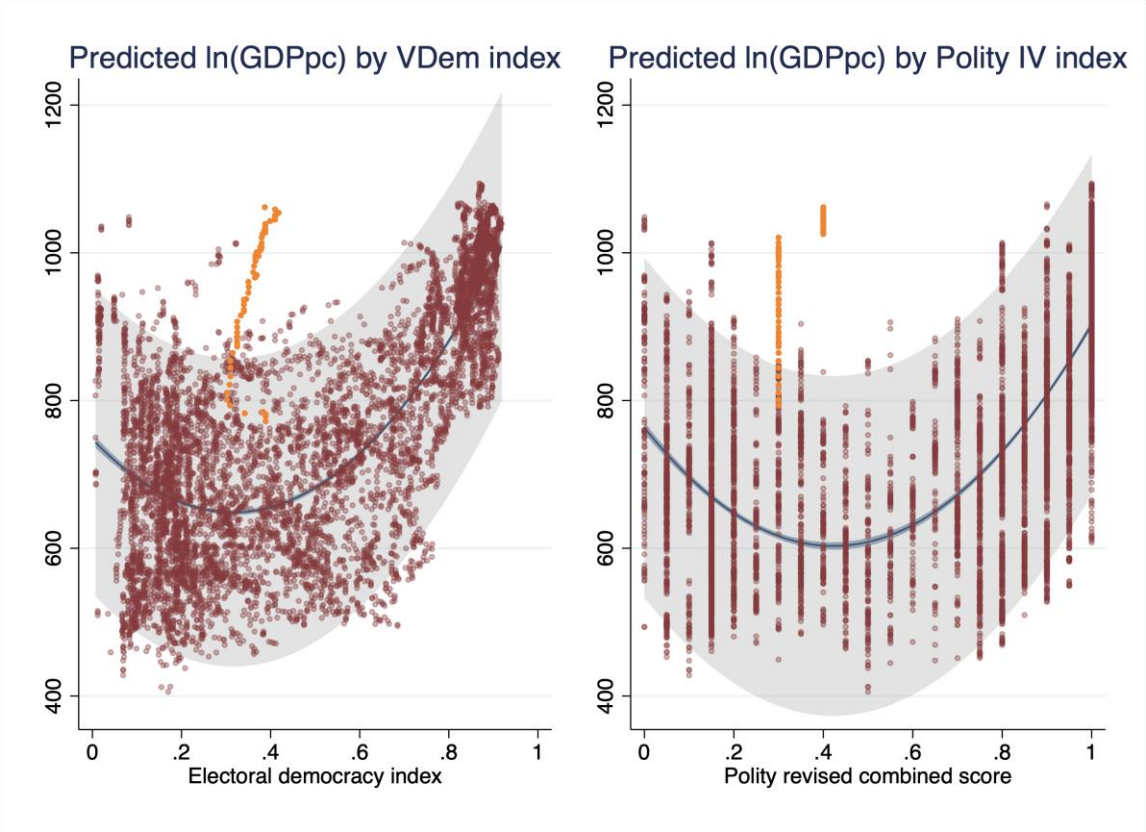


Figure E.2 The location of Russia (in orange)



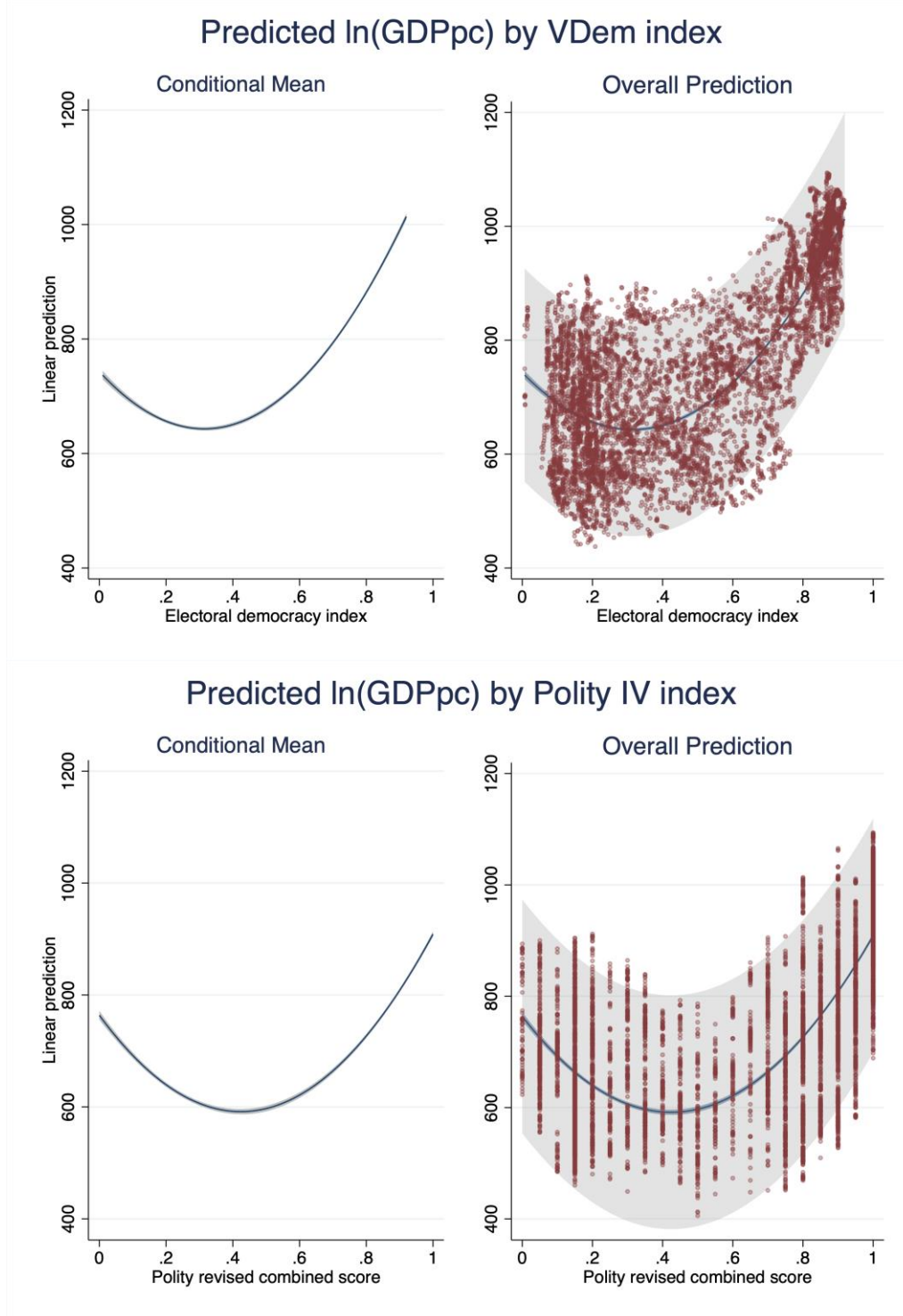
**Figure E.3** The location of Singapore (in orange)



## E.2. Excluding influential observations

Influential observations are detected recurring to difference in fits (*dfits*), i.e. the (scaled) difference between predictions of the dependent variable with and without the *i*th observation in the regression. Large absolute values of *dfits* indicate influential data points. We re-run all the regressions after removing observations such that  $|dfits| > 2\sqrt{k/N}$ , where *N* is the number of observations and *k* is the number of predictor terms (i.e., the number of regression parameters excluding the intercept).

**Figure E.4** Replicating Figure 1 [Predicted values of GDP per capita] after excluding influential observations



**Table E.1** Replicating Table 1 [Effect of Democracy and Autocracy on GDP per Capita] after excluding influential observations

Dep.Var.: (Log) GDP per Capita	Pooled OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Autocracy	-7.791** [3.150]	6.356* [3.392]	2.456 [3.317]	17.534*** [3.547]	22.200*** [3.416]	14.105*** [1.822]	13.683*** [1.764]	12.618*** [1.616]
Democracy	234.593*** [2.766]	234.667*** [2.829]	210.123*** [2.860]	231.111*** [3.180]	166.763*** [3.243]	23.311*** [2.002]	18.985*** [1.932]	24.772*** [1.798]
English Legal Origin			-26.933*** [2.773]		37.461*** [3.396]	26.451*** [1.785]	28.914*** [1.787]	28.380*** [2.499]
Socialist Legal Origin			0.932 [3.564]		-20.970*** [6.010]	-25.123*** [3.201]	-42.890*** [3.893]	-103.256*** [8.852]
Scandinavian Legal Origin			116.121*** [6.443]		153.092*** [12.096]	60.663*** [6.730]	59.935*** [6.355]	43.867*** [6.551]
German Legal Origin			109.803*** [6.655]		109.245*** [6.805]	52.801*** [3.790]	50.332*** [3.547]	52.541*** [3.688]
Religion: Protestant, %pop				0.340*** [0.064]	-0.991*** [0.121]	-0.690*** [0.069]	-0.550*** [0.066]	-0.385*** [0.073]
Religion: Muslim, %pop				-0.318*** [0.045]	-0.519*** [0.045]	-0.018 [0.025]	-0.011 [0.034]	-0.548*** [0.043]
Religion: Other, %pop				-1.055*** [0.045]	-1.313*** [0.055]	-0.118*** [0.031]	-0.083*** [0.032]	-0.008 [0.037]
Religion Fractionalization					29.823*** [7.354]	4.579 [4.096]	18.123*** [4.031]	-20.114*** [4.294]
Ethnic Fractionalization					-176.202*** [5.719]	-88.545*** [3.083]	-49.669*** [3.207]	-60.650*** [3.336]
Colony						-28.991*** [1.949]	-15.112*** [2.186]	-8.578*** [2.575]
GDP per capita in 1960, ln						1.367*** [0.010]	1.075*** [0.014]	1.043*** [0.015]
Year F.E.	NO	YES	YES	YES	YES	YES	YES	YES
Region F.E.	NO	NO	NO	NO	NO	NO	YES	(absorbed)
Region × initial regime F.E.	NO	NO	NO	NO	NO	NO	NO	YES
Observations	7452	7522	7500	6653	6220	5973	5934	5959
r <sup>2</sup>	0.54	0.53	0.57	0.57	0.65	0.91	0.92	0.94

Standard errors in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.



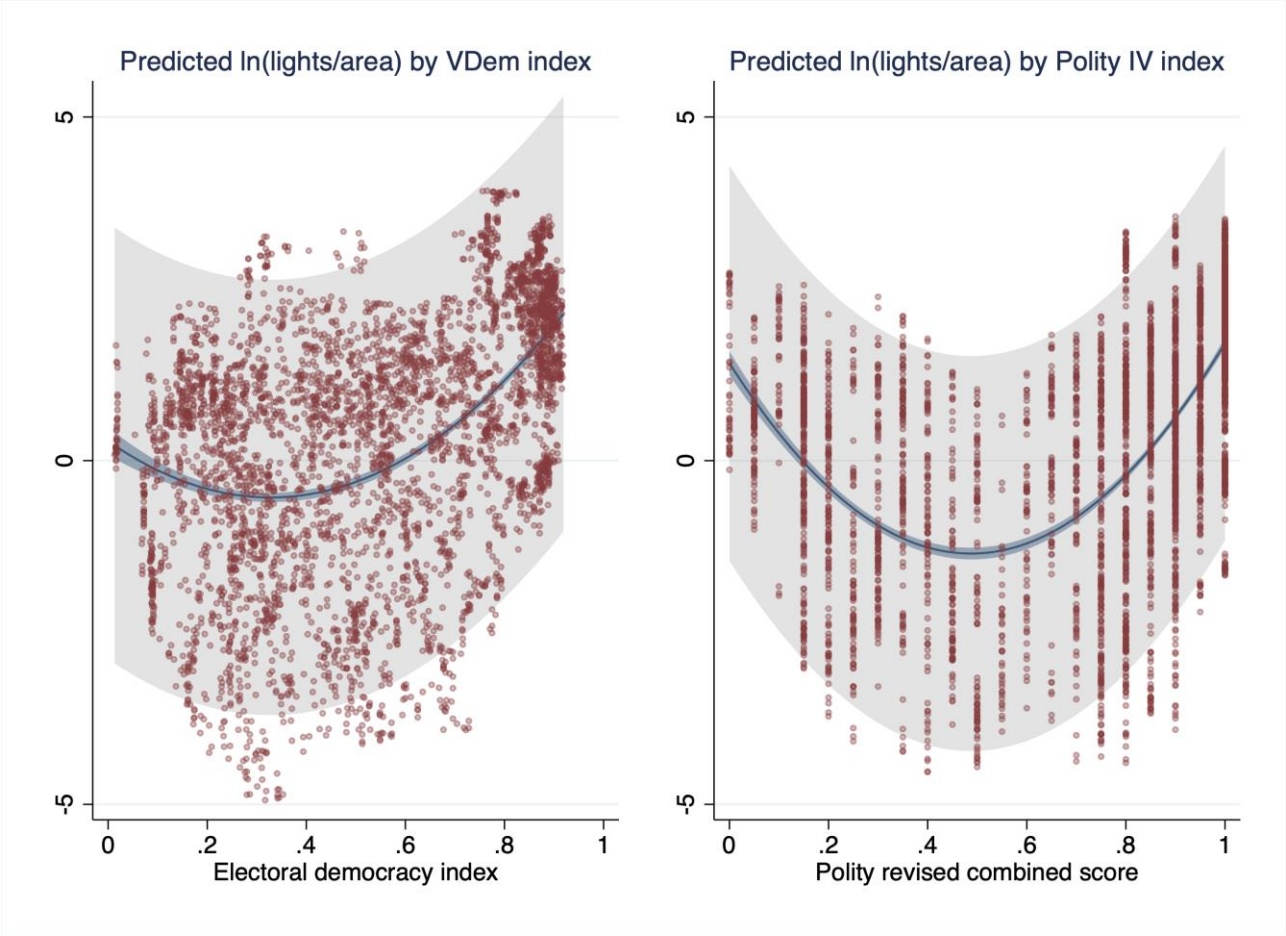
**Table E.2** Replicating Table 2 [Effect of Democracy and Autocracy on GDP per Capita – ANRR specification] after excluding influential observations

Dep.Var.: (Log) GDP per Capita	WITHIN ESTIMATES				ARELLANO AND BOND ESTIMATES			
	(1-lags)	(2-lags)	(4-lags)	(8-lags)	(1-lags)	(2-lags)	(4-lags)	(8-lags)
Autocracy	0.221 (0.274)	0.287 (0.220)	0.251 (0.226)	0.551** (0.244)	0.512 (0.477)	0.813* (0.421)	1.002** (0.449)	1.199*** (0.426)
Democracy	0.299 (0.301)	0.364 (0.233)	0.400* (0.231)	0.489* (0.251)	0.491 (0.520)	0.654 (0.447)	0.845* (0.449)	0.763* (0.446)
log GDP first lag	0.979*** (0.004)	1.271*** (0.019)	1.243*** (0.019)	1.234*** (0.021)	0.946*** (0.009)	1.184*** (0.041)	1.157*** (0.043)	1.147*** (0.043)
log GDP second lag		-0.294*** (0.018)	-0.215*** (0.025)	-0.230*** (0.027)		-0.239*** (0.038)	-0.170*** (0.046)	-0.180*** (0.045)
log GDP third lag			-0.012 (0.019)	0.005 (0.017)			0.001 (0.022)	-0.000 (0.023)
log GDP fourth lag			-0.041*** (0.013)	-0.049** (0.021)			-0.041** (0.020)	-0.039* (0.020)
p-value, lags 5–8				0.099				0.093
Long-run effect of autocracy	10.477 (12.953)	12.418 (9.512)	9.705 (8.749)	17.529** (7.620)	9.510 (8.570)	14.517** (7.066)	18.801** (7.913)	21.324*** (7.531)
Long-run effect of democracy	14.159 (13.759)	15.731 (9.725)	15.466* (8.681)	15.553** (7.675)	9.123 (9.719)	11.692 (8.347)	15.857* (8.803)	13.567* (8.233)
Effect of autocracy after 25 years	4.331 (5.361)	7.005 (5.360)	6.252 (5.621)	12.764** (5.548)	7.126 (6.495)	12.420** (6.061)	16.257** (6.826)	18.606*** (6.606)
Effect of democracy after 25 years	5.853 (5.834)	8.874 (5.574)	9.964* (5.640)	11.325** (5.629)	6.836 (7.238)	10.002 (6.991)	13.712* (7.405)	11.838* (6.980)
Persistence of GDP process	0.979*** (0.004)	0.977*** (0.003)	0.974*** (0.004)	0.969*** (0.005)	0.946*** (0.009)	0.944*** (0.010)	0.947*** (0.009)	0.944*** (0.010)
AR2 test p-value					0.00	0.97	0.24	0.07
Observations	7601	7438	7126	6483	7443	7284	6968	6328
Countries in sample	162	162	162	161	162	162	162	161

Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

*Note:* these results are obtained with a higher threshold to identify influential observations, i.e.:  $|dfits| > 4\sqrt{(k/N)}$ . Indeed, when using the standard rule of thumb ( $2\sqrt{(k/N)}$ ), too many influential observations are removed.

**Figure E.5** Replicating Figure 3 [Predicted values of night-lights] after excluding influential observations



**Table E.3** Replicating Table 3 [Effect of Democracy and Autocracy on Night Lights] after excluding influential observations

Dep.Var.: lnNTL	Pooled OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Autocracy	76.772*** [8.753]	66.919*** [7.302]	54.380*** [7.486]	101.073*** [8.595]	44.947*** [8.064]	20.520*** [7.477]	26.538*** [7.545]	13.728* [8.016]
Democracy	183.583*** [5.277]	186.472*** [4.926]	169.353*** [5.234]	224.516*** [5.949]	154.319*** [5.927]	50.817*** [5.750]	41.227*** [5.429]	38.432*** [5.143]
English Legal Origin			-20.894** [5.576]		89.308** [6.433]	96.923*** [5.665]	61.690** [5.656]	-13.641* [7.396]
Socialist Legal Origin			58.214*** [6.164]		8.913 [10.652]	3.332 [9.395]	-107.750** [12.118]	-270.739*** [25.952]
Scandinavian Legal Origin			5.475 [14.478]		193.806*** [24.380]	235.931*** [22.884]	201.712*** [21.278]	43.135** [20.373]
German Legal Origin			133.891*** [13.831]		141.635*** [13.434]	73.124*** [11.844]	66.860*** [10.979]	29.443*** [11.257]
Religion: Protestant, %pop				-1.214*** [0.137]	-2.677** [0.237]	-4.116** [0.227]	-3.014** [0.220]	-1.925*** [0.220]
Religion: Muslim, %pop				0.183** [0.091]	-0.018 [0.088]	0.084 [0.076]	-0.725*** [0.103]	-1.336*** [0.128]
Religion: Other, %pop				-0.629*** [0.090]	-0.927*** [0.105]	-0.234** [0.099]	-0.428*** [0.099]	-0.589*** [0.114]
Religion Fractionalization					45.104*** [14.503]	111.711*** [12.725]	193.051*** [11.733]	51.475*** [12.588]
Ethnic Fractionalization					-263.283*** [10.985]	-223.572*** [9.946]	-139.009*** [9.966]	-105.672*** [10.232]
Colony						-57.219*** [5.637]	-12.092** [6.112]	-33.810*** [7.467]
GDP per capita in 1960, ln						0.965*** [0.029]	0.550*** [0.039]	0.813*** [0.041]
Year F.E.	NO	YES	YES	YES	YES	YES	YES	YES
Region F.E.	NO	NO	NO	NO	NO	NO	YES	(absorbed)
Region*initial regime F.E.	NO	NO	NO	NO	NO	NO	NO	YES
Observations	4233	4248	4284	3574	3267	3030	3025	3043
r2	0.22	0.32	0.33	0.38	0.55	0.68	0.74	0.81

Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Appendix F. Additional analysis of potential mechanisms

**Table F.1** Effect of Democracy and Autocracy on Potential Mechanisms: Investment, innovation and income distribution

	Dependent Variable:				
	Log(*100) of Gross Fixed Capital Formation per capita (in 2015 constant USD\$)	Log(*100) of patent applications by residents (for every 1 mln inhabitants)	Log(*100) of patent applications by non-residents (for every 1 mln inhabitants)	Top 1% Share (based on Income or Wealth)	Top 10% Share (based on Income or Wealth)
	(1)	(2)	(3)	(4)	(6)
<b>A. Period 1960-2018</b>					
Autocracy	1.491 (1.885)	-7.353* (4.236)	-18.563 (14.850)	0.002 (0.002)	-0.000 (0.003)
Democracy	0.396 (0.875)	-1.086 (2.919)	3.887 (3.668)	0.002 (0.001)	0.003* (0.001)
Lagged dep. var. (4 lags)	YES	YES	YES	YES	YES
Lagged GDP pc(4 lags)	YES	YES	YES	YES	YES
Observations	4732	2442	2332	3688	3671
Countries in sample	139	114	108	158	158
<b>B. Period 1960-2010</b>					
Autocracy	0.294 (1.177)	-9.992** (4.933)	-18.708 (16.922)	0.003 (0.004)	0.000 (0.005)
Democracy	0.243 (0.984)	-2.096 (3.446)	5.348 (4.738)	0.002 (0.002)	0.002 (0.002)
Lagged dep var. (4 lags)	YES	YES	YES	YES	YES
Lagged GDP pc (4 lags)	YES	YES	YES	YES	YES
Observations	3682	1794	1711	2589	2551
Countries in sample	130	108	101	158	158

This table reports the estimation results of the model specification represented by equation (2) but substituting GDP per capita with alternative dependent variables, as reported in the header of each column. It uses the trichotomous classification of political regimes described in Section 3. All the columns include four lags of both the dependent variable and GDP per capita as controls. In the top panel, estimation results are obtained considering the full sample (1960-2018). In the bottom panel, estimation results are obtained considering the subsample 1960-2010. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table F.2** Effect of Democracy and Autocracy on Potential Mechanisms: Market reforms, political instability, clientelism and corruption

	Dependent Variable:									
	Probability of Unrest		Probability of Major Government Crises		Market reforms		Clientelism		Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>A. Period 1960-2018</b>										
Autocracy	-4.883** (2.048)	-1.831 (1.854)	-7.917*** (1.394)	-6.257*** (1.469)	-1.134*** (0.342)	-0.376 (0.340)	0.003 (0.002)	0.006* (0.003)	0.000 (0.002)	0.003 (0.003)
Democracy	-8.584*** (2.174)	-8.630*** (2.413)	-4.428** (1.943)	-5.260** (2.286)	0.668 (0.448)	0.581 (0.462)	-0.003 (0.002)	-0.005** (0.002)	-0.004** (0.002)	-0.007*** (0.002)
Lagged dep.var. (4 lags)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Lagged GDP per capita (4 lags)	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Observations	7966	6815	7927	6784	5656	4558	8694	7102	8649	7077
Countries in sample	170	162	170	162	146	144	170	162	170	162
<b>B. Period 1960-2010</b>										
Autocracy	-5.225** (2.129)	-2.492 (1.988)	-8.336*** (1.544)	-6.757*** (1.705)	-1.134*** (0.342)	-0.376 (0.340)	0.003 (0.003)	0.006* (0.003)	-0.001 (0.002)	0.002 (0.003)
Democracy	-10.609*** (2.515)	-10.884*** (2.834)	-7.465*** (1.957)	-8.178*** (2.283)	0.668 (0.448)	0.581 (0.462)	-0.004 (0.002)	-0.005* (0.003)	-0.005** (0.002)	-0.007*** (0.002)
Lagged dep.var. (4 lags)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Lagged GDP per capita (4 lags)	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Observations	6606	5620	6571	5593	5656	4558	7334	5907	7289	5882
Countries in sample	170	162	169	161	146	144	170	162	170	162

This table reports the estimation results of the model specification represented by equation (2) but substituting GDP per capita with alternative dependent variables, as reported in the header of each column. It uses the trichotomous classification of political regimes described in Section 3. Columns (1), (3), (5), (7) and (9) include four lags of the dependent variable as controls. Columns (2), (4), (6), (8) and (10) also include four lags of GDP per capita. In the top panel, estimation results are obtained considering the full sample (1960-2018). In the bottom panel, estimation results are obtained considering the subsample 1960-2010. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table F.3** Effect of Democracy and Autocracy on political polarization, political violence and mobilization (from V-Dem)

	Dependent Variable:				
	Political Polarization (1)	Political Violence (2)	Mobilization for Democracy (3)	Mobilization for Autocracy (4)	CSO Repression [-] (5)
<b>A. Period 1960-2018</b>					
Autocracy	0.035* (0.020)	-0.043** (0.021)	-0.185*** (0.036)	0.069*** (0.024)	-0.177*** (0.030)
Democracy	-0.087*** (0.020)	-0.090*** (0.026)	-0.207*** (0.037)	-0.078*** (0.022)	0.167*** (0.036)
Lagged dependent variable var. (4 lags)	YES	YES	YES	YES	YES
Lagged GDP per capita (4 lags)	YES	YES	YES	YES	YES
Observations	6963	6962	6818	6825	7102
Countries in sample	160	160	157	158	162
<b>B. Period 1960-2010</b>					
Autocracy	0.035 (0.021)	-0.040* (0.022)	-0.189*** (0.038)	0.073*** (0.026)	-0.201*** (0.035)
Democracy	-0.100*** (0.022)	-0.092*** (0.027)	-0.226*** (0.041)	-0.101*** (0.023)	0.193*** (0.042)
Lagged dependent variable var. (4 lags)	YES	YES	YES	YES	YES
Lagged GDP per capita (4 lags)	YES	YES	YES	YES	YES
Observations	5784	5783	5663	5662	5907
Countries in sample	160	160	157	158	162

This table reports the estimation results of the model specification represented by equation (2) but substituting GDP per capita with alternative dependent variables, as reported in the header of each column. Specifically: (a) *Political Polarization*: Is society polarized into antagonistic, political camps?; (b) *Political Violence*: How often have non-state actors used political violence against persons this year?; (c) *Mobilization for Democracy*: In this year, how frequent and large have events of mass mobilization for pro-democratic aims been?; (d) *Mobilization for Autocracy*: In this year, how frequent and large have events of mass mobilization for pro-autocratic aims been?; (e) *CSO Repression*: Does the government attempt to repress civil society organizations (CSOs)? [inverted sign]. The table uses the trichotomous classification of political regimes described in Section 3. All the columns include four lags of both the dependent variable and GDP per capita as controls. In the top panel, estimation results are obtained considering the full sample (1960-2018). In the bottom panel, estimation results are obtained considering the subsample 1960-2010. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

## Appendix G. Varieties of Democracy

In our main analyses, the main V-Dem Democracy index we refer to is the Electoral Democracy Index.

*The electoral principle of democracy seeks to embody the core value of making rulers responsive to citizens, achieved through electoral competition for the electorate's approval under circumstances when suffrage is extensive; political and civil society organizations can operate freely; elections are clean and not marred by fraud or systematic irregularities; and elections affect the composition of the chief executive of the country. In between elections, there is freedom of expression and an independent media capable of presenting alternative views on matters of political relevance. In the V-Dem conceptual scheme, electoral democracy is understood as an essential element of any other conception of representative democracy — liberal, participatory, deliberative, egalitarian, or some other.*

Then, Electoral Democracy is a necessary but not sufficient condition for other dimensions of democracy, and specifically:

- **Liberal Democracy:** *The liberal principle of democracy emphasizes the importance of protecting individual and minority rights against the tyranny of the state and the tyranny of the majority.*
- **Participatory Democracy:** *The participatory principle of democracy emphasizes active participation by citizens in all political processes, electoral and non-electoral*
- **Deliberative Democracy:** *The deliberative principle of democracy focuses on the process by which decisions are reached in a polity. According to this principle, democracy requires more than an aggregation of existing preferences. There should also be respectful dialogue at all levels—from preference formation to final decision—among informed and competent participants who are open to persuasion.*
- **Egalitarian Democracy:** *The egalitarian principle of democracy holds that material and immaterial inequalities inhibit the exercise of formal rights and liberties, and diminish the ability of citizens from all social groups to participate.*

Table G.1 below considers alternative trichotomous classifications of political regimes based on different varieties of democracy.

**Table G.1** Effect of Democracy and Autocracy on (Log) GDP per Capita – Considering different Varieties of Democracy

Dep.Var.: (Log) GDP per Capita	Pooled OLS					
	Trichotomous classification of political regimes based on:					
	Polity	Electoral Democracy [VDem]	Liberal Democracy [VDem]	Participatory Democracy [VDem]	Deliberative Democracy [VDem]	Egalitarian Democracy [VDem]
Autocracy	16.833*** [2.105]	9.344*** [2.075]	18.659*** [2.057]	12.413*** [2.063]	21.461*** [2.019]	5.974*** [1.961]
Democracy	14.618*** [2.078]	12.574*** [2.154]	39.104*** [2.413]	48.378*** [2.709]	35.404*** [2.262]	36.446*** [2.516]
English Legal Origin	11.840*** [3.029]	11.274*** [3.044]	10.517*** [2.996]	12.030*** [2.977]	11.030*** [2.988]	11.109*** [3.013]
Socialist Legal Origin	-116.296*** [11.189]	-111.343*** [11.273]	-112.204*** [11.010]	-103.739*** [10.919]	-112.002*** [10.991]	-104.910*** [11.088]
Scandinavian Legal Origin	45.915*** [8.435]	41.440*** [8.464]	40.659*** [8.314]	35.266*** [8.273]	43.359*** [8.303]	38.593*** [8.358]
German Legal Origin	43.808*** [4.697]	45.157*** [4.718]	40.764*** [4.643]	40.687*** [4.617]	41.575*** [4.632]	41.890*** [4.658]
Religion: Protestant, %pop	-0.441** [0.093]	-0.374*** [0.094]	-0.369*** [0.092]	-0.333*** [0.091]	-0.416** [0.092]	-0.343*** [0.092]
Religion: Muslim, %pop	-0.388*** [0.054]	-0.374*** [0.055]	-0.321*** [0.054]	-0.380*** [0.053]	-0.353*** [0.054]	-0.352*** [0.054]
Religion: Other, %pop	0.045 [0.047]	0.071 [0.048]	0.075 [0.047]	0.123*** [0.046]	0.078* [0.047]	0.071 [0.047]
Religion Fractionalization	0.961 [5.207]	-3.479 [5.209]	-0.549 [5.114]	-8.598* [5.078]	-1.795 [5.110]	-2.350 [5.128]
Ethnic Fractionalization	-85.453*** [4.327]	-82.919*** [4.305]	-78.462*** [4.244]	-78.006*** [4.222]	-82.071*** [4.225]	-77.883*** [4.264]
Colony	-1.312 [3.131]	-0.201 [3.154]	-2.197 [3.098]	-4.206 [3.083]	-1.403 [3.089]	-1.636 [3.122]
GDP per capita in 1960, ln	0.997*** [0.018]	0.997*** [0.018]	0.997*** [0.018]	0.997*** [0.018]	0.997*** [0.018]	0.997*** [0.018]
Year F.E.	YES	YES	YES	YES	YES	YES
Region × initial regime F.E.	YES	YES	YES	YES	YES	YES
Observations	6192	6262	6238	6262	6262	6262
r2	0.90	0.90	0.90	0.90	0.90	0.90

This table reports the estimation results of the model specification represented by equation (1) when considering alternative trichotomous classifications of political regimes based on the different measures (varieties) of democracy reported in the header of each column. The reported coefficients are multiplied by 100 to ease their interpretation. See Table 1 in the main text for a description of the other explanatory variables. Standard errors are clustered at the country level and are reported in brackets. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.



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