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Abstract: Recent empirical work has established that 'democracy causes growth'. In this paper, we determine the underlying institutions which drive this relationship using data from the Varieties of Democracy project. We sketch how incentives and opportunities as well as the distribution of political power shaped by underlying institutions, in combination with the extent of the market, endogenously form an 'economic blueprint for growth', which likely differs across countries. We take our model to the data by adopting novel heterogeneous treatment effects estimators, which allow for non-parallel trends and selection into institutional change, and run horse races between underlying institutions. We find that freedom of expression, clean elections, and legislative executive constraints are the foremost drivers of long-run development. Erosion of these institutions, as witnessed recently in many countries, may jeopardise the perpetual growth effect of becoming a liberal democracy we establish for the post-WWII period.

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1   Introduction

Recent research establishes a positive long-run relationship between democracy and economic growth (e.g. Madsen et al., 2015; Acemoglu et al., 2019; Boese and Eberhardt, 2021). Nevertheless, two important challenges to a better understanding of how democracy causes growth remain: first, the underlying political and economic institutions which drive the democracy-growth nexus have not been identified; and second, the existing literature has implicitly assumed that the democracy-growth relationship is the same across countries and over time spent in democracy, which makes it difficult to derive credible policy implications for individual countries (Durlauf, 2020).

The first challenge is to better understand *how* democracy fosters growth: Which institutional building blocks are essential, what's inside the black box? In a frequently-cited phrase from his seminal book *On Democracy* Robert Dahl suggests that "democracy has meant different things to different people at different times and places" (Dahl, 2000, 3), which is reflected in the variety of political institutions brought together in the binary indicators of democracy in Papaioannou and Siourounis (2008); Cheibub et al. (2010); Boix et al. (2013) and Acemoglu et al. (2019): electoral rights, civil rights, executive constraints or a (selective) combination of all these — see Appendix Figure A-2. Acemoglu et al. (2019, fn 4), for instance, argue that their meta-indicator successfully captures "a bundle of institutions that characterize electoral democracies", but that this misses elements of a "broader set of inclusive institutions" (ibid) emphasized in other work by Acemoglu and Robinson (2012). Which elements of the 'bundle' matter most for economic prosperity, if indeed they are not all of equal significance, is left uncertain. This question is the focus of the present study.

The second challenge relates to the heterogeneity of democracy's effect on growth across countries and within countries over time: existing research typically models a homogeneous democracy-growth relationship *across countries* and presents the growth effect of democracy as an average *over time*. First, such assumptions ignore existing arguments for heterogeneous growth effects across democratisers, including 'elite-biased democratisation' (Albertus and Menaldo, 2018) among other work emphasising differential *modes* of regime change

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(e.g. peaceful vs violent regime change or 'democratisation by mistake': Cervellati and Sunde, 2014; Treisman, 2020), or the negative implications of populist leaders for economic performance, regardless of political regime (Funke et al., 2020). A systematic analysis of heterogeneities is only possible when country regressions, not pooled regressions of all countries, form the basis of empirical investigation (Eberhardt, 2022). Second, distinguishing growth implications of institutional change *over time* speaks to a political economy interpretation of the *experience* of democracy.[1] Political scientists refer to the initial period in many new democracies as 'democratic overload', a 'tumultuous youth' during which historical internal rivalry may raise its ugly head again and leaders may prioritise short-term policies to pander to the impatient populace, with negative implications for sustainable economic growth (Gerring et al., 2005). But politicians, bureaucrats and citizens learn over time, decision-making and bureaucratic processes become more formalised and hence predictable, cementing the 'political institutionalisation' of authority in the country. These thoughts point to the potential for non-linear growth effects with length of democratic experience. This aside, the focus on an average treatment effect in the existing literature pre-supposes that democracy has a one-off levels effect. If democracy fosters the 'right incentives' to innovate, then a more permanent effect in line with many endogenous growth theories cannot be ruled out, but this can only be discovered if the length of time spent in democracy is explicitly acknowledged in the analysis *and* presentation of results.

The main contribution of our study is to overcome these challenges to answer the question "*Which institutional building blocks drive the democracy-growth relationship?*" We address the first challenge by developing a conceptual framework that outlines how change in political

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[1]We do not employ 'democratic capital stocks' (e.g. Gerring et al., 2005; Persson and Tabellini, 2009): these are computed over very long time horizons and may conflate the effects of *democratic experience* of the current regime with those of *democratic legacy*. Furthermore, results for stocks are difficult to interpret when economic magnitudes are of interest, and given the 'within-country' nature of empirical assessment, the identification in the empirical analysis derives from the *changes* in stocks over time, not the stock levels.

and economic institutions fosters economic growth over time.[2] We then build an empirical model in line with this framework and trace the democracy-growth nexus from an encompassing high-level concept of liberal democracy (Mukand and Rodrik, 2020) down to individual institutions while accounting for the effect of 'rival' low-level institutions.[3] Examples of these low-level building blocks include free and fair elections or freedom of expression: tangible practices and reflections of sound institutions, rather than abstract high-level 'bundles'. We overcome the second challenge with an econometric implementation that allows us to study the evolution of *country-specific* effects of institutional change on economic growth over time. Our empirics provide insights in the relative relevance of different institutions for economic prosperity, evaluated over the time spent 'in regime'.

Our empirical analysis exploits the Varieties of Democracy (V-Dem) project's hierarchical indices to adopt an encompassing conceptual framework for 'liberal democracy' including political rights, executive constraints, property rights, and other civil rights. The V-Dem data offer a close mapping between the building blocks of liberal democracy and the empirical analysis of institutional change for a large sample of countries over 1949-2018. We dichotomise these indices to create regime change indicators in a variety of ways with empirical results consistent across these alternatives.

Our empirical implementation uses the Chan and Kwok (2022) Principal Component Difference-in-Difference (PCDID) estimator which arrives at country-specific estimates for the treatment effect and hence is not subject to recent concerns about the use of the two-way fixed effects estimator when treatment effects are likely to be heterogeneous (De Chaisemartin and d'Haultfœuille, 2020; Goodman-Bacon, 2021; Athey and Imbens, 2022). The PCDID estimator allows for pre-intervention non-parallel trends and endogenous selection into regime

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[2]We use 'institutional change' and 'regime change' interchangeably.

[3]We construct regime dummies from continuous V-Dem indices. There is an unfortunate overlap in names between some of these indices and the regimes in V-Dem's 'Regimes of the World' (ROW) dataset (Lührmann et al., 2018). We only ever use the latter for comparison of high-level democracy indicators in Column [3] of Table 1 and Panel (a) of Figure 3.

change by augmenting the estimation equation of a 'treated' country with common factors estimated from the residuals of the same equation in the control sample. These common factors capture unobserved confounders such as total factor productivity — intuitively, these factors can be compared to the 'artificial countries' constructed by the synthetic control (SC) methodology; indeed, its latest variant, generalized SC, employs estimated factors rather than weighted combinations of country series.

We adopt the graphical form of presentation introduced in Boese and Eberhardt (2021) to report our findings: we employ multivariate local linear regression and plot the smoothed estimated treatment effects against the 'years in regime.' This enables us to study heterogeneous growth effects over time and to control for sample characteristics and regime reversal dynamics. In the comparison of mid- and low-level building blocks of democracy this also allows us to conduct horse races by conditioning on evolution and magnitude of 'rival' institutions.[4]

We have two main findings: first, when we study the effect of becoming a 'liberal democracy', we find that in the long-run liberal democracy appears not to just have a temporary but a permanent growth effect. Second, studying constituent components of liberal democracy, we establish that clean elections, freedom of expression and legislative constraints on the executive drive economic prosperity in the long-run. In contrast, the initially strong positive effects of freedom of association, judicial constraints on the executive, and the rule of law peter out and turn statistically and economically insignificant after a decade or two. These findings are robust to an alternative empirical setup which explicitly models the inter-dependencies between different institutions in their effect on growth — see Appendix D.

Given our novel and highly flexible empirical approach there are naturally limitations to our analysis (real and perceived) which need to be mentioned. First, we rely on dichotomising regime change across three tiers of democratic institutions. While this (popular) practice

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[4]For instance, when charting the effect of regime change defined on the basis of the 'electoral democracy' index we control for the value of the 'liberal component' index in the year of polyarchy regime change as well as the variability of the liberal component index during the time in the polyarchy 'regime.'

yields easily-interpretable results which are shown to be robust across reasonable alternative cutoffs, we cannot speak to the effect of marginal improvements in political institutions. Second, we argue that estimating treatment effects for individual countries and manipulating these using 'smoothing' and conditioning on their data and regime change characteristics can yield time-profiles providing more nuanced insights than an average treatment effect estimate across countries of diverse experience. But we cannot speak to the causal effects on *individual countries*. Furthermore, from the perspective of a country with five years of treatment, we cannot confirm/test whether their outcome after a further twenty years will match that of those countries we analysed with twenty-five years of treatment — we estimate the central tendency over treatment length, but cannot guarantee that this is the true structural secular trajectory countries will take. Third, inclusion or omission of additional variables, be they observed or unobserved, will always be a matter of some uncertainty. We have tried to mitigate this caveat by (i) providing tests confirming the assumptions over *observable controls* (trade, population growth) included on the basis of theoretical arguments, and (ii) estimating alternative specifications capturing *unobservables* (i.e. including one to six common factors) with robust results across reasonable alternatives. Fourth, we attempt to isolate individual institutional factors in their causal effect when such 'building blocks' of democracy are known to be highly correlated. We use two strategies to address this issue, one presented in the main paper where our results are conditioned on the evolution of 'rival' building blocks, and another in the Appendix where we explicitly model complementarity/conditional effects between building blocks —- the latter results provide some reassurance that we successfully isolate the effect of components of polyarchy and the liberal component.

The remainder of this paper is structured as follows: in Section 2 we review the constituent elements of our liberal democracy conceptual framework and sketch the mechanisms determining the democracy-growth nexus. The data proxies from V-Dem and data transformations are discussed in Section 3. The empirical strategy is provided in Section 4, with results presented in Section 5. The conclusion reviews our findings in the context of the recent global experience of the erosion of democratic institutions.

2 From Institutions to Growth

The focus of this paper is on unbundling the democracy-growth nexus to pinpoint the democratic building blocks driving this relationship. Below we introduce our conceptual framework in which the tractable building blocks of democracy are embedded to lay the foundations for our empirical analysis and then present our definition of democratic institutions and relate it to previous studies of democracy and growth.

2.1 Conceptual Framework

How can democracy foster economic development? Figure 1 provides a schematic overview of how this process can be synthesised. We differentiate between an endogenous process on the left of the diagram and a sequential process that accumulates over time on the right. Long-run economic growth following democratic regime change can be thought of as the outcome of a secular amplification or moderation of the 'blueprint for growth'. We identify three factors jointly forming this blueprint: 'incentives and opportunities' for firms and individuals determine economic fundamentals, 'market size' determines whether these fundamentals have the potential to foster long-term economic growth, and the 'political power' structure determines to what extent this potential can be realised to foster economic growth. These factors should not be viewed as (decision-making) processes *in isolation*, *sequentially* determining the economic outcomes of an institutional framework, but as a set of endogenous determinants. Over time, the impact of the 'blueprint' changes: 'experience' explains how and why the 'democratic dividend' will differ with time and hence also across countries. We discuss these elements in turn below.

Incentives and Opportunities The 'right' institutions incentivise and offer opportunities for firms and individuals (i) to invest in capital accumulation (e.g. Hall and Jones, 1999; Acemoglu et al., 2001, 2002), namely physical (K) in the case of firms and human (HC) in the case of individuals, and/or (ii) to improve technological efficiency (TFP, e.g. Aghion et al.,

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Figure 1: Mechanisms — Institutions and Economic Development

"Economic Blueprint for Growth"   "Experience"   "Growth"
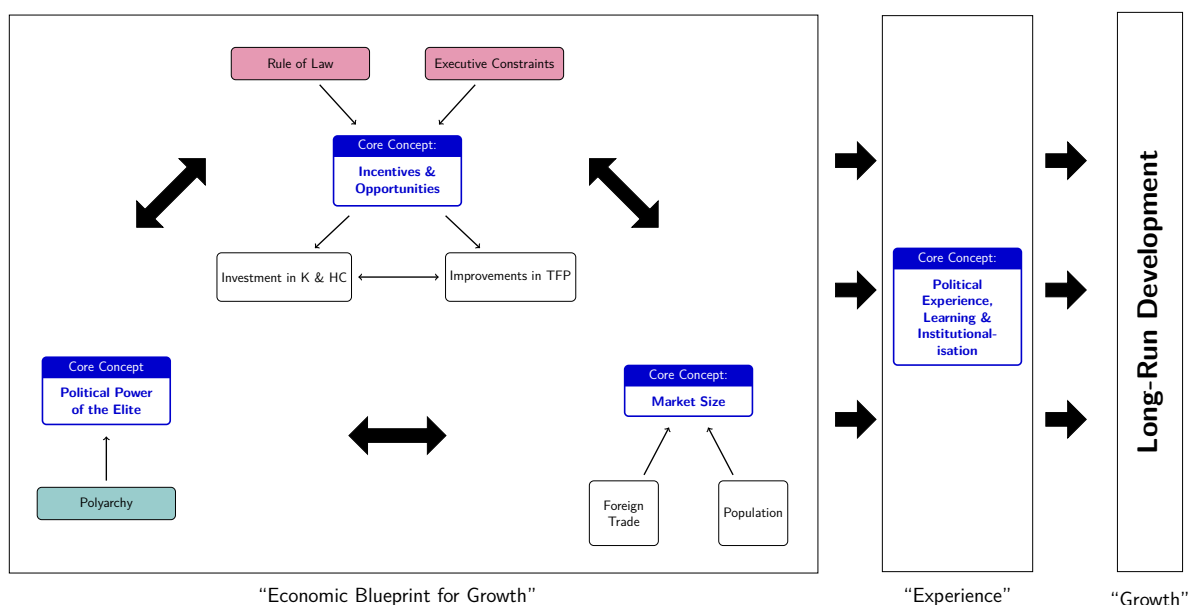
Notes: This diagram shows the proposed mechanisms of how institutions lead to growth. There are four core concepts which together determine the economic effect of institutions. Shaded boxes are for institutions (colouring in line with Figure 2).

2007).[5] Investment takes place if firms and individuals are assured to reap the fruits of their investments by the presence of secure property rights and protection against misappropriation of private returns — a suite of civil rights which we refer to as the 'rule of law' and 'constraints on the executive'. These are, of course, the institutions commonly associated with Douglass North (North, 1981; North and Weingast, 1989) and 'getting incentives and opportunities and prices right' also entails the reduction of market frictions and the facilitation of transaction more generally, including foreign trade (Besley, 1995).

Country-specific investment efficiency and the relative emphasis between capital accumulation and productivity improvements following regime change imply that the democratic dividend from getting incentives 'right' is likely to differ across countries.

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[5]TFP improvements can be achieved through purposive R&D and innovation (in a broad sense, see Cirera and Maloney, 2017), including knowledge diffusion and spillovers from abroad (Halperin et al., 2009; Knutsen, 2015), and/or by addressing resource misallocation (e.g. structural transformation).

Market Size   The best blueprint for growth cannot deliver prosperity if there is only a limited market, if the country has a small population, is closed to international trade (by fate or choice), and/or is far away from large, open economies with ample consumer demand to feed on. The incentives and opportunities that determine the potential for growth are themselves affected by this 'extent of the market' argument (e.g. Jones, 1995; Peters, 2021). The economic growth potential afforded an economy by its 'Northian' institutions is amplified or attenuated by the realities of its demographic, geographic or international environment (Acemoglu and Zilibotti, 2001). Hence we should expect two countries with identical institutions to experience different long-run growth if their market size differs substantially.

The Distribution of Political Power   This speaks to the fundamental political differences between democracy and autocracy: "[I]n no autocracy is it possible for the present-day rulers to effectively *constrain future decisions*, particularly those taken by their successors. This means that long-term *credible commitment* is impossible in an authoritarian setting" (Gerring et al., 2005, 336, emphasis added). Economic decision-making does not merely focus on the institutional environment *at the time of the decision* but also on potential future changes to this environment. The more concentrated political power in an economy, the more likely the 'Northian' institutions governing investment behaviour will be undermined and government decision-making will become "discretionary or even arbitrary" (Madsen et al., 2015, 175) in the future. Although this functionally relates to the investment incentives of the 'economic fundamentals' (e.g. Acemoglu et al., 2002, 1262), we separate this out to emphasise that democratic institutions can curtail the power of the elite in at least two ways: (i) by the power of the vote, and (ii) by the power of information and transparency. Executive constraints can go some way to reign in political leaders (Cox and Weingast, 2018), yet 'accountability' of a regime can ultimately only come from the power of the electorate to withdraw the leaders' mandate: "[d]emocracy is a system in which parties lose elections" (Przeworski, 1991, 10). Fair(er) elections provide strong incentives for politicians to be "more responsive to citizens' needs" by means of *electoral sanction* (Ofosu, 2019, 963).

Democratic Experience   Abstracting from all other determinants of the magnitude of the democracy-growth relationship discussed so far, it is important to separate out long-run and short-run effects. Parts of the existing literature already recognises this, but the primary motivation here is the (economic or civil) upheaval during regime change, accompanied by a slump in the economic growth rate which could bias estimated effects of democracy downwards (e.g. Cervellati and Sunde, 2014; Acemoglu et al., 2019). Our motivation for 'nonlinear' within-country effects over time builds on a political economy interpretation of the *experience* of democracy.[6] Following regime change new democracies frequently face a period of upheaval which in some cases leads to reversal to autocracy or 'hybrid regimes' (Diamond, 2002; Brownlee, 2009). With expectations sky-high, leaders in new democracies may prioritise short-term policies to fire up the political business cycle or to pander to impatient political supporters. Internal struggles among factions may arise; if certain groups in society were previously disengaged or suppressed then their newly-established freedom may find them vociferously making demands or rehashing old animosities with other groups. These forms of 'democratic overload' may prove costly when a regime's bureaucracy is insufficiently institutionalised: lacklustre economic performance, disillusionment, and perhaps even nostalgia for the 'old' regime.

Yet if allowed time, things are likely to improve. One fundamental difference in policy-making between autocracies and democracies is that the former is leader-centred whereas the latter "generally involves many more players" (Gerring et al., 2005, 330), which implies debate, consensus-building, and input from experts: over time, governments may learn how to improve policy-making. In addition the ongoing experience of democracy fosters the 'political institutionalisation' of authority patterns in the country and the behaviour of political institutions.[7]

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[6]The importance of accounting for the length of time spent in democracy is central to Gerring et al. (2005) and echoed in Persson and Tabellini (2009) among others.

[7]A related literature argues for increased popular support for democracy over time ('democracy creating its own demand'), though this is empirically challenged in favour of a 'thermostatic model' (Claassen, 2020).

Implications   There are three important implications for empirical modelling deriving from our discussion. First, it is to be expected that democratic regime change leads to differential long-run economic prosperity, due to differences in economic fundamentals and in market size — our empirics control for the latter (population growth and trade) and allow for the former by modelling country-specific treatment effects. Second, even two 'institutionally' identical countries with identical economic fundamentals may experience differential 'democratic dividends' if they vary in their 'democratic experience'. We allow for a non-linear learning effect in democracies by mapping treatment effects to 'years in treatment'. And third, the different focal points of analysis in a 'Northian' tradition (rule of law, executive constraints) and that of political scientists adopting a minimal definition of democracy (polyarchy) point to fundamentally different dominant drivers of growth through democratic regime change. Drilling down to these underlying institutional building blocks will enable us to run horse races between them to chart their relative significance for long-run economic prosperity.

2.2   Defining Democracy

We trace the democracy-growth relationship through three tiers of political and economic institutions (see Figure 2). At the highest level (Tier 1) is our encompassing definition of democracy/institutions, Liberal Democracy. This combines an electoral democracy emphasising participation and competition with executive constraints and the rule of law — the latter is seen as the "truly distinctive" feature of liberal democracy (Mukand and Rodrik, 2020, 765) and represents the dominant factor studied in the 'institutions rule' empirical literature. The 'mid-level' (Tier 2) splits these concepts into their constituent parts, namely an 'electoral democracy' (polyarchy) component,[8] and a 'liberal component'. Tier 3 sees these split into 'low-level' components: freedom of speech, freedom of association, suffrage, elected leaders, and clean elections in case of the polyarchy index; and the rule of law guaranteeing individual liberties, along with judicial and legislative constraints on the executive in case of the

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[8]This follows Dahl (1971), closest in conceptual coverage to the polity2 variable from PolityIV, though the correspondence is not perfect (see Appendix Figure A-2).

Figure 2: Liberal Democracy — a conceptual framework with selected references
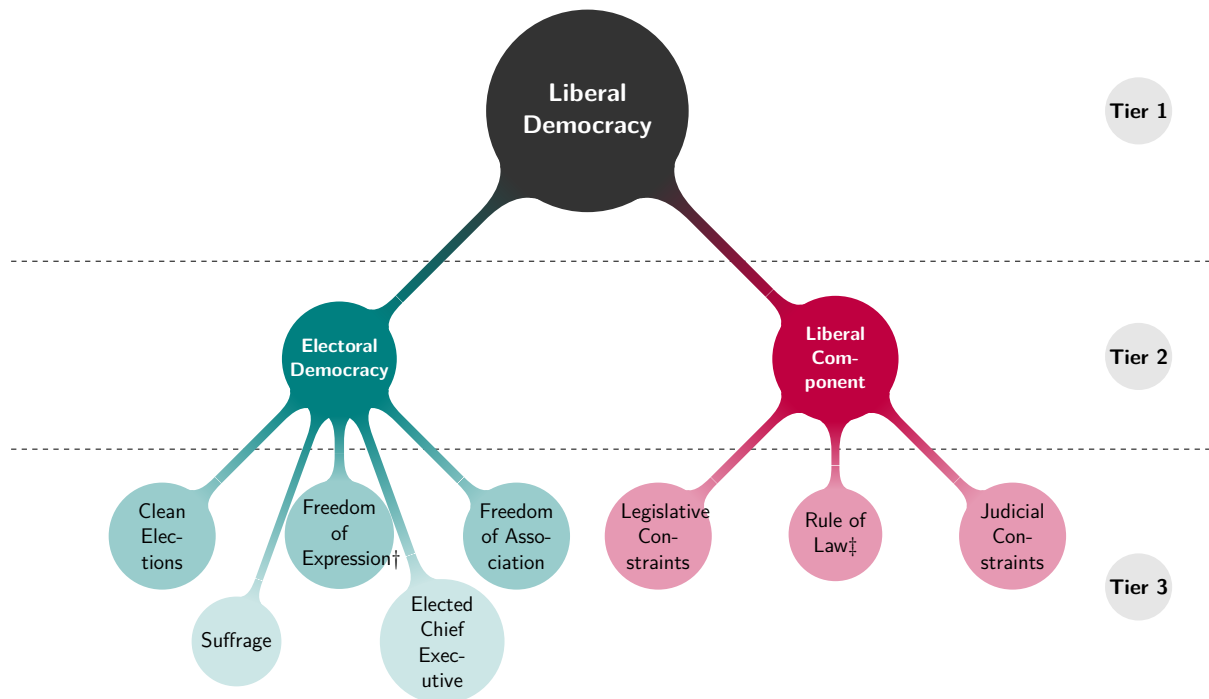
Notes: The framework presents the V-Dem conceptualisation of liberal democracy. 'Suffrage' and 'Elected Chief Executive' are not considered in our post-WWII analysis: they have very limited variation over time and near-universal coverage. We refer to judicial and legislative constraints jointly as 'executive constraints'. † This includes 'alternative sources of information'. ‡ In its entirety this component also covers 'Individual Liberties and Equality before the Law.'

liberal component.[9] In contrast to the existing literature, using this three-tiered framework, we can pinpoint those specific institutional elements of the broadly defined concept of liberal democracy that are driving the 'democratic dividend'.

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[9]Over the past 70 years, 'Suffrage' and 'Elected Chief Executive' display near-universal coverage and limited temporal variation. Hence, we omit them from our post-WWII analysis.

3 Data and Descriptives

3.1 Concepts and Data Sources

Concepts & Measures   Our analysis benefits from the use of the V-Dem dataset (Coppedge et al., 2021) in two distinct ways: from the underlying conceptualization of liberal democracy and the availability of hierarchical data. The V-Dem dataset allows for a direct mapping of the data to the concepts depicted in Figure 2 and enables us to empirically 'drill down' three tiers to systematically analyze the growth effects of each of the building blocks of liberal democracy while conditioning on the evolution of 'rival' building blocks.[10] The V-Dem dataset employs a wide range of lower-level indicators distinguished either as 'factual in nature' based on extant sources or coded by country experts and coordinators,[11] which are then systematically aggregated and transformed to create the index variables across three tiers we use in this study. Due to the strategies employed in developing the underlying definitions, in the measurement scales applied in constructing individual lower-tier indices and, crucially, in the theoretical justification for the weighting and aggregation procedures to arrive at higher-tier measures, the V-Dem indices naturally lend themselves to hierarchical investigation (for more details including a comparison to PolityIV and other alternative democracy indices, see Boese, 2019).

The empirical counterpart to the concept of Liberal Democracy in the top tier of Figure 2 is V-Dem's Liberal Democracy Index. Liberal democracy consists of two second tier components: electoral democracy and the liberal component (with empirical counterparts in the

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[10]'Drilling down' with PolityIV would not be possible, since (i) the theoretical elements feeding into the PolityIV democracy index do not map into our conceptual framework (as is highlighted in Figure A-2), (ii) its rules for weighting and aggregating constituent measures are arbitrary, and (iii) it treats periods of interregnum, interruption and transition ambiguously.

[11]The latter type variables are based on information on an ordinal scale and subsequently aggregated across coders using Bayesian item response theory models (Coppedge et al., 2017; Pemstein et al., 2022, 29f).

V-Dem dataset). The principle of Electoral Democracy rests on the eight institutional guarantees[12] outlined by Dahl (1971), capturing contestation and participation. These guarantees are integrated into the five building blocks of polyarchy, in turn corresponding to the concepts on the lowest tier of Figure 2: freedom of association, freedom of expression and alternative sources of information, clean elections, suffrage and elected officials.[13] Similarly, the Liberal Component, which covers "constitutionally protected civil liberties, strong rule of law, and effective checks and balances that limit the use of executive power" (Lindberg et al., 2014, 160), can be broken down into three components with empirical counterparts in the V-Dem data: the Equality before the Law and Individual Liberties index, capturing the extent to which rule of law prevails, as well as judicial and legislative constraints on the executive. Detailed definitions for the indices across all three tiers are provided in Appendix Table A-1.

Data Sources Our empirical analysis uses three main data sources: the V-Dem data (Coppedge et al., 2021, version 11) of high-, mid- and low-level indicators for democracy, real income per capita and population data from the updated Maddison dataset (Maddison,

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[12]Freedom to form and join organizations, Freedom of expression, Right to vote, Eligibility for public office, Right of political leaders to compete for support, Alternative sources of information, Free and fair elections, Institutions for making government policies depend on votes and other expressions of preference. See Teorell et al. (2019) and Wilson and Boese (2021).

[13]Our analysis below does not consider the polyarchy sub-components of 'suffrage' and 'elected chief executive': 89% of observations in the full sample indicate universal suffrage, while the mean sample index value for 'elected officials' is 0.76 (mean −1/4 SD: 0.66, mean +1/4 SD: 0.87). Adopting our mean index cut-off would only provide for two control group countries (ARE, SAU) in the former and eleven in the latter (dropping to six for the mean +1/4 SD cutoff) — hence, these practices cannot provide for a feasible control sample to estimate common factors. Even though suffrage in particular is the subject of much economic analysis, this is focused on historical narratives (e.g. Engerman and Sokoloff, 2005).

2007; Bolt and van Zanden, 2020), and trade data from IMF DOTS — we adopt export-share of trade and population growth as additional controls to capture the significance of the 'extent of the market'. Tellingly, the inclusion of a trade variable was indicated to affect the magnitude of the democracy-growth nexus in Papaioannou and Siourounis (2008, Table 3, column 5) and Acemoglu et al. (2019, Table 6, column 6). For ease of interpretation we log-transform the dependent variable (real GDP per capita), and multiply it with 100, so that regime change can be interpreted in terms of the percentage change in per capita income. In comparative analysis of high-level democracy indicators we also adopt the V-Dem *Regimes in the World* categorisation (Lührmann et al., 2018, ROW); the polity2 variable from PolityIV (Marshall et al., 2017) to construct two binary democracy variables (cut-offs 0 and 5); and the Boix et al. (2013) definition of democracy.

Transformation of Democracy Indices   Our empirical analysis relies on *binary* indicators for liberal democracy and its constituent components, in line with much of the recent empirical literature in economics (Giavazzi and Tabellini, 2005; Rodrik and Wacziarg, 2005; Persson and Tabellini, 2006; Papaioannou and Siourounis, 2008; Acemoglu et al., 2019). Since the V-Dem indices are quasi-continuous and range from zero to one this raises the question which cut-offs to chose in order to arrive at a binary democracy dummy. In the main part of the paper we adopt the index mean *for the entire sample* ($N = 157$), along with robustness checks ranging from $1/4$ of a standard deviation below to $1/4$ of a standard deviation above the mean. Index means as well as the standard deviations for the high-, mid- and low-level democracy indices are presented in Appendix Table A-3. Alternatively, in Appendix Section C we present results using 0.5 as the cut-off, including robustness checks where cut-offs range between 0.4 and 0.6. In line with the findings in Baltz et al. (2020) we do not find qualitatively substantial deviations in our results if we adopt alternative cutoffs.

3.2   Sample Makeup and Descriptives

Full Sample   For the main analysis using V-Dem data our sample comprises 157 countries from 1949 to 2018 with on average 53 country observations (8,303 observations). Depending

on the definition of the democracy dummy, this contains three different groups: (i) those countries which were democracies throughout the sample period, (ii) those which were autocracies throughout the sample period, and (iii) those which became democracies and/or reverted to autocracy. In our analysis the countries in (i) are discarded, although their respective index values form part of the calculations to determine the threshold for each democracy indicator. The countries in (ii) represent the control sample, and those in (iii) the treatment sample — we report the sample sizes of the latter two in our results plots and tables.

Descriptives Details on each of the 157 countries over 1949-2018 are tabulated in Appendix Table A-2. Simple descriptives reveal that over time the median country has become richer and more democratic: The median income growth rate (rate of change in the liberal democracy index) in the full sample is 2.24% per annum (0.97%), compared with 2.10% (1.89%) in the treated sample for liberal democracy and 2.15% (0.62%) in the control sample.

Our panel is unbalanced. Appendix Figure A-1 indicates the differential start years in the sample for all 157 countries and for the polyarchy PCDID regressions (treated countries only). The patterns are next to identical, with over 40% of countries in either sample having start years after 1959. These differential sample statistics are taken into account when we present the long-run democratic dividend.

Another feature that stands out is that several countries experienced multiple regime changes. Much of the existing literature on democracy and growth does not concern itself with 'regime change dynamics' (exceptions include Giavazzi and Tabellini, 2005 and Papaioannou and Siourounis, 2008): whether a country had repeated episodes of crossing the democracy threshold. As shown in Appendix Table A-4, *multiple* regime changes occur in 25%, 35% and 31% of countries for the liberal democracy, polyarchy and liberal component definitions of regime change (adopting the mean index cut-off), respectively. These regime change dynamics are taken into account when we present our results for the long-run democratic dividend.

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4   Empirical Strategy

This section introduces novel methods to capture the impact of observable and unobservable heterogeneity on empirical estimates of treatment effects, building on the 'common factor' framework (Andrews, 2005; Pesaran, 2006; Bai, 2009). We discuss how we should think about these common factors, what they could represent, and why we do not use some of the many observable proxies adopted in the cross-country growth literature to replace them. We then detail a novel difference-in-difference approach which extracts common factors from control countries to identify the causal effect of a discrete treatment variable in the face of endogenous selection into treatment and non-parallel pre-treatment trends. We close this section by explaining our strategy for presenting the results from these empirical implementations.

4.1   Capturing unobserved heterogeneity using common factors

In our empirical approach we employ common factors to capture time-varying unobserved heterogeneity across countries. When it comes to this unobserved heterogeneity, growth economists have mastered the art of putting a label on "our ignorance" (Abramovitz, 1956), everything we think may matter but we have not measured or cannot measure: total factor productivity (TFP). Whenever we run a cross-country regression of income per capita or its growth on some observed 'determinants', as is our intention here, we need to be concerned about capturing TFP, since its pervasiveness is the source of the perennial 'transmission bias' (Marschak and Andrews, 1944). Relatively tangible candidates capturing elements of TFP growth include investment in R&D, human capital development, infrastructure investment, and innovation incentives in form of tax breaks and grants; less tangible ones include 'absorptive capacity', trust, good citizenship, culture, the spread of the potato, genetic diversity, colonial heritage, the neolithic transition, staple crops, luck and many more.

These exaggerated lists highlight that there is an inherent *dimensionality problem* in cross-country growth empirics: following the seminal work of Barro (1991) empirical studies have included a myriad of growth determinants in their models, far too many to feasibly combine in a single study without running out of degrees of freedom, and the unpopularity

of cross-country growth regressions since the early 2000s at least in part derives from the frequent 'kitchen-sink' approach to growth empirics or the lack of robustness of results to changes in the covariates (Durlauf, 2020). Thus, capturing all or even just the most relevant determinants of TFP with *observable* proxies is an impossible task.

The recent panel time series literature instead has employed *dimensionality-reducing* tools to capture 'interactive fixed effects': global factors affecting all countries, but to a different extent, and local factors affecting a small sub-group of countries in the sample (strong and weak factors: see Chudik and Pesaran, 2013). One popular approach here is to employ cross-section averages of all model variables (Pesaran, 2006), an alternative (which is part of our implementation) the adoption of principle component analysis (PCA) to create estimated proxies for unobserved common factors from regression residuals (Bai, 2009). We now explain how these unobserved common factors can help identify the democracy-growth nexus.

4.2 Heterogeneous Difference-in-Difference Estimation

Recent contributions to the macro panel econometric literature have been able to build bridges to the literature on policy evaluation using difference-in-difference specifications (Gobillon and Magnac, 2016; Chan and Kwok, 2022) and synthetic controls (Xu, 2017). What distinguishes these latest approaches from their canonical predecessors is the adoption of interactive fixed effects in order to address two well-known challenges to identification in these popular methods: (i) the presence of non-parallel trends prior to the policy change evaluated, and (ii) endogenous selection into 'treatment'. Our implementation adopts the Chan and Kwok (2022) PCDID estimator, which estimates a *country-specific* treatment effect and by employing interactive fixed effects allows for correlation between the unobserved determinants of growth and selection into democratic transition or reversal.[14]

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[14]See Section 2 and Eberhardt (2022) for a discussion of potential sources of heterogeneity in the democracy-growth nexus.

Formally, using potential outcomes, define

$$y_{it} = \overline{\Theta}_i \, \mathbf{1}_{\{i \in I\}} \, \mathbf{1}_{\{t > T_{0i}\}} + y_{it}^0, \tag{1}$$

where $\overline{\Theta}_i$ refers to the time-averaged treatment effect on the treated unit i, $\mathbf{1}_{\{i \in I\}}$ is a dummy for the treatment group, and $\mathbf{1}_{\{t > T_{0i}\}}$ is a dummy for the (heterogeneous) treatment date. This is a reduced form model which already incorporates a decomposition of the potentially time-varying heterogeneous treatment effect: $\Theta_{it} = \overline{\Theta}_i + \widetilde{\Theta}_{it}$. We assume that the time-varying idiosyncratic component of this treatment effect over the treatment period is mean zero for treated units, i.e. $E(\widetilde{\Theta}_{it} | t > T_{0i}) = 0$. The full empirical model is

$$y_{it}^0 = \beta_i' x_{it} + u_{it} \qquad u_{it} = \lambda_i' f_t + \epsilon_{it} \tag{2}$$

$$\Rightarrow \qquad y_{it} =: \overline{\Theta}_i \, \mathbf{1}_{\{i \in I\}} \, \mathbf{1}_{\{t > T_{0i}\}} + \beta_i' x_{it} + \mu_i' f_t + \varepsilon_{it}, \tag{3}$$

with the flexible assumption $x_{it} = \Lambda_i' f_t + \nu_{it}$, i.e. any controls x are endogenous due to the common factor structure. f is a set of unobserved common factors and μ is some combination of the λ and Λ parameters. $\overline{\Theta}_i$ is what we seek to estimate, Chan and Kwok (2022) refer to this as ITET, the treatment effect of unit i averaged over the treatment period. The average treatment effect ATET is simply the average of the heterogeneous ITET across countries.

The implementation is straightforward: for the sample of countries which experienced variation in the treatment dummy over time we specify the following regression model

$$y_{it} = \alpha_i + \beta_i \, \mathsf{Dem}_{it} + \gamma_i' X_{it} + \delta_i' \hat{f}_t + \varepsilon_{it}, \tag{4}$$

where y is per capita GDP (in logs $\times 100$), Dem is the democracy dummy, and X is the set of additional controls (population growth and export share of trade). $\hat{f}$ are common factors estimated via PCA from the residuals of a heterogeneous regression of y on X *in those countries which never experienced democracy during the sample period* (control group). These estimated factors can capture the presence of uncommon and/or stochastic trends between treatment and control samples (Chan and Kwok, 2022). The empirical model accommodates

selection into democracy given that we can allow for correlation between the estimated factors, the observable covariates (including the regime dummy), and the country intercept.

Below we present the ATET results for models augmented with one to six estimated factors.[15] Our main specification will be the model augmented with four factors, for which we present results using running line regressions — see the following section.

The main identifying assumptions for the PCDID estimator of β_i are as follows: (i) we can capture all unobservable determinants of economic development with the common factor error structure; and hence (ii) ε_{it} is white noise and therefore orthogonal to all other elements of equation (4). These are standard assumptions for interactive fixed effects models made in the panel time series literature (Pesaran, 2006; Bai, 2009) and in Athey et al. (2021): they imply that the endogeneity surrounding democratic regime change as well as the nonparallel trends are entirely captured by the controls, the factor structure, and the deterministic components in their correlation with the treatment variable.[16]

The main threat to identification derives from idiosyncratic shocks to country i, such as financial crises or natural resource discoveries, which may further or thwart a drive to democratic regime change while simultaneously affecting economic prospects. Existing research suggests that financial crises have a significant international (and hence common factor) dimension (Arellano et al., 2017; Cesa-Bianchi et al., 2019), while oil exploration is guided by global prices (a common factor) and is known to follow rather then lead democratic regime change (Cust and Harding, 2020). Inclusion of additional controls is only warranted if these are exogenous to the treatment dummy conditional on the estimated common factors — we present Wald (χ^2) test results to this effect alongside the ATET estimates.

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[15]In line with the literature we adopt robust regression (Hamilton, 1992) to compute outlier-robust means. Inference is based on a non-parametric variance estimator (Pesaran, 2006).

[16]Since we estimate the common factors there is potential for correlation between the error terms of treated and control countries — this bias can be removed if we require that asymptotically $\sqrt{T}/N_c \to 0$, where N_c is the number of control countries and T is the time series dimension of the panel.

4.3 Conditional Mean Results in Heterogeneous Treatment Models

The models introduced above provide country-specific treatment estimates. Below we present most of our results in graphical form, plotting local predictions for the estimated democracy coefficients $\hat{\beta}_i$ (treatment effect) against the *time spent in (democratic) regime* (treatment length), following the practice introduced in Boese and Eberhardt (2021). Presenting sample average results for country-specific democracy estimates (ATET) introduces all the sample and treatment heterogeneities across countries which blight pooled panel analysis, e.g. differential time spent in the sample, differential year of entry into the sample, countries moving back and forth between regimes. The ATET also ignores the arguments for a nonlinear relationship over the length of treatment developed above (Gerring et al., 2005).

Our graphical results are based on multivariate smoothing of the country estimates: running line regressions, which are k nearest neighbour locally linear regressions, allow us to *jointly* condition on all of the above characteristics. Rather than a noisy, bivariate scatter of the democracy-growth estimates, $\hat{\beta}_i$, against a single variable ('years in regime'), we plot the *predicted* values from this multivariate smoothing procedure against the years spent in regime.[17] Standard errors are calculated based on the local weighted least squares fit.

Furthermore, when moving to mid- and low-level democracy indices we can condition on the country-specific value and variability of one or more *'rival'* indices: for instance, if the 'mid-level' polyarchy index in country i rises above the full sample mean in 1990 ('regime change') and remains above this threshold until 2018, then our running line regression for the income effect of polyarchy against length of time in the polyarchy regime, in addition to the regime change count and country series start year, controls for country i's liberal component index value in 1990 as well as the standard deviation of that index over the 1990-2018 period. For a low-level indicator, such as freedom of association, under the same scenario the regression controls for the values of the liberal component (mid-level 'rival'), as well as freedom of expression, and clean elections indices (low-level 'rivals') in 1990 along with the

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[17]Binary indicators are accounted for linearly rather than locally-linearly.

standard deviations for each of these indices over 1990-2018. While each $\hat{\beta}_i$ is estimated from a country-regression as defined in equation (4), the cross-country profile of the 'treatment effect' of regime change thus accounts for the evolution of other political institutions at critical points in time — hence we refer to these results as 'horse races' between rival mid- and low-level democracy indicators.

In Appendix D we investigate whether explicitly modelling one institutional building block while conditioning on another — for instance, free and fair elections may only lead to economic prosperity if civil rights are secure and executive powers constrained by the legislative or jurisprudence — leads to substantially different empirical results. It does not.

5 Empirical Results

5.1 High-level Indicators of Democracy

We present robust mean ATET estimates for 'democracy dummies' derived from five high-level democracy indicators, in columns [1] to [5] of Table 1: all of these estimates presented below adopt the PCDID specification with population growth and exports/total trade as additional controls and augmented with four estimated factors from the respective control groups — in a lower panel of the table we report ATET estimates for alternative specifications augmented with one to six factors and the Wald test results for the exogeneity of the two control variables. The table also indicates the size of the treatment and control samples. There is substantial heterogeneity between the estimates for PolityIV and V-Dem high-level indicators as well as the size of respective treatment and control samples. All ATET estimates, with the exception of the democracy definition by Boix et al. (2013), are statistically significant and positive.[18]

Panel (a) of Figure 3 presents the smoothed predictions from running line regressions for the country-specific coefficients of the five high-level indicators of democracy plotted against treatment length, controlling for the number of regime changes as well as the start year of each country series. Here and in all following graphs a filled (hollow) marker indicates statistical (in)significance at the 10% level, and predicted values (markers) are minimally perturbed to ease illustration. We suggest that democracy estimates at the extremes (0-5 years and 65-70 years in regime) are likely biased as they either have very few observations 'in regime' or 'out of regime' to reliably estimate a difference-in-difference; as a reminder of this we add vertical lines at these values in all plots. The Liberal Democracy dummy, the Regimes of the World definition of democracy and the more conservative cut-off for the PolityIV polity2 variable (>5) all yield similar profiles, more concave and with lower maxima for the latter two. Results for the more liberal PolityIV polity2 cutoff (>0, dark blue line), which partly underlies the democracy

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[18]The alternative factor augmentations, as indicated in a lower panel of the table, yield qualitatively very similar results for three or five factors as the specification augmented with four factors presented in detail.

Table 1: Regime Threshold Models of Democracy and Economic Development

	High-level indicators					Mid-level indicators	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Polity IV Cutoff >=1	4.190* [2.488]						
Polity IV Cutoff >=6		4.576* [2.408]					
V-Dem ROW Cutoff >=2			9.685*** [2.435]				
V-Dem Lib. Democracy > mean				9.656*** [2.519]			
Boix et al. Dummy					3.959 [2.757]		
V-Dem Polyarchy > mean						6.550*** [1.892]	
V-Dem Lib. Component > mean							5.007* [2.614]
Test for Exogenous Controls:							
χ^2	1.06	6.16	9.685	0.47	1.80	6.54	2.55
p-value	.59	.05	.04	.79	.41	.04	.28
Treatment Sample:							
Countries	89	78	76	66	69	81	76
Observations	5,096	4,570	4,281	3,782	3,641	4,572	4,316
Median Sample size (yrs)	62	65	62	63	62	62	60
Median Time in Regime (yrs)	27	23	24	28	23	26	26
Control Sample:							
Countries	33	49	52	59	48	45	40
Observations	1,498	2,313	2,522	2,869	1,968	2,149	1,859
Alternative Specifications:							
1 factor	2.738	9.121***‡	8.353***‡	7.395***‡	3.384	7.186***‡	6.977**
2 factors	0.905	5.562**‡	8.298***‡	9.600***	3.497	10.677***‡	5.277**
3 factors	3.899*	6.201**‡	9.342***	9.684***	2.713	7.392***‡	6.631**
4 factors	4.190*	4.576*‡	9.685***‡	9.656***	3.959	6.550***‡	5.007*
5 factors	4.033**	6.398***‡	8.912***‡	9.417***	3.010	8.176***‡	6.317**‡
6 factors	5.828***	5.141**‡	7.937***‡	10.399***	4.296	8.018***‡	8.871***‡

Notes: The table reports outlier-robust mean estimates for the Chan and Kwok (2022) Principal Component Difference-in-Difference (PCDID) estimator for empirical models of per capita GDP (dependent variable), see Equation (4). The respective democracy indicator is defined on the basis of: the two alternative Polity IV polity2 cutoffs, the V-Dem ROW cut-off, the mean cutoffs for the V-Dem liberal democracy, polyarchy and liberal component indeces, and the indicator variable by Boix et al. (2013) in [5]. The estimates represent ATET and can be interpreted as the percentage increase in per capita GDP over the control group of countries which did not democratise. Statistical significance at the 10%, 5% and 1% level is indicated as *, **, and ***, respectively. Population growth and Exports/Total Trade are included but not reported. We provide Wald tests for their exogeneity. All results are for the PCDID specification with *four* estimated factors. In the final rows of the table we present the ATET estimates if we include between 1 to 6 factors. ‡ indicates that the Wald test for exogenous controls is rejected.

Figure 3: High-Level Indicators for Democracy and Economic Development
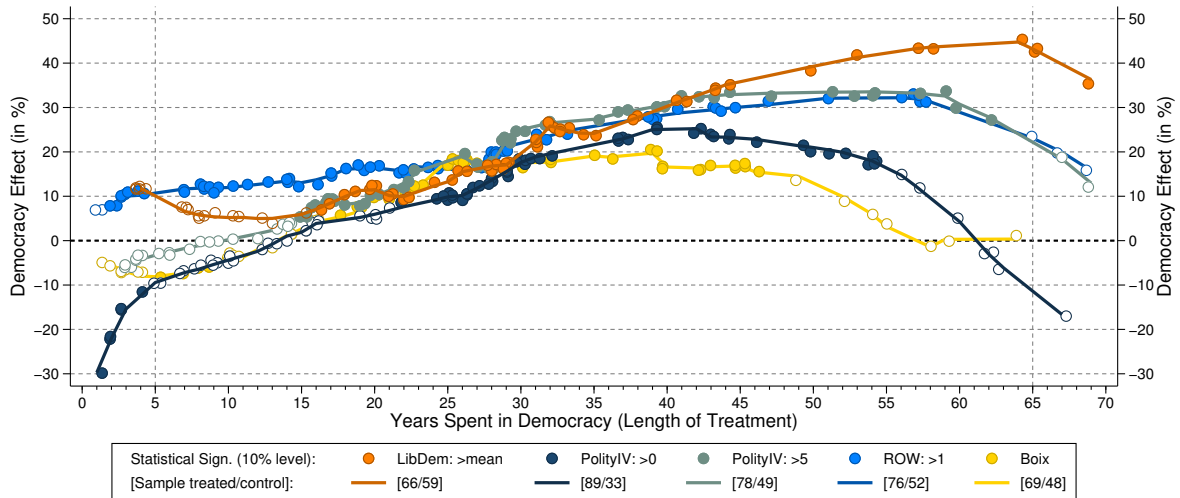
(a) Five High-Level Democracy Indicators
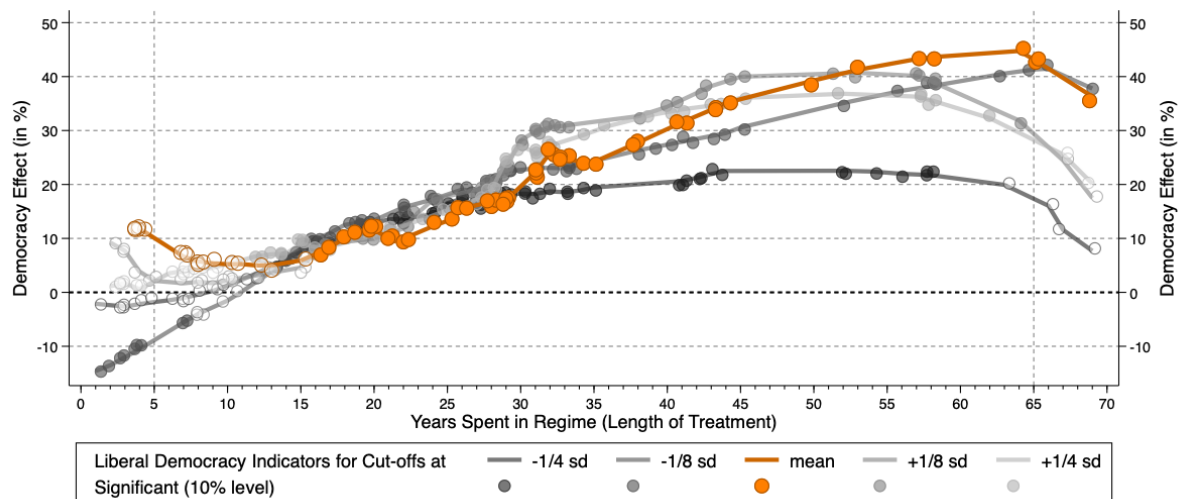
(b) Liberal Democracy (various cutoffs relative to the standardised index mean)

Notes: In the upper panel we present the country-specific PCDID running line estimates for five different high-level indicators for democracy as indicated. The lower panel focuses on democracy indicators derived from the V-Dem liberal democracy index and we adopt alternative cutoffs around the standardised mean (-1/4sd, -1/8sd, mean, +1/8sd, +1/4sd,). All estimates presented are from running line regressions, which further linearly condition on (i) the number of times a country experienced regime change, and (ii) the start year of the country series. The estimates can be interpreted as locally averaged ITET, with the scales indicating the percentage increase in per capita GDP associated with the number of years spent in democracy (x-axis). The filled (white) markers indicate statistical (in)significance at the 10% level. The markers are minimally dispersed for illustrative purposes. Table 1 reports the median number of years of 'treatment' for each model, from 23 (Boix) to 28 (LibDem).

definition in Acemoglu et al. (2019), are qualitatively identical to those by these authors: a long-run effect of around 20% higher per capita income after 30 years in democracy, although our much longer sample indicates that in the very long run this effect evaporates. Adopting liberal democracy (orange line) results in substantially higher economic development in the long-run and the relationship is next to linear: 50 years of liberal democracy are associated with 40% higher income per capita, implying an annualised growth effect of 0.8%. In line with arguments laid out above the initial years in regime do not show a significant growth effect, there is even some regression before the democratic dividend begins to rise from around 15 years in regime.

Panel (b) of the same figure focuses on the robustness of the running line regression result for liberal democracy, where the mean as a cut-off for the dummy is presented using the orange line and markers while different shades of grey represent estimates varying the cut-off between $1/4$ of a standard deviation below the mean and $1/4$ of a standard deviation above the mean. All results indicate a positive and significant (in statistical and economic terms) democracy effect, though alternative cutoffs may lead to different conclusions about the nature of the liberal democracy-growth relationship over the long run (around the mean cutoff the effect over treatment length is broadly linear).

5.2   Drilling Down (i): Mid-Level Indicators of Democracy

For the V-Dem mid-level indicators (Table 1, columns [6]-[7]), polyarchy and the liberal component, we can see somewhat lower ATET estimates than for the encompassing liberal democracy indicator, which in case of the liberal component is only borderline statistically significant. Figure 4 studies these mid-level indicators in some more detail, polyarchy in panel (a) and the liberal component in panel (b); in each case the coloured line is the running line estimate when we adopt the mean index as the cut-off for the dummy variable, while the alternative lines in shades of grey are the robustness checks for lower or higher cut-offs. It appears that results across cut-offs are very similar for the polyarchy variable, whereas for the liberal component this is only the case up to around 45 years of 'treatment.'

In panel (c) we run horse races: the polyarchy running line regression here further con-

Table 2: Lower-level Institutions and Economic Development

	Polyarchy			Liberal Component		
	[1]	[2]	[3]	[4]	[5]	[6]
Freedom of Expression > mean	5.568* [3.062]					
Freedom of Association > mean		5.892* [3.221]				
Free and Fair Elections > mean			6.791*** [2.199]			
Rule of Law > mean				4.934*** [1.747]		
Judicial Constraints > mean					8.978*** [2.790]	
Legislative Constraints > mean						5.671* [3.287]
Test for Exogenous Controls:						
χ^2	3.83	9.65	4.50	2.02	4.63	5.89
p-value	.15	.01	.11	.36	.10	.05
Treatment Sample:						
Countries	92	85	82	81	66	83
Observations	5,195	4,826	4,633	4,526	3,816	4,736
Median Sample size (years)	58	58	58	58	58	63
Median Time in Regime (years)	29	29	24	29	27	29
Control Sample:						
Countries	23	24	39	34	41	39
Observations	901	1,030	1,764	1,585	1,806	1,761
Alternative Specifications:						
1 factor	2.160‡	0.563‡	5.740**‡	7.681***	9.064***‡	5.300‡
2 factors	5.460	5.560‡	5.912**	3.086	10.464***‡	4.516
3 factors	5.760*	5.510*‡	7.132***	5.210***	9.613***	6.610*
4 factors	5.568*	5.892*‡	6.791***	4.934***	8.978***	5.671*‡
5 factors	5.577*	5.602*‡	5.792***	4.913***	8.474***	7.258**‡
6 factors	6.170**	5.623*‡	6.379***‡	5.420***	8.700***‡	6.566**‡

Notes: The table reports outlier-robust mean estimates for the Chan and Kwok (2022) Principal Component Difference-in-Difference (PCDID) estimator for empirical models of per capita GDP (dependent variable), see Equation (4). The respective democracy indicator is defined on the basis of the components of polyarchy (electoral democracy) in [1] to [3], and components of the liberal component in [4] to [6]. For all other details see Table 1.

trols for the index value of the liberal component (in the year of regime change) as well as its standard deviation during the time in the polyarchy regime and in analogy for the liberal component running line regression. The grey bars highlight the distribution of country estimates across treatment length. Both mid-level measures of democracy imply positive effects on economic development in the long-run, though it is clear that these are much more modest, around 10%, for the liberal component, than for polyarchy — it would appear that the long-run growth effect we detect in the analysis of liberal democracy above is primarily driven by the polyarchy component.[19] An alternative take on these results is that electoral democracy is *not exclusively* driving economic prosperity, and turning to our lower tier analysis we can now also spell out which institutions matter *at which point* in the democratic 'endeavour' of countries.

5.3 Drilling Down (ii): Low-Level Indicators of Democracy

Figure 5 presents the horse races among the constituent components of polyarchy and the liberal component — running line estimates for alternative regime cutoffs without conditioning for 'rival' institutions are provided in Appendix Figures B-1 and B-2, the associated ATET estimates are presented in Table 2. The running line estimates, say for clean elections, marked in orange in Panel (a) of Figure 5, control for the means and standard deviations of the other two sub-components (Freedom of Expression and Freedom of Association) as well as of the liberal component in the way described in Section 4.3. The grey shaded bars indicate the distribution of country-estimates across the range of 'years of treatment' and we use vertical dashed lines to separate out the extremes of the distribution. Whenever we talk of 'regime change' in the following we refer to the moment when the institutional index in question (e.g. clean elections index) passes the adopted threshold (i.e. the mean index value across all 157 countries over 1949-2018; for results using the cut-off of 0.5 see Appendix C).

The components of polyarchy, presented in Panel (a), result in varied long-run growth effects: while the trajectories of Freedom of Expression and Clean Elections are clearly pos-

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[19]Our findings are qualitatively unchanged if we use 0.5 as cut-off — see Appendix Figure C-2.

Figure 4: Mid-level Democracy Indicators and Horseraces

(a) Polyarchy Indicator for Democracy: Different Cut-offs

(b) Liberal Component Indicator for Democracy: Different Cut-offs
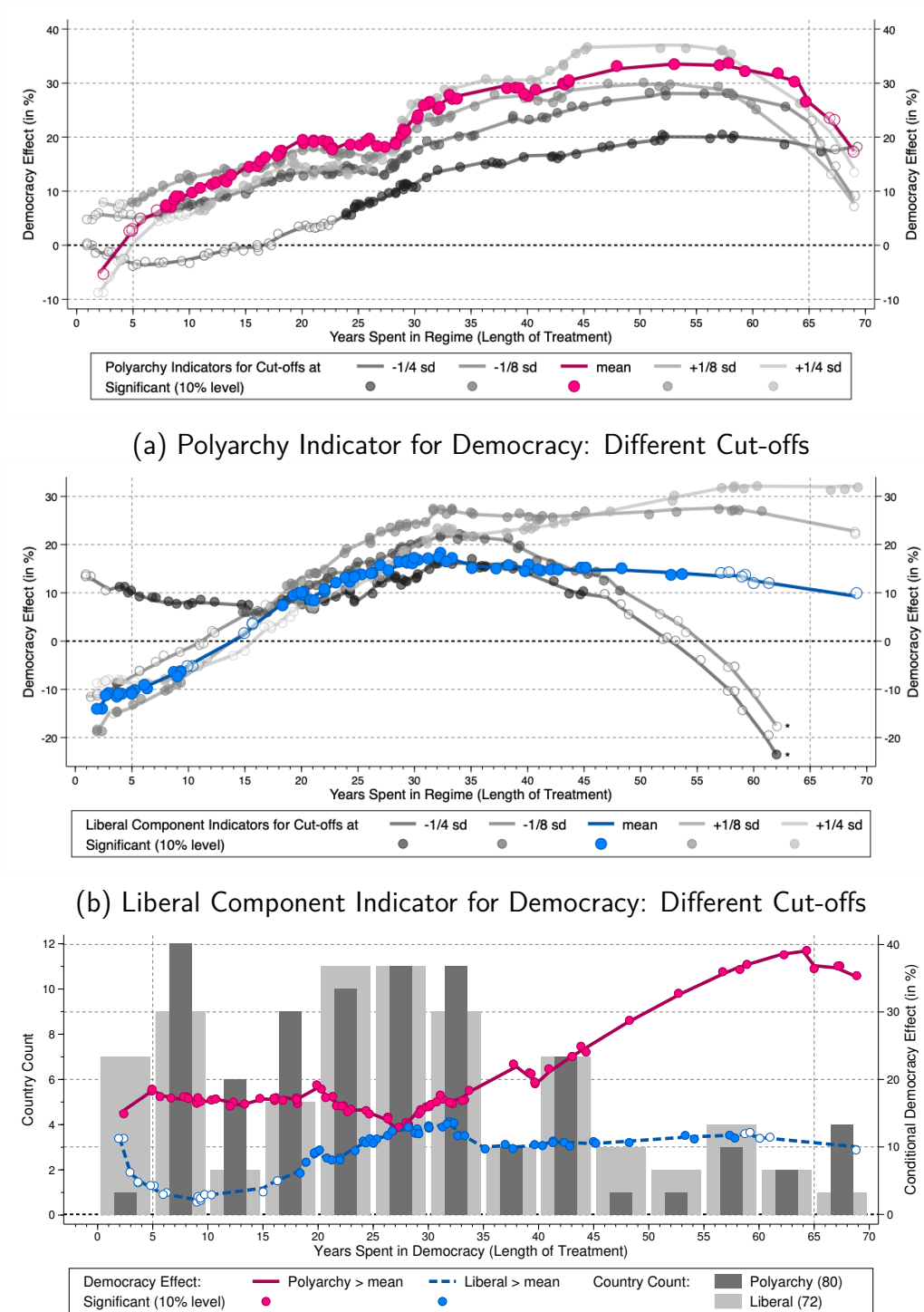
(c) Horse race: Conditional 'polyarchy' and 'liberal component' effects

Notes: Panels (a) and (b) present running line plots for polyarchy and the liberal component using different cutoffs. ∗ We exclude one (significant) estimate for ease of presentation. In Panel (c) we run a horse race between the estimates of country results for the two mid-level democracy indicators: the polyarchy (liberal component) running line estimates linearly control for the value of the liberal component (polyarchy) index in the year of regime change, the standard deviation of the same index over the treatment period, the number of regime switches and sample start year of each country. The bars indicate the country count for each 5-year interval of experience of democracy. Table 1 reports the median number of years of 'treatment': 26, respectively.

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itive and statistically significant, the effect of Freedom of Association peters out and turns insignificant (in statistical and economic terms). The ability to form parties and civil society organisations (Freedom of Association) nevertheless clearly provides for a large positive effect in the early stages after regime change. In contrast, press freedom and the ability for citizens to discuss political matters freely (Freedom of Expression) appear to take a very long time before bearing economic fruits. Free and fair elections appear as a significantly positive driver of economic prosperity within the first decade of regime change and throughout the time period spent in regime.[20]

The building blocks of the liberal component, presented in Panel (b) of the same figure, suggest very strong positive effects of judicial constraints (covering independent courts and respect for the constitution and court rulings) and the rule of law (equality before the law and individual liberties) in the first phase following regime change, up to around 30 and 40 years, respectively, but in the very long-run these institutions no longer contribute to economic prosperity.[21] Legislative constraints on the executive, on the other hand, are initially less important but their effect slowly and steadily increases with years spent in regime.[22] The more muted long-run effect of the mid-tier liberal component can hence be explained by the reduced economic significance of the rule of law and judicial constraints on the executive, while it is clear that guarantees that government agencies can question, investigate and exercise oversight over the executive are an important factor for long-run prosperity.[23] In Appendix D we demonstrate

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[20]Adopting a 0.5 index cutoff, Panel (a) of Appendix Figure C-5 shows very similar trajectories for Freedom of Association and Clean Elections, with the results for Freedom of Expression much more non-linear, although the patterns of initial insignificance (beyond 5 years in regime) and later economic and statistical significance (from around 30 years) is confirmed.

[21]If Turkey and the Philippines are excluded from this analysis then the judicial constraints effect remains statistically insignificant beyond 45 years 'in regime'.

[22]The sharp negative effect in the initial years seems to be driven by the experiences of Egypt, Libya and Algeria.

[23]Adopting a common threshold of 0.5 for all institutional building blocks of the liberal com-

Figure 5: Horseraces between Low-level Indicators of Democracy
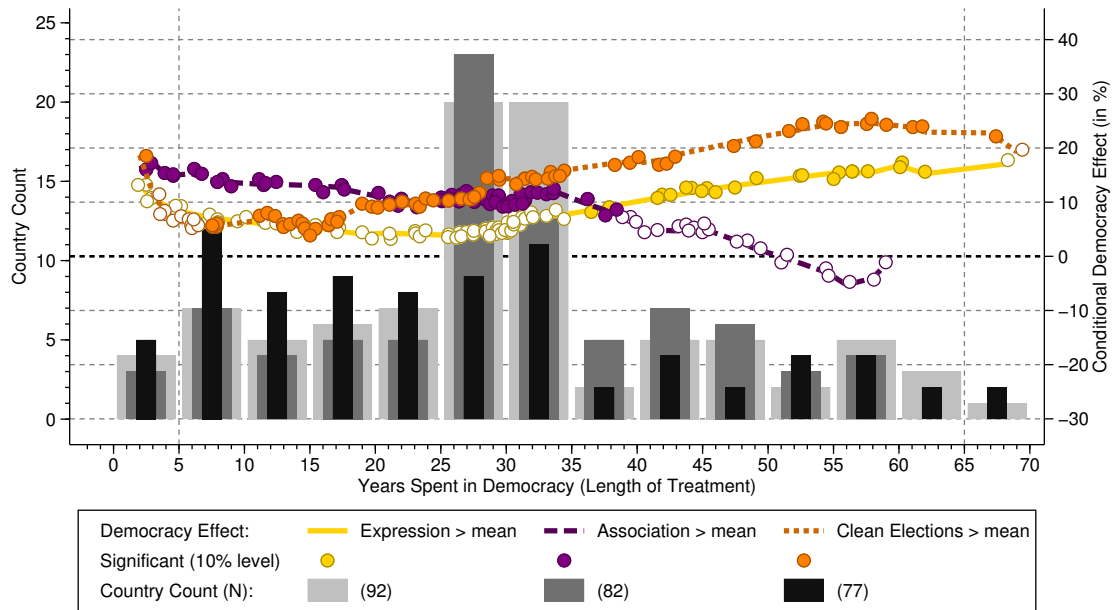
(a) Components of Electoral Democracy (Polyarchy)
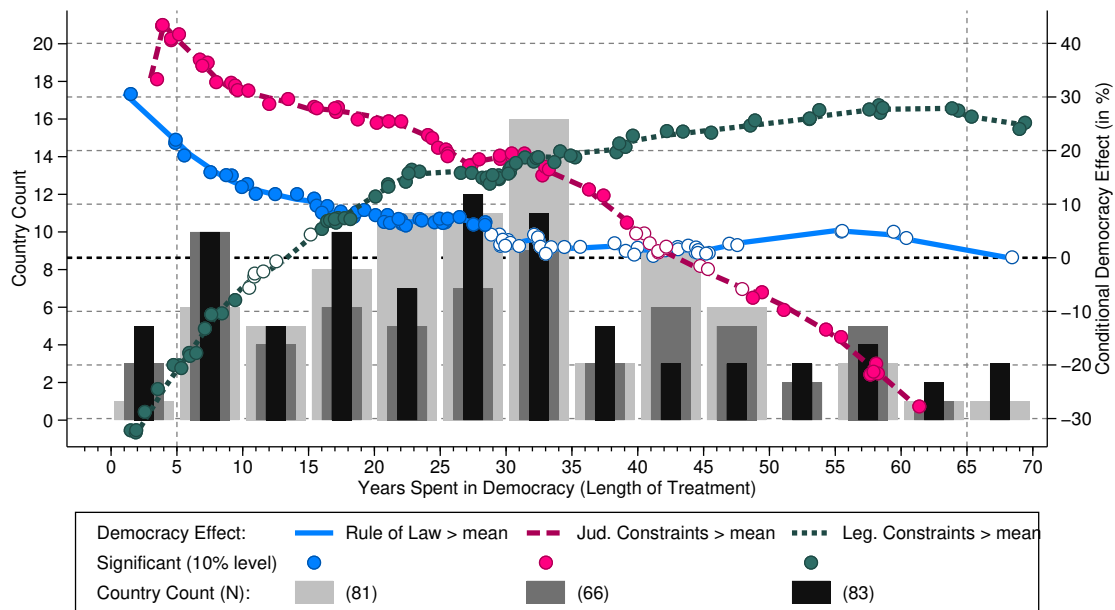
(b) Components of the Liberal Component

Notes: We run horse races between the estimates of country results for the low-level democracy indicators: the running line regressions of the growth effect (y-axis) and the years of treatment (x-axis) additionally condition on the value and standard deviation of 'other' mid- and low-level democracy indices; e.g. for the 'freedom of expression' analysis this is the liberal component (mid-level 'rival' to polyarchy), freedom of association, and clean elections (both 'rival' subcomponents of polyarchy). In analogy for the other subcomponents presented. Shaded bars indicate the country distributions of treatment years, full (hollow) markers in the running line plots indicate statistical (in)significance at the 10% level. Table 2 reports the median number of years of 'treatment' for each model: 24 for clean elections, 29 for the other two polyarchy components; 27 for judicial constraints, 29 for the other two liberal components.

that explicitly modelling one institutional building block while conditioning on another does not lead to qualitatively different empirical results.

Taken together, these lower tier findings rationalise the relative significance of polyarchy versus the liberal component in the long-run growth process. At the same time, they highlight the differential economic significance of individual institutions at early stages of regime change, while further underlining that despite the seeming dominance of polyarchy the elements of the liberal component are far from irrelevant for economic development. Minimalist definitions of democracy, limited to electoral democracy, cannot capture the full picture of the economic implications of democratic regime change.

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ponent (see Panel (b) of Figure C-5) confirms the above patterns with regard to the two elements of executive constraints, while the effect of rule of law differs quite markedly in that it is negative in the initial years and then continuously improves with time in regime. It should be noted that the full sample mean for rule of law, at 0.62, is markedly higher than that for all other lower-tier institutional indices.

6 Concluding Remarks

In this study we adopt heterogeneous difference-in-difference (PCDID) implementations to trace the positive and significant causal relationship between liberal democracy and long-run economic growth to its constituent institutional components. Building on a conceptual framework and with the help of hierarchical V-Dem data we are able to study the lower tier building blocks of liberal democracy, relating to institutions such as Freedom of Expression or Judicial Constraints on the Executive, in their significance as 'drivers' of the positive long-run democracy-growth nexus. Since studying individual institutions in isolation would be equivalent to asking whether the steering wheel *on its own* is relevant for the movement of a vehicle, we employ two alternative strategies to condition our results on 'rival' institutions, equivalent to additionally accounting for the engine, wheels, and power transmission in our vehicle analogy: first, we condition on the evolution of the rival institutions *after* our PCDID estimation, and second, we devise an interaction model which captures the treatment effect in the presence of both sets of institutions. The patterns emerging from these two alternative approaches are very similar, suggesting that the first approach does not paint a misleading picture of the institutional driving forces of the liberal democracy-growth nexus.

Our results provide a number of important insights into the democracy-growth nexus and the question 'how democracy causes growth'. First, our focus on an encompassing concept of 'liberal democracy' which captures aspects related to the electoral process, civil liberties, and constraints on the executive, and which matches the conceptual construct developed in recent work by Mukand and Rodrik (2020), leads us to conclude that democratic regime change has a perpetual growth effect, on the order of around 0.8% per annum. Existing work in this literature has found a levels effect which implies the dividends from regime change accrue as a one-off effect (albeit over a time horizon of 20 to 30 years), e.g. Acemoglu et al. (2019). Our finding is important because it implies that liberal democracy has an economic dividend which keeps on giving. . . in perpetuity.

Second, we are able to trace this positive effect of democracy on growth through lower tiers of institutions, which consistently shows that electoral democracy and its constituent

components are important drivers of the long-run growth effect of liberal democracy. The liberal component and its constituent elements clearly *do* matter for economic prosperity, also in the long-run, but perhaps less substantially so. While we do not explicitly study sequencing of different political and economic institutions, one interpretation of our findings is that those institutions typically associated with Douglass North and a long line of economists (labelled 'incentives and opportunities' in Figure 1) are of particular relevance for the growth process in the decade(s) immediately after democratic regime change, whereas the institutions political scientists associate with a minimal definition of democracy (the 'distribution of political power' in the same framework) *additionally* are also relevant in the very long-term beyond these stages. Third, in our analysis of high and mid-level democracy indicators as well as lower-level institutions we find that a focus on at most 25 or 30 years 'in regime' during the post-WWII era, as is the practice in the recent literature (Acemoglu et al., 2019), leads to qualitatively very different conclusions from our analysis over 1949-2018, which can trace the effect of a much longer period spent 'in regime.'[24]

In the light of recent global developments, our findings can act as a stark warning to policymakers about the economic prospects from change in political institutions: the past decade has seen substantial erosion of democratic institutions across the globe — Figure 6 charts the share of our sample of 'treated' countries for the analysis of 'liberal democracy' in which the index for the respective democratic institution *declined* over the 2009-2018 period (i.e. prior to the emergence of Covid-19 which triggered temporary restriction of many civil liberties and other institutions in many countries). Exactly half of the treated sample which, following our definition, are still classified as Liberal Democracies in 2018 (light blue bar) saw a decline in this Tier 1 index; the median change for these 33 countries was a drop of 5.6% from their 2009 index value. If we ignore whether countries are classified as Liberal Democracy in 2018 or not (dark pink bar) then closer to two-thirds of countries saw a decline, with a

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[24]In the liberal democracy (polyarchy/liberal component) analysis the upper quartile of our sample experienced 34 (38-39) years in regime; these numbers are even higher for the analysis of some lower-tier institutions.

Figure 6: Erosion of Democratic Institutions (2009-2018)
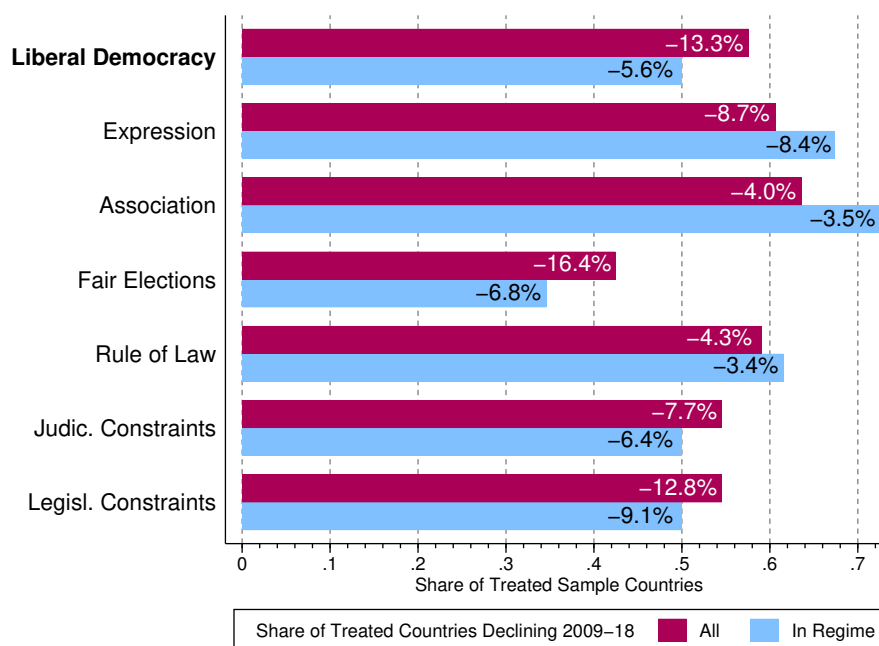
Notes: The figure charts the share of countries in the treatment sample for 'liberal democracy' (N=66; orange line in Panel (a) of Figure 3) for which the respective index *declined* over the 2009-2018 period. We report two shares for each institution: one for all countries in the treatment sample and one for those countries which in 2018 were 'in regime' (i.e. above the mean value of the respective institutional index). Liberal Democracy is the Tier 1 concept, Freedom of Expression, Freedom of Association and Fair Elections are Tier 3 components of electoral democracy, the remaining institutions are Tier 3 components of the liberal component. The percentages reported represent the median change in the respective index from 2009 to 2018 among those countries which experienced decline.

median decline of 13.3%. Studying the constituent components of electoral democracy and the liberal component in the remainder of the chart, we can see that with the exception of 'Fair Elections' *all* these democratic institutions declined in half or more sample countries. It is interesting to point out that the median proportional changes among countries which did see erosion of democratic institutions were most substantial for Legislative Constraints on the Executive, Freedom of Expression and Fair Elections (-9.1%, -8.4% and -6.8%, respectively): exactly those institutions we highlighted as being the lower-tier driving force of the democracy-growth nexus in the long-run. The global decline in democratic institutions has significant implications for long-term economic prosperity: if the current trend continues this may well erode the perpetual growth effect of democratisation we find and trace in this paper.

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Online Appendix — not for publication

A Data Appendix

Table A-1: V-Dem political institutions: Indices (V-Dem v11)

		(I) High-level Index of Democracy and Associated Regime Definitions
Liberal Democracy	*v2x_libdem*	"[A]n electoral democracy in combination with constraints on the executive by the judiciary as well as the legislature and transparent and rigorously-enforced laws and individual liberties" (LLT 2017: 1).

		(II) Mid-level Indices of Democracy
(a) Electoral Democracy (Polyarchy)	*v2x_polyarchy*	Electoral participation and competition, clean elections, and inbetween elections freedom of expression and association (LLT 2017: 1).
(b) Liberal Component	*v2x_liberal*	Constitutionally protected civil liberties, strong rule of law, an independent judiciary and effective checks and balances on the executive (LLT 2017: 1).

		(III) Low-level Indices of Democracy
		(a) Pertaining to Electoral Democracy/Polyarchy
(i) Freedom of expression and alternative sources of information	*v2x_freexp_altinf*	The extent to which: "government respect[s] press and media freedom, the freedom of ordinary people to discuss political matters at home and in the public sphere, as well as the freedom of academic and cultural expression" (C: 42).
(ii) Freedom of association	*v2x_frassoc_thick*	The extent to which: "parties, including opposition parties, [are] allowed to form and to participate in elections, and civil society organizations [are] able to form and to operate freely" (C: 43).
(iii) Clean elections	*v2xel_frefair*	The extent to which: "elections [are] free and fair" (C: 44).
(iv)* Elected officials	*v2x_elecoff*	The extent to which: "the chief executive and legislature [are] appointed through popular elections" (C: 43).
(v)* Share of population with suffrage	*v2x_suffr*	"What share of adult citizens as defined by statute has the legal right to vote in national elections?" (C: 43)
		(b) Pertaining to the Liberal Component
(i) Equality before the law and individual liberties	*v2xcl_rol*	The extent to which: "laws transparent and rigorously enforced and public administration impartial, . . . citizens enjoy access to justice, secure property rights, freedom from forced labor, freedom of movement, physical integrity rights, and freedom of religion" (C: 45).
(ii) Judicial constraints on the executive	*v2x_jucon*	The extent to which: "the executive respect the constitution and comply with court rulings, and. . . the judiciary [is] able to act in an independent fashion" (C: 46).
(iii) Legislative constraints on the executive	*v2xlg_legcon*	The extent to which: "the legislature and government agencies e.g., comptroller general, general prosecutor, or ombudsman [are] capable of questioning, investigating, and exercising oversight over the executive" (C: 46).

Notes: * Not included in the analysis – see maintext for details. The labels in the first column are the full names given to respective concepts in V-Dem (we adopt version 11, C21), the second column reports the exact variable name, the third column gives a brief definition; citations: LLT – Lührmann et al. (2018); C – Coppedge et al. (2019); C21 – Coppedge et al. (2021). Return to Section 3.1 (Concepts and Data Sources) in the maintext.

Table A-2: Sample Makeup

	ISO	Country	Start	End	Obs	Miss	GDP per capita			Liberal Democracy			Regime Change					
							Base	End	Δpa	Base	End	Δpa	+LD	-LD	+Pol	-Pol	+Lib	-Lib
1	AFG	Afghanistan	1959	2018	51	9	1,307	1,935	0.7%	0.07	0.19	1.7%	C	C	C	C	C	C
2	AGO	Angola	1951	2018	61	7	1,715	7,771	2.2%	0.04	0.21	2.5%	C	C	C	C	C	C
3	ALB	Albania	1982	2018	37	0	3,783	11,104	2.9%	0.06	0.42	5.4%	2	1	1	0	1	0
4	ARE	UAE	1977	2018	40	2	41,915	76,398	1.4%	0.05	0.09	1.6%	C	C	C	C	C	C
5	ARG	Argentina	1953	2018	66	0	7,769	18,556	1.3%	0.21	0.63	1.7%	2	1	4	3	3	2
6	ARM	Armenia	1993	2018	26	0	4,130	11,454	3.9%	0.34	0.34	0.0%	C	C	1	1	1	0
7	AUS	Australia	1949	2018	70	0	11,536	49,831	2.1%	0.74	0.82	0.1%	A	A	A	A	A	A
8	AUT	Austria	1949	2018	66	4	5,249	42,988	3.0%	0.62	0.76	0.3%	A	A	A	A	A	A
9	AZE	Azerbaijan	1993	2018	26	0	4,315	16,628	5.2%	0.18	0.06	-4.2%	C	C	C	C	C	C
10	BDI	Burundi	1970	2018	49	0	893	651	-0.6%	0.07	0.05	-0.9%	C	C	C	C	C	C
11	BEL	Belgium	1998	2018	21	0	31,481	39,756	1.1%	0.81	0.82	0.1%	A	A	A	A	A	A
12	BEN	Benin	1961	2018	58	0	1,482	2,220	0.7%	0.23	0.49	1.3%	1	0	1	0	1	0
13	BFA	Burkina Faso	1962	2018	55	2	1,060	1,590	0.7%	0.23	0.52	1.4%	2	1	2	1	1	0
14	BGD	Bangladesh	1974	2018	45	0	872	4,099	3.4%	0.20	0.11	-1.3%	C	C	2	2	C	C
15	BGR	Bulgaria	1956	2018	38	25	3,392	18,444	2.7%	0.06	0.52	3.5%	1	0	1	0	1	0
16	BHR	Bahrain	2002	2018	17	0	19,488	39,499	4.2%	0.07	0.04	-3.0%	C	C	C	C	C	C
17	BIH	Bosnia & Herz.	1994	2018	25	0	3,017	10,461	5.0%	0.06	0.35	7.0%	1	0	1	0	1	0
18	BLR	Belarus	1993	2018	26	0	9,077	18,727	2.8%	0.45	0.11	-5.4%	0	1	0	1	0	1
19	BOL	Bolivia	1949	2018	70	0	3,083	6,696	1.1%	0.07	0.36	2.3%	1	0	1	0	1	1
20	BRA	Brazil	1949	2018	70	0	2,204	14,034	2.6%	0.26	0.60	1.2%	1	0	1	0	1	1
21	BRB	Barbados	1959	2018	56	4	5,053	11,995	1.4%	0.37	0.66	1.0%	A	A	A	A	A	A
22	BWA	Botswana	2001	2018	18	0	8,083	15,842	3.7%	0.61	0.58	-0.3%	A	A	A	A	A	A
23	CAF	Central Afr. Rep.	1961	2018	54	4	1,597	623	-1.6%	0.12	0.25	1.3%	C	C	C	C	C	C
24	CAN	Canada	1949	2018	70	0	11,260	44,869	2.0%	0.63	0.77	0.3%	A	A	A	A	A	A
25	CHE	Switzerland	1949	2018	70	0	10,944	61,373	2.5%	0.56	0.86	0.6%	A	A	A	A	A	A
26	CHL	Chile	1949	2018	70	0	5,710	22,105	1.9%	0.27	0.80	1.6%	2	1	2	1	1	1
27	CHN	China	1979	2018	40	0	1,859	13,102	4.9%	0.05	0.05	0.2%	C	C	C	C	C	C
28	CIV	Cote d'Ivoire	1961	2018	58	0	2,114	3,714	1.0%	0.15	0.37	1.6%	1	0	2	1	2	1
29	CMR	Cameroon	1963	2018	56	0	1,366	2,888	1.3%	0.07	0.13	1.0%	C	C	C	C	C	C
30	COG	Congo, Rep.	1961	2018	58	0	2,020	5,715	1.8%	0.19	0.11	-1.0%	C	C	1	1	1	1
31	COL	Colombia	1949	2018	70	0	3,359	13,545	2.0%	0.09	0.51	2.5%	1	0	2	1	1	0
32	COM	Comoros	1970	2018	46	3	961	1,724	1.2%	0.06	0.21	2.4%	1	1	2	2	1	1
33	CPV	Cape Verde	1971	2018	48	0	1,435	6,831	3.3%	0.03	0.68	6.3%	1	0	1	0	2	1
34	CRI	Costa Rica	1949	2018	70	0	3,384	14,686	2.1%	0.21	0.84	2.0%	1	0	1	0	A	A
35	CUB	Cuba	1949	2018	46	24	2,482	8,326	1.7%	0.32	0.09	-1.9%	C	C	C	C	0	1
36	CYP	Cyprus	1951	2018	68	0	2,782	27,184	3.4%	0.10	0.76	3.0%	1	0	1	0	1	0
37	CZE	Czech Republic	1994	2018	25	0	13,518	30,749	3.3%	0.83	0.71	-0.6%	A	A	A	A	A	A
38	DEU	Germany	1951	2018	68	0	6,704	46,178	2.8%	0.78	0.83	0.1%	A	A	A	A	A	A
39	DJI	Djibouti	1982	2018	37	0	3,043	3,296	0.2%	0.08	0.12	1.1%	C	C	C	C	C	C
40	DNK	Denmark	1949	2018	70	0	10,351	46,312	2.1%	0.86	0.89	0.0%	A	A	A	A	A	A
41	DOM	Dominican Rep.	1951	2018	54	14	1,780	15,912	3.2%	0.03	0.28	3.2%	1	1	2	1	C	C
42	DZA	Algeria	1951	2018	63	5	2,147	14,228	2.8%	0.10	0.16	0.7%	C	C	C	C	C	C
43	ECU	Ecuador	1949	2018	67	3	2,815	10,639	1.9%	0.19	0.48	1.3%	2	1	1	0	3	2
44	EGY	Egypt	1951	2018	68	0	1,443	11,957	3.1%	0.19	0.12	-0.7%	C	C	C	C	0	1
45	ESP	Spain	1949	2018	70	0	3,435	31,497	3.2%	0.06	0.79	3.6%	1	0	1	0	1	0
46	EST	Estonia	1993	2018	26	0	12,207	27,409	3.1%	0.82	0.85	0.2%	A	A	A	A	A	A
47	ETH	Ethiopia	1951	2018	68	0	630	1,838	1.6%	0.02	0.15	2.7%	C	C	C	C	C	C
48	FIN	Finland	1949	2018	70	0	6,604	38,897	2.5%	0.76	0.84	0.1%	A	A	A	A	A	A
49	FRA	France	1949	2018	70	0	7,884	38,516	2.3%	0.64	0.80	0.3%	A	A	A	A	A	A
50	GAB	Gabon	1961	2018	58	0	4,415	17,614	2.4%	0.12	0.22	1.1%	C	C	C	C	C	C
51	GBR	United Kingdom	1949	2018	70	0	11,088	38,058	1.8%	0.69	0.81	0.2%	A	A	A	A	A	A
52	GEO	Georgia	1993	2018	26	0	3,793	11,985	4.4%	0.16	0.55	4.7%	1	0	1	0	1	0
53	GHA	Ghana	1951	2018	68	0	1,808	4,267	1.3%	0.21	0.62	1.6%	3	2	2	1	4	3
54	GIN	Guinea	1982	2018	37	0	858	1,606	1.7%	0.04	0.20	4.4%	C	C	C	C	C	C
55	GMB	The Gambia	1964	2018	55	0	1,274	1,882	0.7%	0.23	0.44	1.2%	2	1	2	1	2	1
56	GNB	Guinea-Bissau	1971	2018	48	0	1,333	1,501	0.2%	0.01	0.34	7.1%	C	C	3	2	2	1
57	GNQ	Equat. Guinea	1982	2018	37	0	2,533	28,529	6.5%	0.03	0.06	1.6%	C	C	C	C	C	C
58	GRC	Greece	1949	2018	70	0	2,979	23,451	2.9%	0.21	0.77	1.9%	1	0	1	0	2	1
59	GTM	Guatemala	1949	2018	70	0	3,365	7,402	1.1%	0.23	0.43	0.9%	1	0	1	0	1	0
60	HKG	Hong Kong	1951	2018	66	2	3,688	50,839	3.9%	0.18	0.28	0.7%	C	C	C	C	A	A

(Continued overleaf)

	ISO	Country	Start	End	Obs	Miss	GDP per capita			Liberal Democracy			Regime Change					
							Base	End	Δpa	Base	End	Δpa	+LD	-LD	+Pol	-Pol	+Lib	-Lib
61	HND	Honduras	1949	2018	70	0	2,013	5,042	1.3%	0.08	0.24	1.6%	C	C	2	2	C	C
62	HRV	Croatia	1994	2018	25	0	9,353	22,012	3.4%	0.22	0.62	4.1%	1	0	1	0	1	0
63	HTI	Haiti	1949	2018	67	3	1,782	1,729	0.0%	0.10	0.26	1.4%	C	C	2	2	2	2
64	HUN	Hungary	1956	2018	53	10	4,632	25,623	2.7%	0.07	0.39	2.7%	1	0	1	0	1	0
65	IDN	Indonesia	1950	2018	66	3	1,280	11,852	3.2%	0.18	0.46	1.4%	2	1	2	0	1	0
66	IND	India	1949	2018	70	0	995	6,806	2.7%	0.15	0.41	1.4%	2	1	2	1	1	0
67	IRL	Ireland	1949	2018	70	0	5,426	64,684	3.5%	0.66	0.81	0.3%	A	A	A	A	A	A
68	IRN	Iran	1965	2018	41	13	4,388	17,011	2.5%	0.08	0.15	1.1%	C	C	C	C	C	C
69	IRQ	Iraq	1951	2018	58	10	2,303	12,836	2.5%	0.16	0.25	0.6%	C	C	C	C	2	3
70	ISL	Iceland	1951	2018	68	0	8,080	43,439	2.5%	0.71	0.80	0.2%	A	A	A	A	A	A
71	ISR	Israel	1951	2018	68	0	5,035	32,955	2.8%	0.50	0.61	0.3%	A	A	A	A	A	A
72	ITA	Italy	1949	2018	70	0	5,188	34,364	2.7%	0.56	0.79	0.5%	A	A	A	A	A	A
73	JAM	Jamaica	1951	2018	68	0	2,251	7,273	1.7%	0.24	0.70	1.6%	1	0	1	0	A	A
74	JOR	Jordan	1954	2018	65	0	2,848	11,506	2.1%	0.17	0.25	0.6%	C	C	C	C	6	6
75	JPN	Japan	1949	2018	70	0	2,867	38,674	3.7%	0.37	0.74	1.0%	A	A	1	0	A	A
76	KAZ	Kazakhstan	1993	2018	26	0	9,174	25,308	3.9%	0.18	0.12	-1.6%	C	C	C	C	C	C
77	KEN	Kenya	1951	2018	68	0	1,229	3,377	1.5%	0.05	0.35	2.9%	1	0	2	2	1	0
78	KGZ	Kyrgyz Rep.	1993	2018	26	0	3,765	5,177	1.2%	0.21	0.34	1.9%	C	C	1	0	1	0
79	KHM	Cambodia	1956	2018	48	15	912	3,629	2.2%	0.15	0.08	-1.1%	C	C	C	C	C	C
80	KOR	Korea, Rep.	1956	2018	63	0	1,382	37,928	5.3%	0.16	0.80	2.6%	1	0	1	0	1	0
81	KWT	Kuwait	1974	2018	45	0	34,962	65,521	1.4%	0.28	0.29	0.1%	C	C	C	C	2	2
82	LAO	Lao PDR	1956	2018	52	11	744	6,451	3.4%	0.12	0.10	-0.4%	C	C	C	C	C	C
83	LBN	Lebanon	1951	2018	58	10	5,150	12,559	1.3%	0.20	0.31	0.6%	C	C	1	0	1	0
84	LBR	Liberia	1967	2018	52	0	4,065	818	-3.1%	0.11	0.44	2.8%	1	0	1	0	2	1
85	LBY	Libya	1956	2018	63	0	950	15,013	4.4%	0.13	0.16	0.4%	C	C	1	1	C	C
86	LKA	Sri Lanka	1949	2018	70	0	1,911	11,663	2.6%	0.53	0.48	-0.2%	1	1	2	2	1	1
87	LSO	Lesotho	2001	2018	18	0	1,997	2,731	1.7%	0.27	0.45	2.9%	1	0	1	0	A	A
88	LTU	Lithuania	1993	2018	26	0	8,621	27,371	4.4%	0.76	0.76	0.0%	A	A	A	A	A	A
89	LUX	Luxembourg	1998	2018	21	0	44,143	57,428	1.3%	0.78	0.78	0.0%	A	A	A	A	A	A
90	LVA	Latvia	1993	2018	26	0	8,439	24,313	4.1%	0.63	0.75	0.7%	A	A	A	A	A	A
91	MAR	Morocco	1951	2018	68	0	2,324	8,451	1.9%	0.05	0.26	2.5%	C	C	C	C	1	0
92	MDA	Moldova	1993	2018	26	0	5,384	6,747	0.9%	0.39	0.40	0.1%	A	A	A	A	A	A
93	MDG	Madagascar	1951	2018	68	0	1,549	1,428	-0.1%	0.07	0.28	2.0%	1	1	3	2	1	1
94	MEX	Mexico	1949	2018	70	0	3,276	16,494	2.3%	0.10	0.45	2.2%	1	0	1	0	1	0
95	MLI	Mali	1964	2018	55	0	888	1,667	1.1%	0.19	0.32	0.9%	2	2	2	1	2	1
96	MLT	Malta	1959	2018	60	0	2,278	32,029	4.4%	0.19	0.57	1.8%	1	0	1	0	1	0
97	MMR	Myanmar	1951	2018	68	0	711	5,838	3.1%	0.16	0.25	0.7%	C	C	C	C	1	1
98	MNE	Montenegro	2007	2018	12	0	12,027	19,504	4.0%	0.40	0.35	-1.0%	0	1	1	1	A	A
99	MNG	Mongolia	1982	2018	37	0	1,814	13,383	5.4%	0.06	0.50	5.9%	1	0	1	0	1	0
100	MOZ	Mozambique	1951	2018	48	20	1,841	1,133	-0.7%	0.02	0.28	3.7%	C	C	3	4	0	0
101	MRT	Mauritania	1963	2018	47	9	944	3,458	2.3%	0.12	0.16	0.4%	C	C	1	1	C	C
102	MUS	Mauritius	1952	2018	65	2	4,002	20,139	2.4%	0.31	0.73	1.3%	1	1	1	1	A	A
103	MWI	Malawi	1967	2018	52	0	725	1,117	0.8%	0.09	0.44	3.1%	1	0	2	1	1	0
104	MYS	Malaysia	1968	2018	51	0	3,096	24,842	4.1%	0.20	0.26	0.5%	C	C	C	C	1	0
105	NAM	Namibia	2001	2018	18	0	5,888	9,043	2.4%	0.53	0.57	0.4%	A	A	A	A	A	A
106	NER	Niger	1961	2018	58	0	1,239	1,239	-0.4%	0.13	0.41	1.9%	3	2	3	2	3	2
107	NGA	Nigeria	1951	2018	66	2	1,262	5,238	2.1%	0.11	0.40	1.9%	1	0	2	1	1	1
108	NIC	Nicaragua	1949	2018	70	0	2,345	4,952	1.1%	0.03	0.06	1.0%	1	1	1	1	1	1
109	NLD	Netherlands	1949	2018	70	0	9,373	47,474	2.3%	0.72	0.83	0.2%	A	A	A	A	A	A
110	NOR	Norway	1949	2018	70	0	8,332	84,580	3.3%	0.71	0.86	0.3%	A	A	A	A	A	A
111	NPL	Nepal	1982	2018	37	0	1,135	2,727	2.4%	0.10	0.51	4.3%	2	1	2	1	3	2
112	NZL	New Zealand	1949	2018	70	0	11,988	35,336	1.5%	0.72	0.84	0.2%	A	A	A	A	A	A
113	OMN	Oman	1971	2018	48	0	5,923	36,478	3.8%	0.05	0.14	2.2%	C	C	C	C	C	C
114	PAK	Pakistan	1951	2018	68	0	969	5,510	2.6%	0.17	0.26	0.6%	C	C	1	1	C	C
115	PAN	Panama	1949	2018	70	0	2,732	22,637	3.0%	0.18	0.56	1.6%	1	0	1	0	1	0
116	PER	Peru	1949	2018	70	0	3,470	12,310	1.8%	0.03	0.68	4.3%	3	2	2	1	4	3
117	PHL	Philippines	1949	2018	70	0	1,634	8,139	2.3%	0.26	0.31	0.3%	1	1	1	0	1	1
118	POL	Poland	1956	2018	53	10	4,565	27,455	2.8%	0.11	0.55	2.5%	1	0	1	0	1	0
119	PRK	DPR Korea	1991	2018	28	0	2,316	1,596	-1.3%	0.02	0.01	-0.2%	C	C	C	C	C	C
120	PRT	Portugal	1949	2018	70	0	3,279	27,036	3.0%	0.08	0.84	3.4%	1	0	1	0	1	0

	ISO	Country	Start	End	Obs	Miss	GDP per capita			Liberal Democracy			Regime Change					
							Base	End	Δpa	Base	End	Δpa	+LD	-LD	+Pol	-Pol	+Lib	-Lib
121	PRY	Paraguay	1949	2018	62	8	2,625	9,339	1.8%	0.06	0.42	2.9%	1	0	1	0	1	0
122	QAT	Qatar	1973	2018	41	5	68,407	153,764	1.8%	0.08	0.10	0.6%	C	C	C	C	C	C
123	RUS	Russian Federation	1982	2018	37	0	12,267	24,669	1.9%	0.03	0.11	3.9%	C	C	1	1	1	1
124	RWA	Rwanda	1965	2018	54	0	1,023	1,929	1.2%	0.16	0.11	-0.6%	C	C	C	C	C	C
125	SAU	Saudi Arabia	1965	2018	54	0	8,717	50,305	3.2%	0.04	0.05	0.1%	C	C	C	C	C	C
126	SDN	Sudan	1951	2018	68	0	1,334	3,380	1.4%	0.06	0.09	0.5%	C	C	C	C	C	C
127	SEN	Senegal	1961	2018	58	0	2,351	2,617	0.2%	0.28	0.56	1.2%	1	0	1	0	A	A
128	SGP	Singapore	1963	2018	51	5	4,049	68,402	5.0%	0.27	0.31	0.3%	C	C	C	C	A	A
129	SLE	Sierra Leone	1958	2018	57	4	1,109	1,684	0.7%	0.11	0.39	2.1%	2	1	1	0	2	1
130	SLV	El Salvador	1949	2018	70	0	2,432	8,598	1.8%	0.05	0.45	3.1%	1	0	1	0	1	0
131	STP	Sao Tome & Pr.	1970	2018	42	7	2,243	3,730	1.0%	0.09	0.55	3.7%	1	0	1	0	1	0
132	SVK	Slovak Republic	1995	2018	24	0	11,874	27,076	3.4%	0.55	0.70	1.1%	A	A	A	A	A	A
133	SVN	Slovenia	1994	2018	25	0	16,665	29,245	2.2%	0.77	0.77	0.0%	A	A	A	A	A	A
134	SWE	Sweden	1949	2018	70	0	10,127	45,542	2.1%	0.71	0.88	0.3%	A	A	A	A	A	A
135	SWZ	Eswatini	2001	2018	18	0	4,977	8,068	2.7%	0.10	0.13	1.2%	C	C	C	C	C	C
136	SYC	Seychelles	1971	2018	48	0	3,987	29,531	4.2%	0.23	0.46	1.5%	1	0	1	0	2	2
137	SYR	Syria	1951	2018	68	0	3,609	3,349	-0.1%	0.17	0.03	-2.5%	C	C	C	C	C	C
138	TCD	Chad	1961	2018	52	6	971	2,046	1.3%	0.12	0.08	-0.6%	C	C	C	C	C	C
139	TGO	Togo	1960	2018	59	0	1,058	1,451	0.5%	0.12	0.21	1.0%	C	C	2	1	C	C
140	THA	Thailand	1957	2018	62	0	1,451	16,649	3.9%	0.11	0.11	0.0%	2	2	2	2	3	3
141	TJK	Tajikistan	1993	2018	26	0	2,482	4,440	2.2%	0.06	0.05	-0.5%	C	C	C	C	C	C
142	TKM	Turkmenistan	1993	2018	26	0	4,604	26,318	6.7%	0.03	0.04	0.4%	C	C	C	C	C	C
143	TTO	Trinidad & Tob.	1951	2018	68	0	6,207	28,549	2.2%	0.27	0.64	1.2%	1	0	1	0	A	A
144	TUN	Tunisia	1951	2018	68	0	1,763	11,354	2.7%	0.04	0.65	4.2%	1	0	1	0	1	0
145	TUR	Turkey	1949	2018	70	0	1,946	19,270	3.3%	0.16	0.11	-0.5%	3	3	2	2	3	3
146	TZA	Tanzania	1951	2018	68	0	743	2,875	2.0%	0.09	0.33	1.9%	1	1	1	1	1	0
147	UGA	Uganda	1951	2018	68	0	1,023	2,045	1.0%	0.11	0.23	1.1%	C	C	C	C	1	0
148	UKR	Ukraine	1993	2018	26	0	7,090	9,813	1.3%	0.38	0.25	-1.6%	1	2	1	2	1	2
149	URY	Uruguay	1949	2018	70	0	6,531	20,186	1.6%	0.68	0.82	0.3%	1	1	1	1	1	1
150	USA	United States	1949	2018	70	0	14,197	55,335	1.9%	0.51	0.75	0.5%	A	A	A	A	A	A
151	UZB	Uzbekistan	1993	2018	26	0	5,193	11,220	3.0%	0.05	0.07	1.1%	C	C	C	C	C	C
152	VEN	Venezuela	1952	2018	65	2	9,309	10,710	0.2%	0.05	0.08	0.7%	1	1	1	1	1	1
153	VNM	Vietnam	1956	2018	55	8	1,218	6,814	2.7%	0.09	0.15	0.8%	C	C	C	C	C	C
154	YEM	Yemen	1991	2018	28	0	3,662	2,285	-1.7%	0.14	0.04	-4.6%	C	C	C	C	C	C
155	ZAF	South Africa	1999	2018	20	0	7,234	12,166	2.6%	0.60	0.63	0.2%	A	A	A	A	A	A
156	ZMB	Zambia	1951	2018	57	11	1,097	3,534	1.7%	0.11	0.26	1.3%	1	1	1	1	1	0
157	ZWE	Zimbabwe	1951	2018	42	26	1,151	1,611	0.5%	0.184	0.218	0.2%	C	C	C	C	2	3

Notes: We provide details on the 157 countries in the full sample of analysis, including Start and End Year of the country time series, the number of observations (Obs) and hence the number of missing observations (Miss). Real GDP pc is in US$ for the first and final year of the country sample, dto for the Liberal Democracy Index; Δpa refers to the average annual percentage change (in GDPpc growth or in the LibDem Index) over the country-specific sample period. The final set of columns indicate regime change as defined by the mean cutoff of the Liberal Democracy Index (LD), the Polyarchy Index (Pol) and the Liberal Component Index (Lib). +LD counts the occasions when a country overcame the threshold/cutoff, -LD counts the reversals, similarly for Pol and Lib. When countries had no regime change or reversal, they either always stayed below the threshold, in which case they are in the control group sample (C), or they always stayed above the threshold (A), in which case they are discarded. We report countries even if they were discarded in all of our analysis since their respective index scores informed the 'full sample mean' we employ to determine the primary cut-off for regime change across all indicators of democracy and political institutions. As robustness check we use cutoffs from $1/4$ sd below the mean to $1/4$ sd above the mean — the regime change counts and control group makeup for these cutoffs are not presented here. Return to Section 3.2 (Descriptives) in the maintext.

Table A-3: Democracy 'Thresholds' and Alternatives

	SD	Mean −1/4 SD	Mean −1/8 SD	Mean cut-off	Mean +1/8 SD	Mean +1/4 SD
Tier 1 *High-level Democracy Index*						
Liberal Democracy	0.281	0.281	0.316	0.351	0.386	0.421
Tier 2 *Mid-level Democracy Indices*						
Liberal Component	0.289	0.482	0.518	0.554	0.590	0.626
Polyarchy	0.289	0.375	0.411	0.447	0.483	0.519
Tier 3 *Low-level Democracy Indices: Elements of Polyarchy*						
F'm of Expression	0.327	0.495	0.536	0.577	0.618	0.658
F'm of Association	0.329	0.473	0.514	0.556	0.597	0.638
Clean Elections	0.355	0.376	0.421	0.465	0.510	0.554
Tier 3 *Low-level Democracy Indices: Elements of the Liberal Component*						
Rule of Law	0.293	0.542	0.579	0.616	0.653	0.689
Judicial Constr	0.310	0.489	0.528	0.566	0.605	0.644
Legislative Constr	0.325	0.450	0.490	0.531	0.571	0.612

Notes: The table presents the definitions of our binary democracy indicators used in the PCDID regressions. SD and Mean are the sample standard deviation and mean of the respective democracy index, where 'sample' includes all countries ($N = 157$, $n = 8,303$ for 1949-2018). The main analysis is conducted using the 'Mean cut-off', robustness checks use cut-offs ranging from $1/4$ of a standard deviation below to $1/4$ of a standard deviation above the sample mean. Return to Section 3.2 (Descriptives) in the maintext.

Table A-4: Regime Change Dynamics

Indicator	Changes	Count	Share
Liberal Democracy	1	48	75%
(64 countries)	2	12	19%
	3	4	6%
Polyarchy	1	52	65%
(80 countries)	2	23	29%
	3	4	5%
	4	1	1%
Liberal Component	1	50	69%
(72 countries)	2	13	18%
	3	6	8%
	4	2	3%
	6	1	1%

Notes: The table presents frequency counts (and shares) of regime changes for the high- and mid-level democracy indicators (adopting the mean cut-off). Return to Section 3.2 (Descriptives) in the maintext.

Figure A-1: Unbalancedness of the Panel
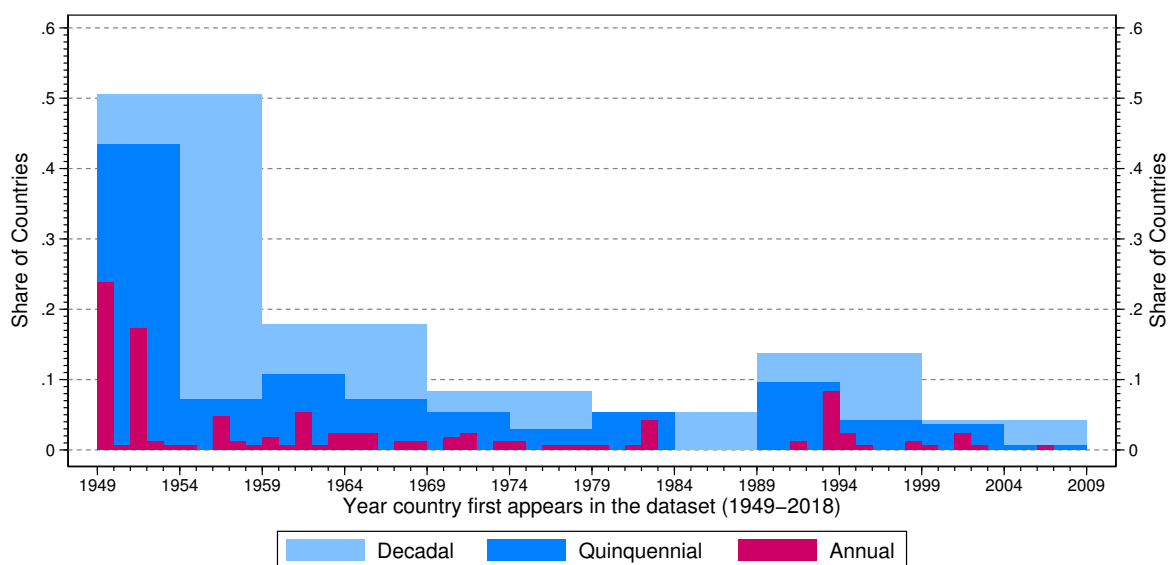
(a) Country Start Year: All Countries (N=157)
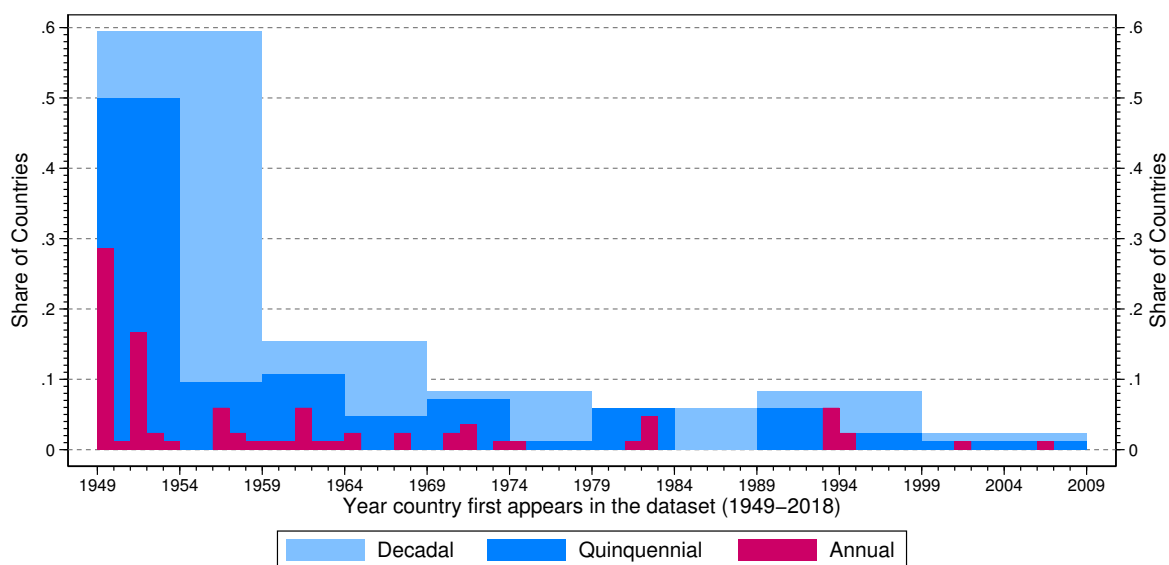
(b) Country Start Year: Polyarchy PCDID Regressions (N=80)

Notes: These histograms present the frequency share of sample countries which enter the data in the year, 5-year or 10-year period, as indicated. Panel (a) uses the full sample for all 157 countries, panel (b) the treated sample of countries which experienced variation in the electoral democracy dummy defined by the exceeding the mean threshold. Return to Section 3.2 (Descriptives) in the maintext.

Figure A-2: Alternative Empirical Measures of Democracy
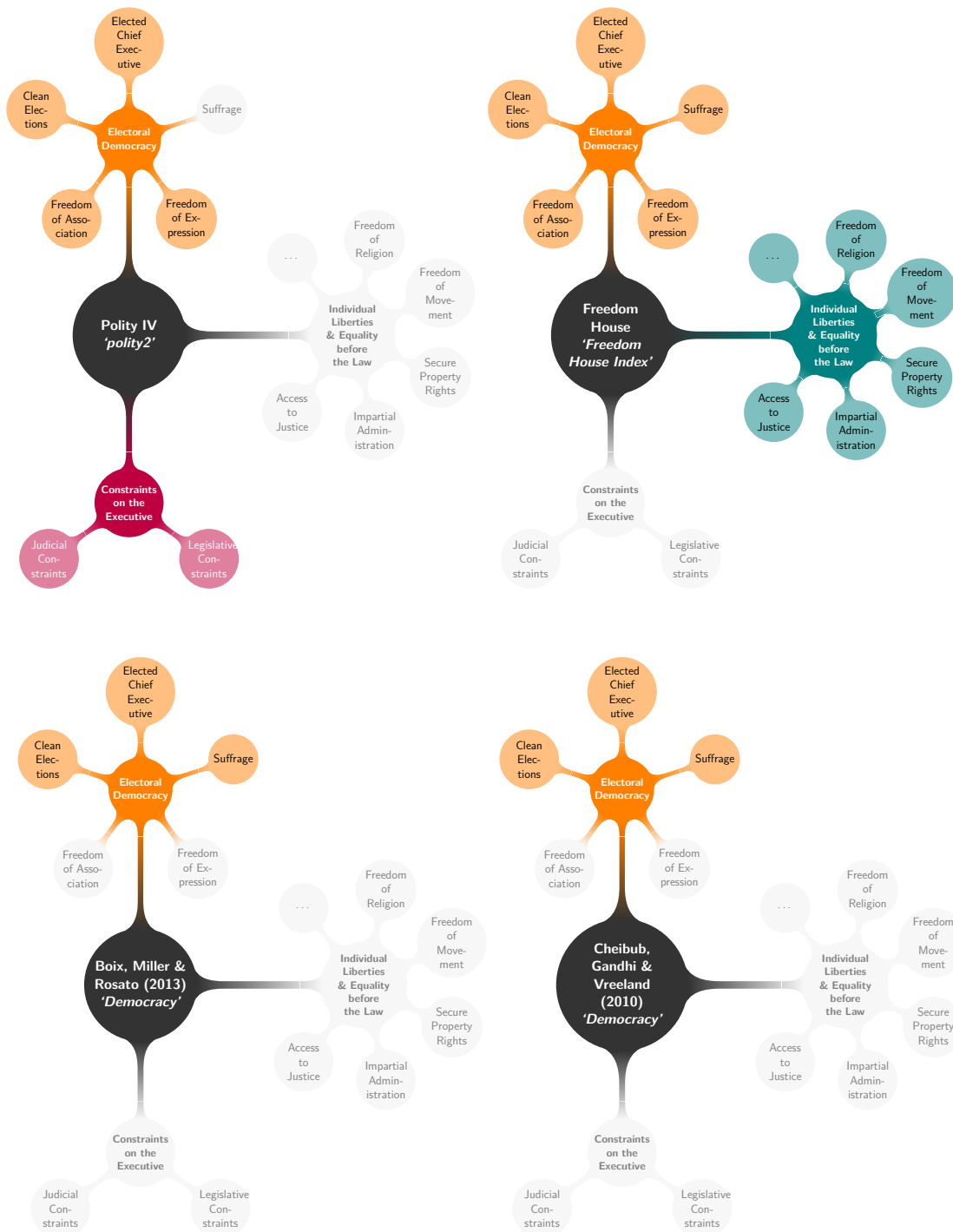
Notes: We compare four popular measures for democracy with the V-Dem conceptual framework for liberal democracy (to aid presentation we ignore here that Executive Constraints and Civil Rights are combined under the V-Dem 'liberal component'). Faint grey aspects/strands are not covered by the democracy measure in question. Note that the Freedom House FHI *does* include aspects of executive constraints but since these are given much less significance than in the Polity IV or V-Dem we decided to shade them in grey. Our visualisations merely illustrate the elements covered by each measure for democracy, not the substantial variation in the aggregation procedure (see Boese, 2019, for detailed discussion). Return to Section 2.2 (Defining Democracy) in the maintext.

B   Multiple cutoffs: low-level indicators

Figure B-1: Low-Level Indices of (Electoral) Democracy: Multiple Cutoffs
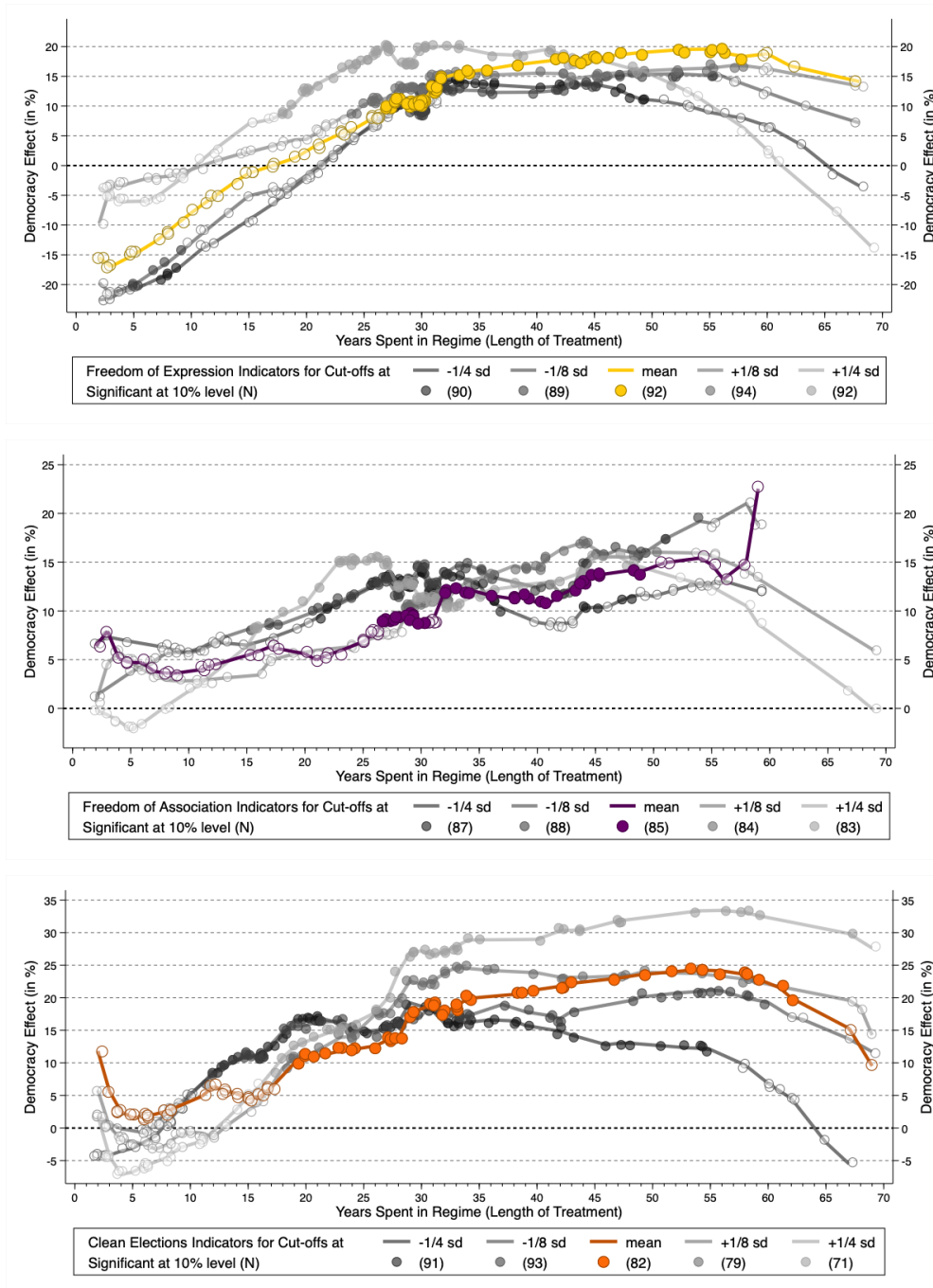
Notes: The plots in this figure present running line regressions for three sub-components of polyarchy (Freedom of Expression, Freedom of Association, and Free and Fair Elections) using different cutoffs for the indicator variable used, in analogy to the plot presented in the lower panel of Figure 3 in the maintext (see that figure for further details on the running line regressions). We do not include analysis of 'suffrage' or 'elected chief executive' here because these are near-universally achieved during our sample period. N indicates the number of 'treated' countries in each running line regression.

Figure B-2: Low-Level Indices of Democracy (liberal component): Multiple Cutoffs
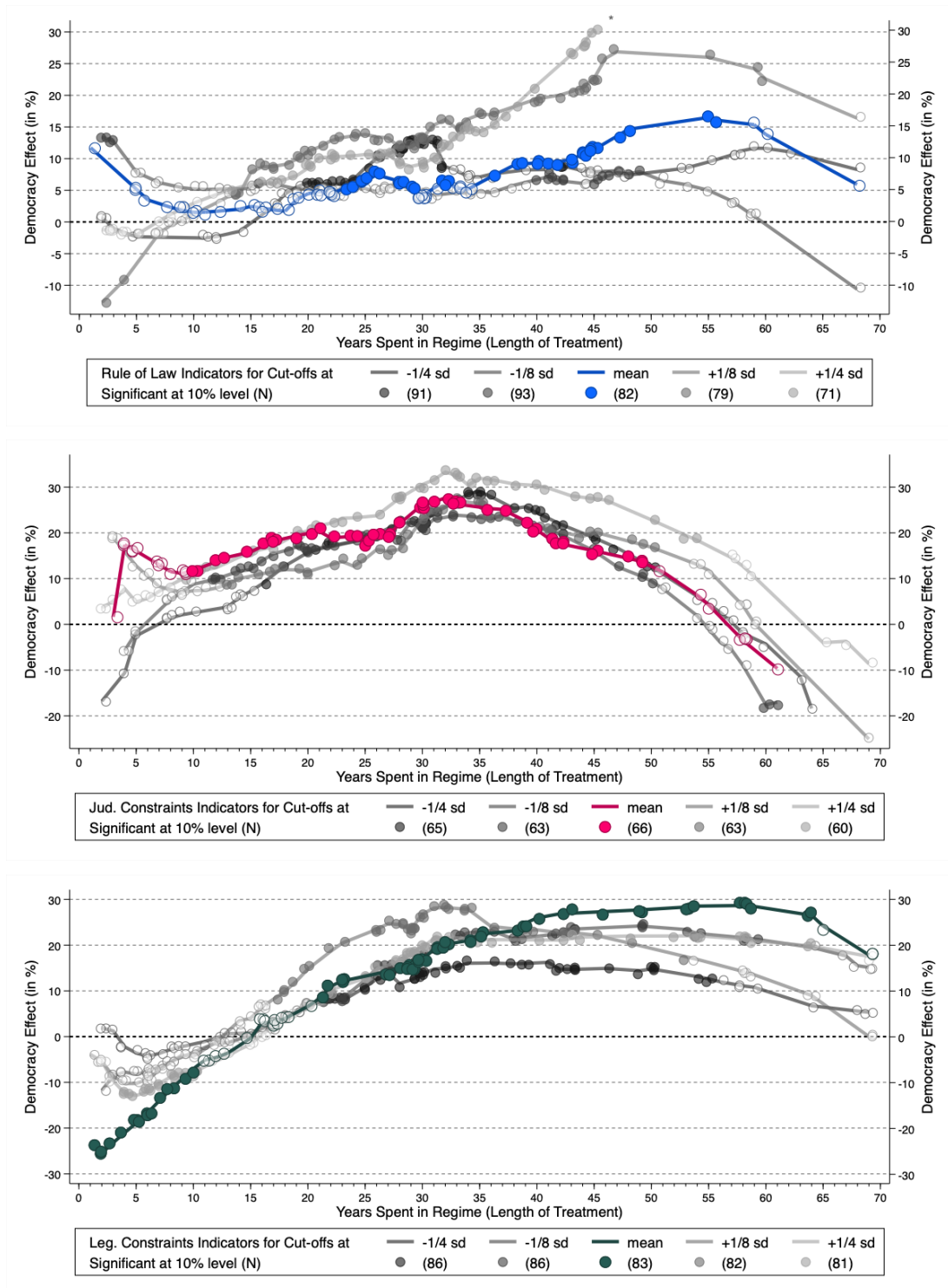
Notes: The plots in this figure present running line regressions for three sub-components of the liberal component (Rule of Law, Judicial Constraints on the Executive, and Legislative Constraints on the Executive) using different cutoffs for the indicator variable used, in analogy to the plot presented in the lower panel of Figure 3 in the maintext (see that figure for further details on the running line regression). ∗ indicates that we excluded a number of (statistically significant) estimates for this robustness check for ease of illustration.

C   PCDID Results – cut-offs around 0.5

Figure C-1: High-Level Indicators for Democracy and Economic Development
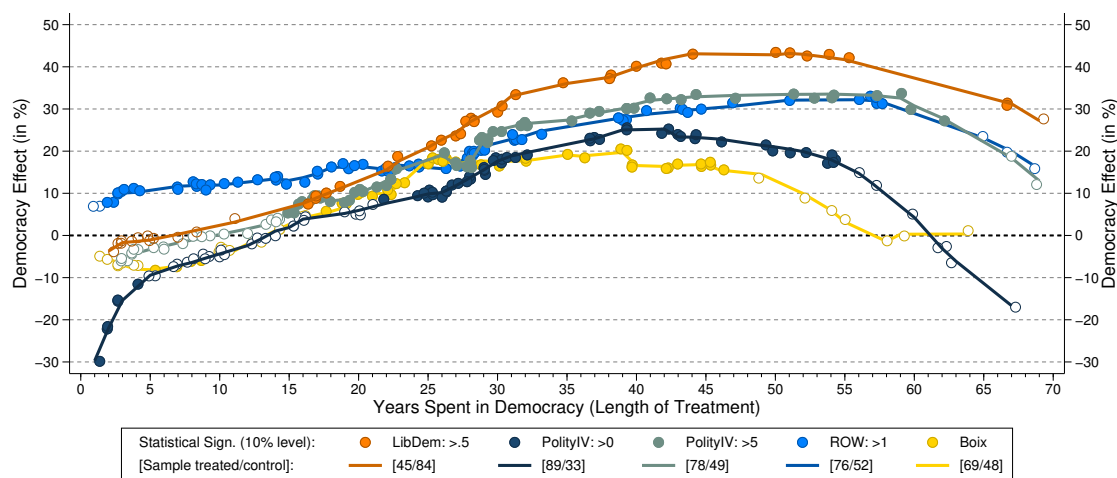
(a) Five High-Level Democracy Indicators
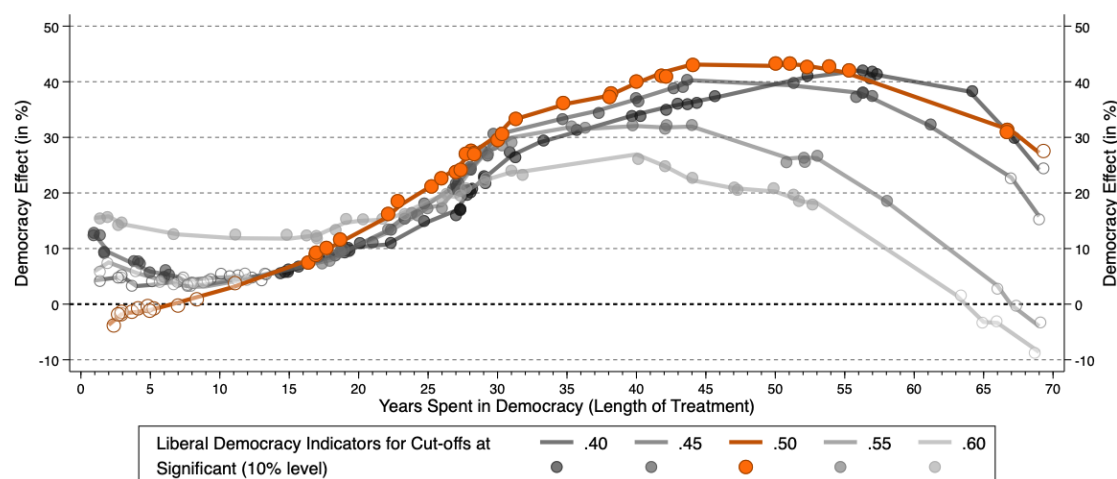
(b) Liberal Democracy (various cutoffs)

Notes: In the upper panel we present the country-specific PCDID running line estimates for five different high-level indicators for democracy as indicated. The lower panel focuses on democracy indicators derived from the V-Dem liberal democracy index and we adopt alternative cutoffs from 0.4 to 0.6 to highlight the robustness of our findings. All estimates presented are from running line regressions, which further linearly condition on the number of times a country experienced regime change and the start year of the country series. The estimates can be interpreted as locally averaged ITET, with the scales indicating the percentage increase in per capita GDP associated with the number of years spent in democracy (x-axis). The filled (white) markers indicate statistical (in)significance at the 10% level. The markers are minimally dispersed for illustrative purposes.

Figure C-2: Mid-level Democracy Indicators and Horseraces
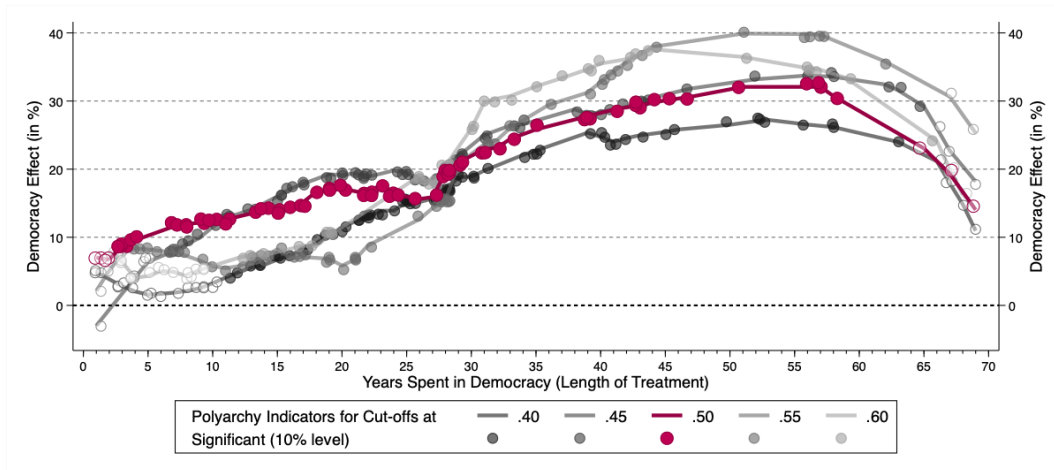
(a) Polyarchy Indicator for Democracy: Different Cut-offs
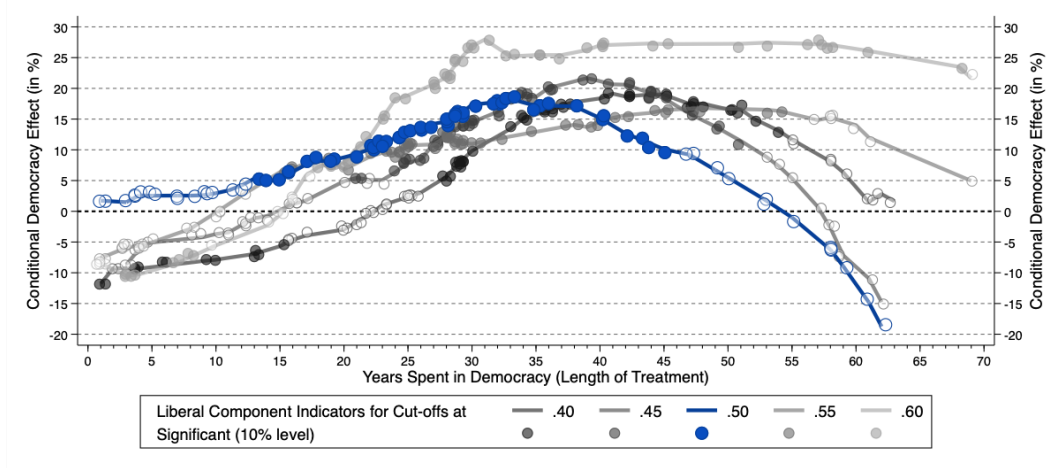
(b) Liberal Component Indicator for Democracy: Different Cut-offs
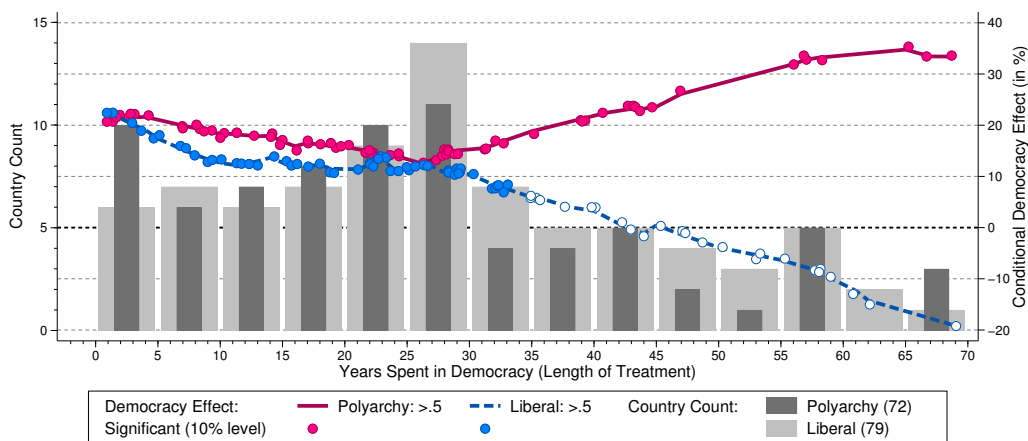
(c) Horserace: Conditional 'polyarchy' and 'liberal component' effects

Notes: Panel (a) and (b) present running line plots for polyarchy and the liberal component using different cutoffs in analogy to the plot presented in the lower panel of Figure 3. In the bottom panel we run a horse race between the estimates of country results for the two mid-level democracy indicators — see notes to Figure 3 for details. The bars indicate the country count for each 5-year interval of experience of democracy.

Figure C-3: Indicators from Low-Level Indices of (Electoral) Democracy: Multiple Cutoffs
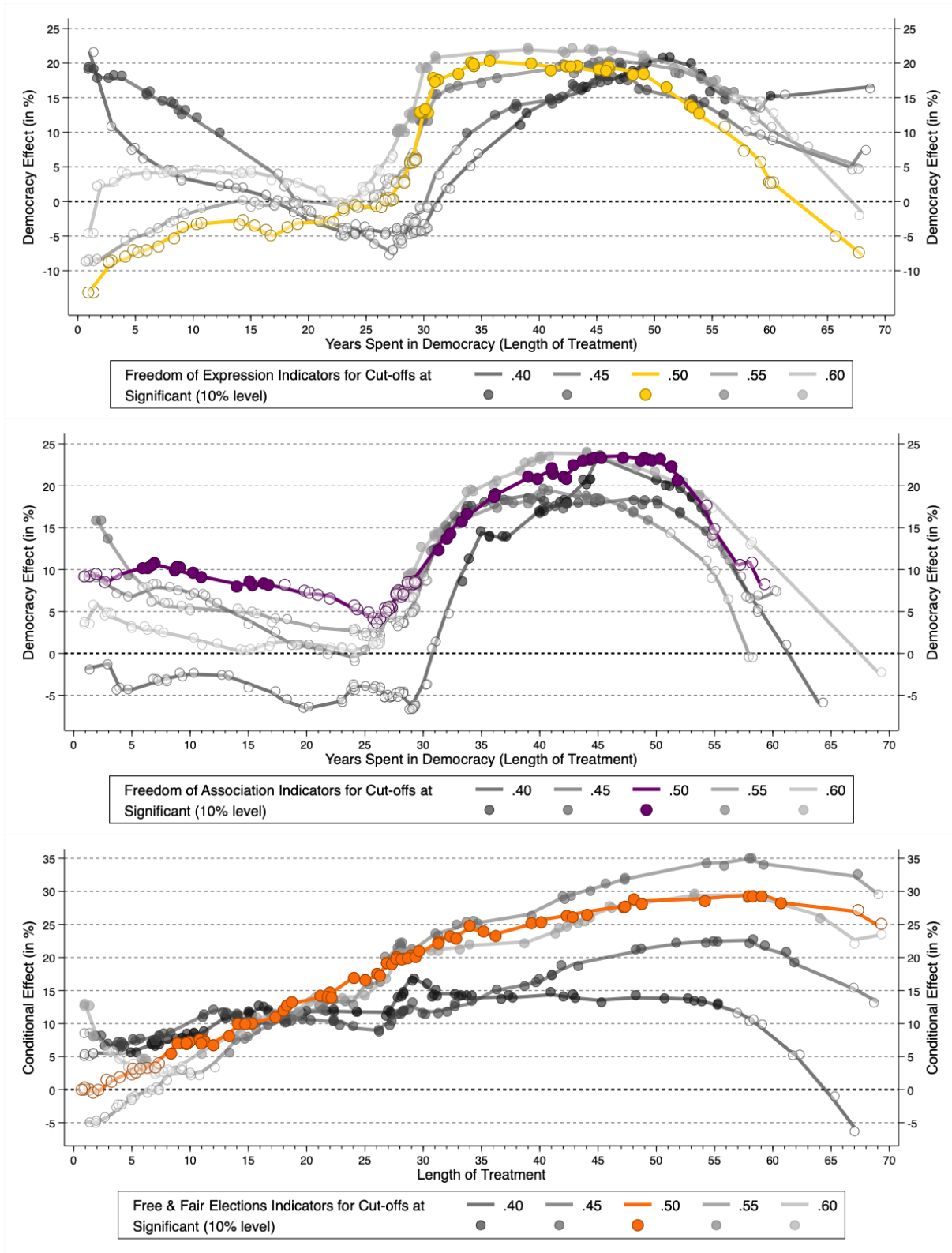
Notes: The plots in this figure present running line regressions for three sub-components of polyarchy (Freedom of Expression, Freedom of Association, and Free and Fair Elections) using different cutoffs for the indicator variable used, in analogy to the plot presented in the lower panel of Figure 3 (see that figure for further details on the running line regression).

Figure C-4: Low-Level Indices of Democracy (liberal component): Multiple Cutoffs
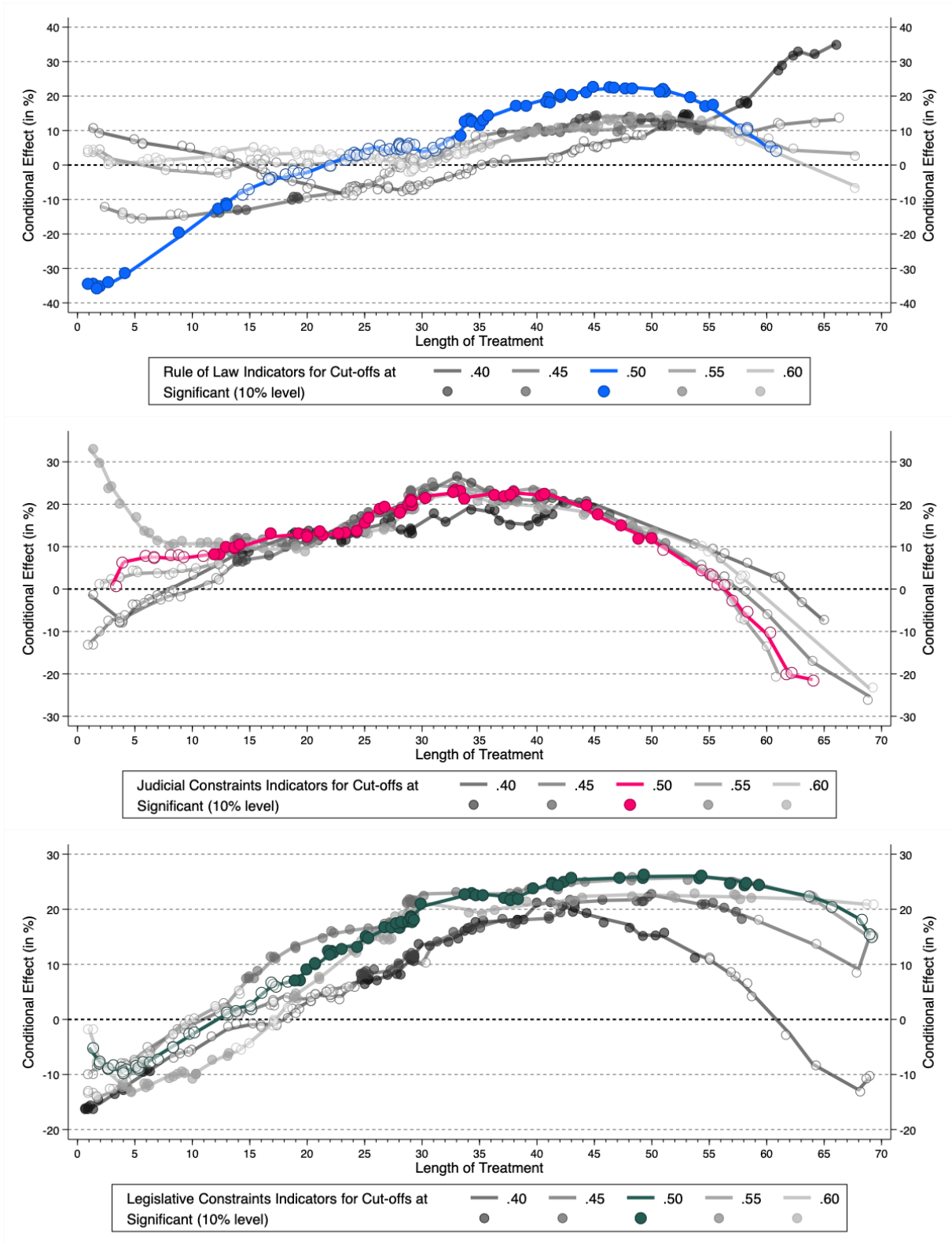
Notes: The plots in this figure present running line regressions for three sub-components of the liberal component (Rule of Law, Judicial Constraints on the Executive, and Legislative Constraints on the Executive) using different cutoffs for the indicator variable used, in analogy to the plot presented in the lower panel of Figure 3 in the maintext (see that figure for further details on the running line regression).

Figure C-5: Horseraces between Low-level Indicators of Democracy
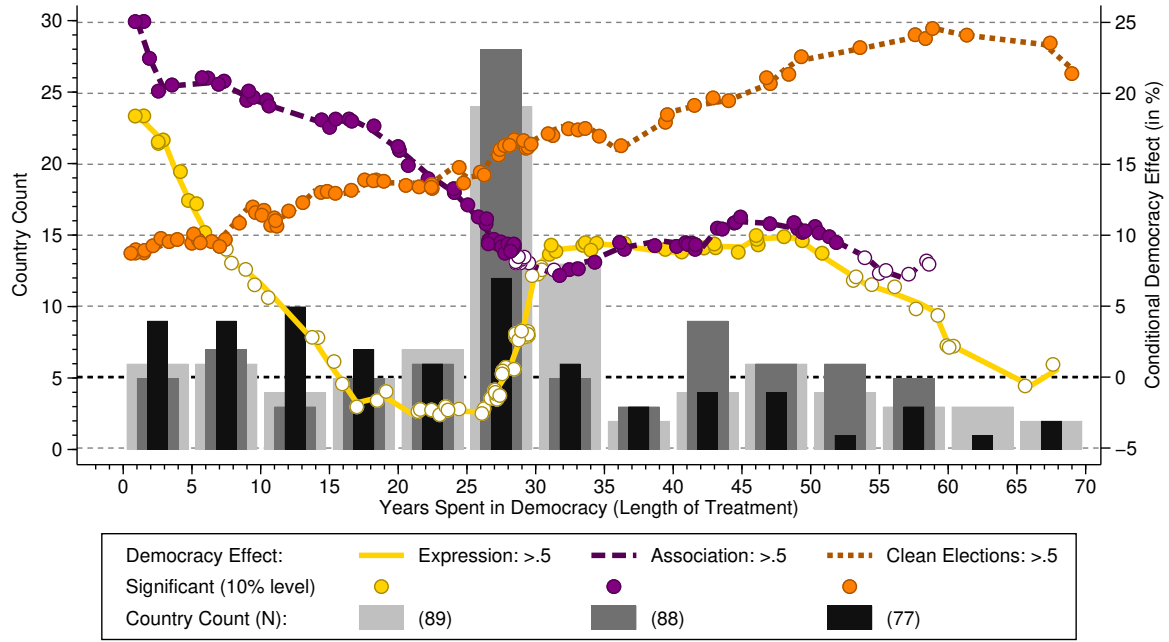
(a) Components of Electoral Democracy (Polyarchy)
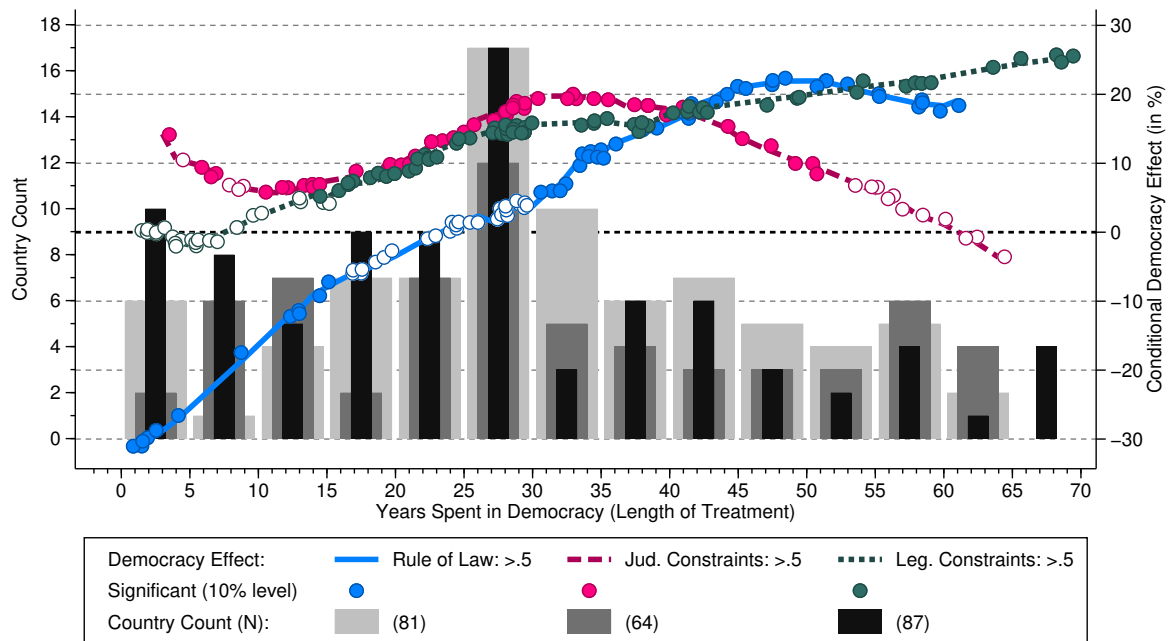
(b) Components of the Liberal Component

Notes: This analysis uses running line regressions which regress the estimate of the diff-in-diff model on the years of treatment, conditioning on the value and standard deviation of 'other' mid- and low-level democracy indices: for the 'freedom of expression' analysis (subcomponent of polyarchy) this is the liberal component, freedom of association, and clean elections. Additional controls are the number of threshold crossings ('democratisations' and 'reversals'), and the start year of the country's data series

D   Robustness: Conditionality between Constituent Components of Liberal Democracy

Our above analysis has operationalised democratic regime change in a treatment effect framework which somewhat abstracts from any explicit *dependencies between political institutions*: for instance, the 'rule of law' effect on economic development may be *conditional* on the country being a functioning 'electoral democracy' or vice-versa. Given that in our horse races the running line regressions condition on the magnitude and variability of 'other'/'rival' political institutions, we have not ignored this issue. However, it could be argued that adopting a specification which puts *interaction effects* at the heart of the analysis would provide a clearer test of our assumption that the above results are meaningful and robust to such 'conditionalities.'

We restrict the potential for interactions to make this implementation feasible: (i) we can interact the two mid-level democracy indicators, but for the 'lower-level' analysis we only interact the sub-component of polyarchy with the liberal component, and vice-versa; and (ii) we do not estimate 'full' models including indicator A, indicator B and their interaction — this would make it difficult to identify each component separately due to the limited degrees of freedom (requiring three sets of estimated factors from different control samples) and the high levels of collinearity between the three dummy variables.[25] Instead, we estimate models which *only* include the interaction variable: the intuition is that if conditionality between institutions, in a fashion not captured by our previous empirical implementation, plays a significant quantitative role for economic development then we should be able to detect this deviation when comparing the results for the 'pure' interaction effect with those for the effects of individual indicator A and B, respectively. Put differently, these interaction effect models simply require that for regime change to occur both indices combined in the interaction have to have breached the respective mean index threshold.

D.1   Modelling Conditionality

We extend the previous PCDID single treatment Difference-in-Difference specification to a model where we study the *interaction* of two treatments. Generically, we denote a treatment A at some point T_A and a treatment B at some other point T_B — the timing/relative order

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[25]Fewer than 11% of all observations for the polyarchy and liberal component dummies (using the mean as the cut-off) are not jointly zero or jointly one, in the 'treated' sample for the interaction effect this rises to 12.5%. Naturally for the interaction term this overlap is even greater.

of the two is ignored: treatment A does not *require* treatment B or vice-versa. However, we are explicit in modelling the joint or interaction effect of having received both treatments at some point T_A or T_B, whichever comes later. Our reduced form treatment effects model with interactive fixed effects is then

$$y_{it} = \overline{\Theta}_i^{AB} \mathbf{1}_{\{i \in \mathcal{A} \cap \mathcal{B}\}} \mathbf{1}_{\{t > \max(T_i^A, T_i^B)\}} + \mu_i^{\mathsf{AB}\prime} f_t^{\mathsf{AB}} + \beta_i' x_{it} + \epsilon_{it}, \tag{5}$$

where we already implement the decomposition of a time-varying heterogeneous treatment effect into, generically, $\Theta_{it} = \overline{\Theta}_i + \widetilde{\Theta}_{it}$, with $E(\widetilde{\Theta}_{it}|t > T_i) = 0$ for all treated units since this represents the demeaned, time-varying idiosyncratic component of Θ_{it}. As a result the error term takes the following form

$$\epsilon_{it} = \varepsilon_{it} + \widetilde{\Theta}_{it}^{AB} \mathbf{1}_{\{i \in \mathcal{A} \cap \mathcal{B}\}} \mathbf{1}_{\{t > \max(T_i^A, T_i^B)\}}, \tag{6}$$

with ε white noise.[26] In equation (5) $\mathcal{A} \cap \mathcal{B}$ is the group of countries which received both treatments and we construct the control group accordingly as those countries which never experienced treatment A or B: we use ~~AB~~ to identify this group.

This is a very restrictive specification, in that we ignore those groups of countries which experienced one but not the other treatment, and hence may distort the true counterfactual. Since our focus is on the potential complementarity between treatments A and B we therefore adopt an alternative model which captures the counterfactual in the groups which did not receive treatment A (or B) regardless of whether they received the other:

$$y_{it} = \overline{\Theta}_i^{AB} \mathbf{1}_{\{i \in \mathcal{A} \cap \mathcal{B}\}} \mathbf{1}_{\{t > \max(T_i^A, T_i^B)\}} + \mu_i^{\mathsf{A}\prime} f_t^{\mathsf{A}} + \mu_i^{\mathsf{B}\prime} f_t^{\mathsf{B}} + \beta_i' x_{it} + \epsilon_{it}, \tag{7}$$

with the same error structure and related assumptions as those indicated above. The difference between the two implementations is in the control group(s) from which the factors augmenting the treatment regression are estimated: (i) in model (5) these are all countries which experienced neither treatment A nor treatment B; (ii) in model (7) all countries which experienced neither treatment, or only experienced treatment A or treatment B.

For ease of illustration we present the empirical implementation using the two mid-level democracy indicators, polyarchy (poly) and the liberal component (lib). For each country which experienced variation in both the polyarchy and liberal component regime change dummies we

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[26]This reduced form error ϵ_{it} has mean zero but can be weakly dependent (e.g. spatial or serial correlation) and/or heteroskedastic.

estimate:

$$y_{it} = \alpha_i + \beta_i^{AB} \left(\text{poly}_{it} \times \text{lib}_{it} \right) + \gamma_i' X_{it} + \delta_i^{AB'} \hat{f}_t^{AB} + e_{it} \qquad (8)$$

$$\text{and} \quad y_{it} = \alpha_i + \beta_i^{AB} \left(\text{poly}_{it} \times \text{lib}_{it} \right) + \gamma_i' X_{it} + \delta_i^{A'} \hat{f}_t^A + \delta_i^{B'} \hat{f}_t^B + e_{it} \qquad (9)$$

for the two implementations, respectively. The estimated common factors, of which there are three sets, are constructed via principal component analysis from the residuals of the following three regressions:

$$y_{it} = \psi_i^A + \theta_i \text{lib}_{it} + \phi_i^{A'} X_{it} + \nu_{it}^A \qquad \forall\, i \notin \mathcal{A} \qquad (10)$$

$$y_{it} = \psi_i^B + \xi_i \text{poly}_{it} + \phi_i^{B'} X_{it} + \nu_{it}^B \qquad \forall\, i \notin \mathcal{B} \qquad (11)$$

$$\text{and} \quad y_{it} = \psi_i^{AB} + \phi_i^{A'} X_{it} + \nu_{it}^{AB} \qquad \forall\, i \notin \mathcal{A} \cap \mathcal{B}. \qquad (12)$$

We present ATET results as well as running line regressions predictions of the estimated regime change effect and the length of treatment controlling for sample start year and the count of threshold crossings.

Figure D-1: Mid-Level Democracy Indicators: Interaction
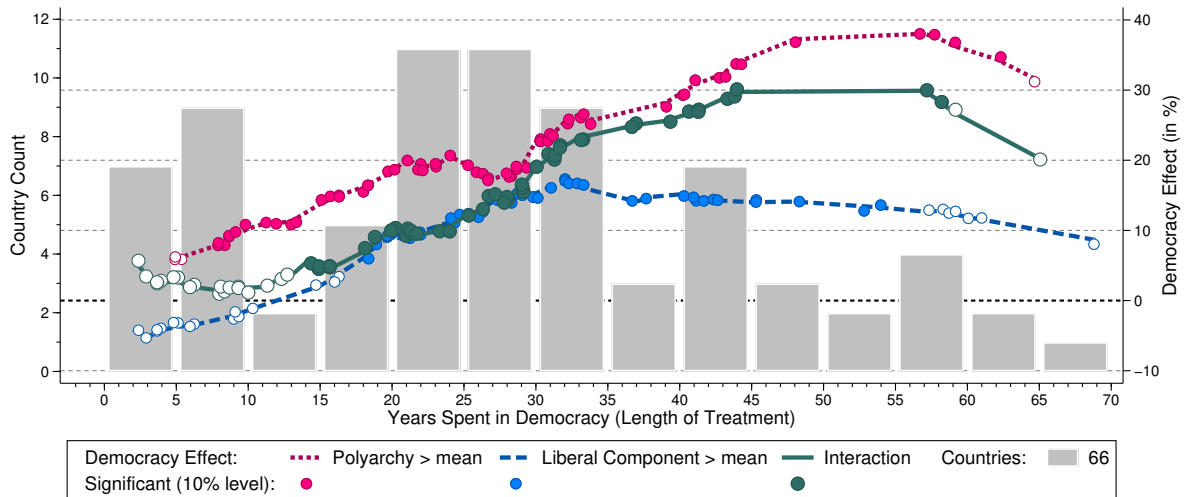
Notes: The figure presents sample-specific running line estimates for polyarchy (short-dashed line), the liberal component (dashed line) and a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constant (hence the deviation from the results in panel (a) of Figure 4). The grey bars in these plots indicate the sample distribution (countries). The results in this figure are based on the specification in equation (9), which includes factors from two control groups as described in the text. Results for the more restrictive specification in equation (8) can be found in Appendix Figure E-1.

D.2 Empirical Results

As is indicated in Panel A of Table D-1, the median number of years countries are in both polyarchy and liberal regimes (treatment length) is typically three to five years shorter than for each of the respective regimes — based on model [3] using the index mean as threshold here and in the following discussion. There are 66 countries in the treatment sample (held constant across specifications), compared with 33 control countries in the simple interaction model of equation (8) and 40 or 45 control countries in the alternative interaction models of equation (9).

In Figure D-1 we present the running line estimates for polyarchy (short pink dashes), the liberal component (long blue dashed), and their interaction (solid emerald line). The profile of the interaction results in this graph first matches that of the liberal component effect and subsequently that of the polyarchy effect but peters out earlier. Importantly, it does not appear to clearly *exceed* the polyarchy effect but instead roughly represents the average between the two effects in isolation. This would imply that a conditional effect of electoral democracy — requiring the liberal component to be in place as well — does not yield higher growth effects over the longer term. The simpler, more restrictive, interaction model yields a qualitatively identical conclusion (see Appendix Figure E-1).

Figure D-2 presents the interaction estimates alongside the respective low-level components and the mid-level 'rival'.[27] Across the six models investigated the interaction specification typically closely matches the results for one or the other individual component or mid-level indicator, only the Freedom of Association interaction with the Liberal Component in panel (d) suggests a substantially higher trajectory with increasing years in regime, a gap of +15%.

Broadly speaking, these exercises did not yield any substantial deviations in the effects from interaction models relative to the effects based on individual low-level or mid-level components of liberal democracy. Hence, we believe our empirical approach in the main results section is robust and meaningful in determining the low-tier drivers of the liberal democracy-growth nexus.

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[27]Appendix Figures D-3 and D-4 plot the robustness checks using alternative regime indicator cut-offs.

Table D-1: Interaction Effect Models of Democracy and Economic Development

	[1] -1/4 sd	[2] -1/8 sd	[3] mean	[4] +1/8 sd	[5] +1/4 sd
Panel (A) Individual Treatment Models, Equation (4)					
Polyarchy	4.017	5.980	7.863	10.753	9.808
(separate model)	[2.087]*	[2.100]***	[2.336]***	[2.864]***	[2.762]***
Liberal Component	3.773	3.886	5.643	12.422	7.916
(separate model)	[2.965]	[2.410]	[2.876]**	[3.163]***	[2.405]***
Treated Countries	75	71	66	60	57
Observations	4,270	3,995	3,695	3,467	3,283
Median Regime in years: Poly	26	25	26	26	26
Median Regime in years: Liberal	28	26	28	29	28
Median Regime in years: Inter	24	22	23	23	21
Panel (B) Simple Interaction Models, Equation (8)					
Interaction Polyarchy ×	8.617	8.216	6.230	9.260	5.346
Liberal Component	[2.321]***	[2.357]***	[1.981]***	[2.607]***	[1.930]***
Control Sample: Countries	24	31	33	37	45
Control Sample: Observations	986	1,367	1,453	1,704	2,134
Alternative Specifications:					
1 factor	7.485**	8.009***	5.426**	8.665***	6.806***
2 factors	12.822***	12.663***	11.006***	10.181***	5.876***
3 factors	8.260***	7.618***	6.363***	8.979***	7.519***
4 factors	8.617***	8.216***	6.230***	9.260***	5.346***
5 factors	8.392***	7.599***	7.271***	8.464***	8.400***
6 factors	9.520***	8.115***	7.690***	10.509***	6.920***
Panel (C) Alternative Interaction Models, Equation (9)					
Interaction Polyarchy ×	8.062	5.156	5.741	7.648	5.962
Liberal Component	[1.898]***	[2.106]**	[2.063]***	[2.345]***	[1.606]***
Control Sample 1: Countries	30	37	40	47	52
Control Sample 1: Observations	1,270	1,667	1,859	2,231	2,528
Control Sample 2: Countries	31	39	45	49	57
Control Sample 2: Observations	1,396	1,840	2,149	2,368	2765
Alternative Specifications:					
1 factor	7.268**	5.491**	5.335**	5.537**	7.827***
2 factors	9.423***	6.369***	7.528***	6.740***	7.602***
3 factors	7.812***	5.989**	7.087***	7.134***	9.195***
4 factors	8.062***	5.156**	5.741***	7.648***	5.962***
5 factors	7.759***	4.731**	5.055***	8.106***	5.081***
6 factors	8.373***	5.608***	4.767**	6.087***	6.719***

Notes: The table reports outlier-robust mean PCDID estimates. The columns represent different definitions for the 'regime change' dummy, relative to the mean index in column [3]. Panel (A) reports ATET for models of Polyarchy and the Liberal Component from respective (separate!) PCDID regressions — the country treatment sample (but not the control sample) is held constant across Panels (A) to (C). Panels (B) and (C) are the ATETs from interaction models between Polyarchy and the Liberal Component for a simple and alternative counterfactual, respectively. The lower parts of each panel report the number of countries and observations in the control samples. Results are for the PCDID specification with population growth, exports/trade and *four* estimated factors. In the final rows of panels (B) and (C) we present the ATET estimates if we include between 1 to 6 factors. Statistical significance at the 10%, 5% and 1% level is indicated as *, **, and ***, respectively.

Figure D-2: Low-Level Democracy Indicators: Interaction
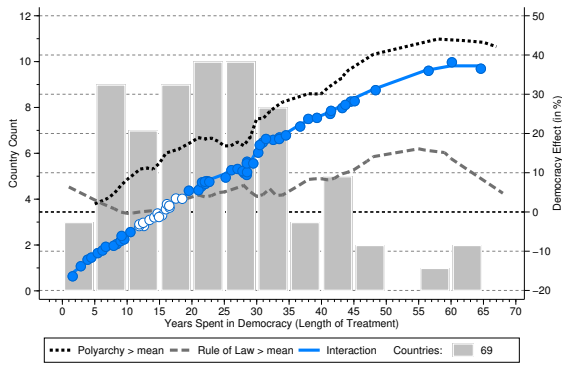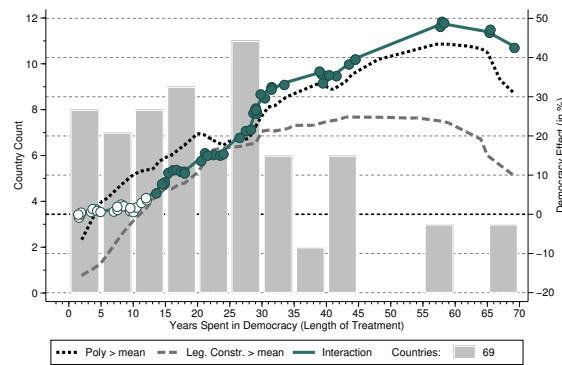
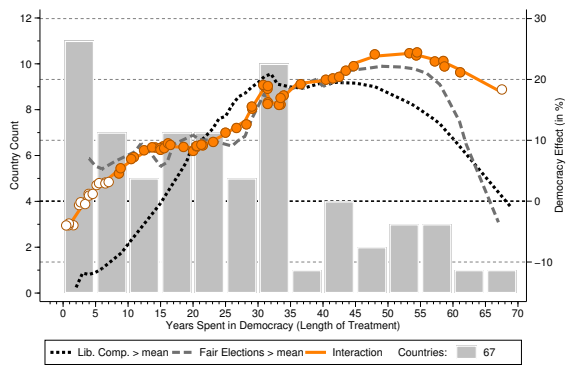(a) Rule of Law × Polyarchy ($N = 69$)   (b) Fr'm of Expr'n × Lib. Comp. ($N = 71$)
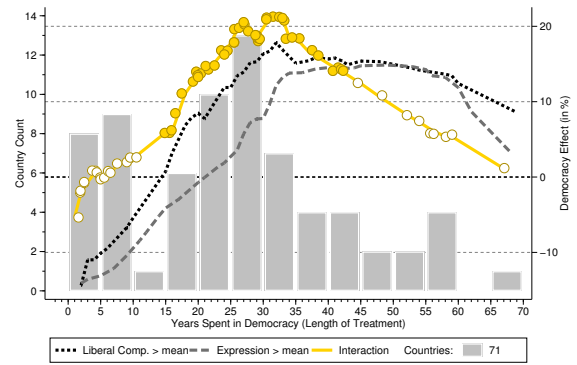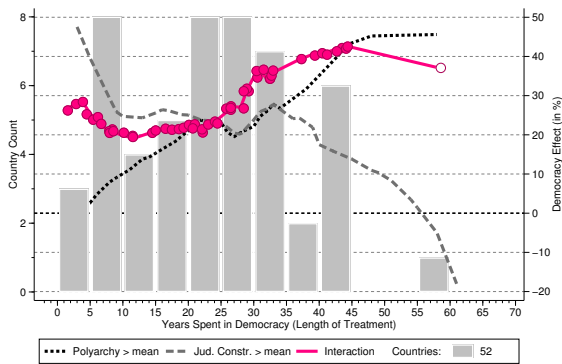
(c) Judic. Constraints × Polyarchy ($N = 52$) (d) Fr'm of Assoc'n × Lib. Comp. ($N = 65$)
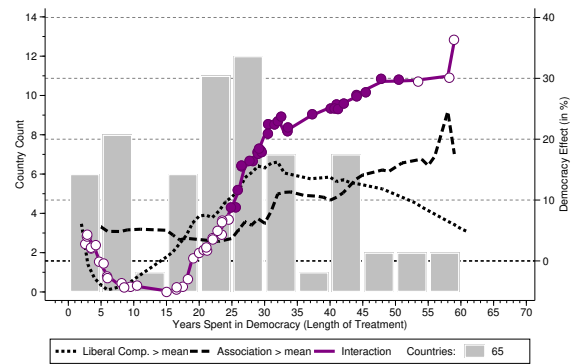
(e) Legisl. Constraints × Polyarchy ($N = 69$) (f) Clean Elections × Lib. Comp. ($N = 67$)

Notes: The plots in this figure present running line regressions for the interaction effect of three sub-components of the liberal component (Rule of Law, Judicial Constraints on the Executive, and Legislative Constraints on the Executive) in the left column and of polyarchy (Freedom of Expression, Freedom of Association, and Free and Fair Elections) in the right column. In each case we show the sample-specific running line estimates for polyarchy or the liberal component (short-dashed line), that for the sub-component (dashed line) and that for a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constant between these three models in each plot. The grey bars indicate the sample distribution (countries) for the interaction model.

(xx)

D.3 PCDID interaction models – multiple cutoffs

Figure D-3: Low-Level Indices of Dem. (lib. component): Interaction w/ Polyarchy
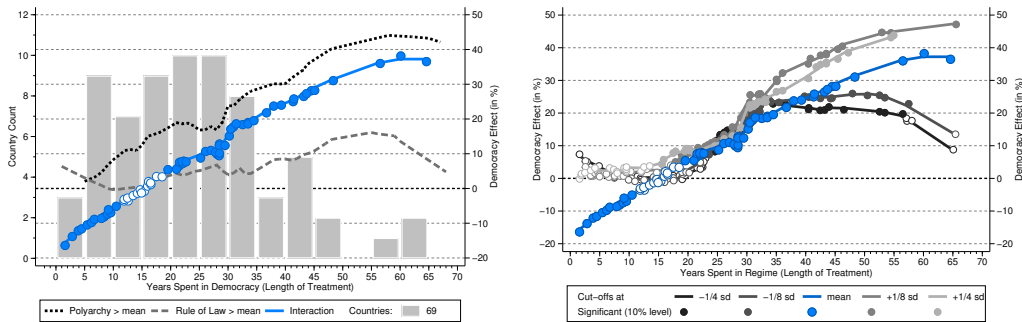
(a) Rule of Law × Polyarchy vs comp's (left, $N = 69$), altern. cutoffs (right)
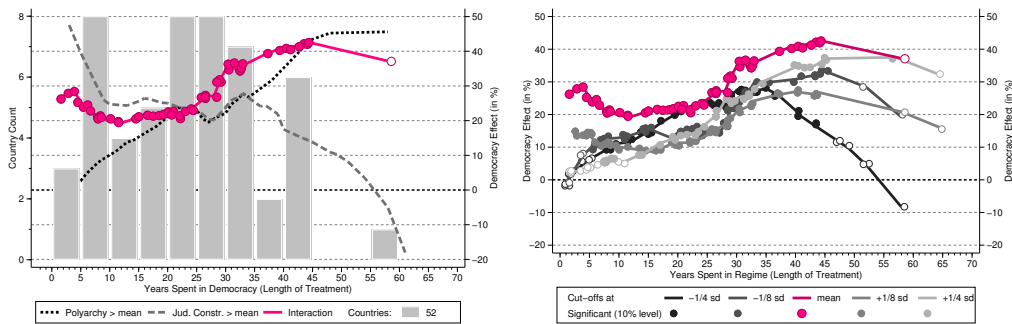
(b) Jud. Constr. × Polyarchy vs comp's (left, $N = 52$), altern. cutoffs (right)

(c) Leg. Constr. × Polyarchy vs comp's (left, $N = 69$), altern. cutoffs (right)

Notes: The plots in this figure present running line regressions for three sub-components of the liberal component (Rule of Law, Judicial Constraints on the Executive, and Legislative Constraints on the Executive). In each case of the left panel we show the sample-specific running line estimates for polyarchy (short-dashed line), that for the sub-component (dashed line) and that for a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constant. The grey bars in these plots indicate the sample distribution (countries) for the interaction model. In each plot of the right panel we investigate different cutoffs to create the standardised 'regime change' dummies in the interaction model: mean, mean $\pm 1/8$ sd, mean $\pm 1/4$ sd.

Figure D-4: Low-Level Indices of (Electoral) Democracy: Interaction with the Liberal Component
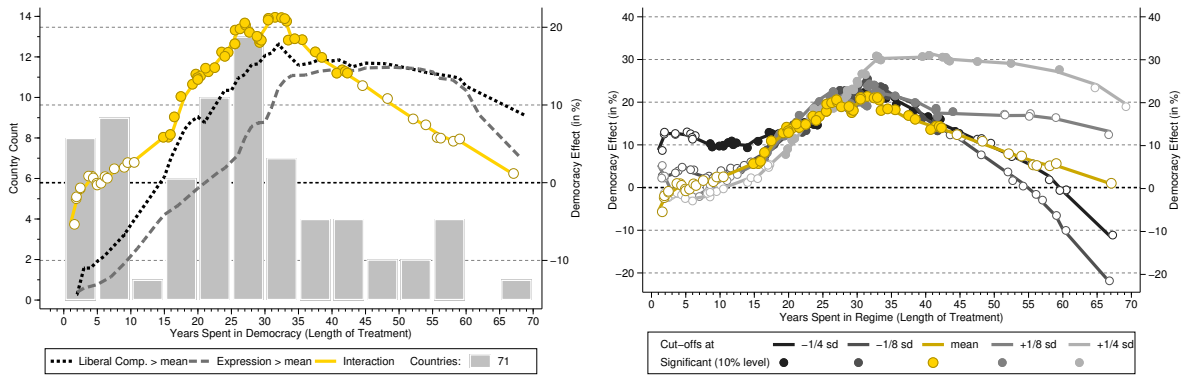
(a) F'dom of Expression × Lib. Comp. vs its comp's (left, $N = 71$), altern. cutoffs (right)
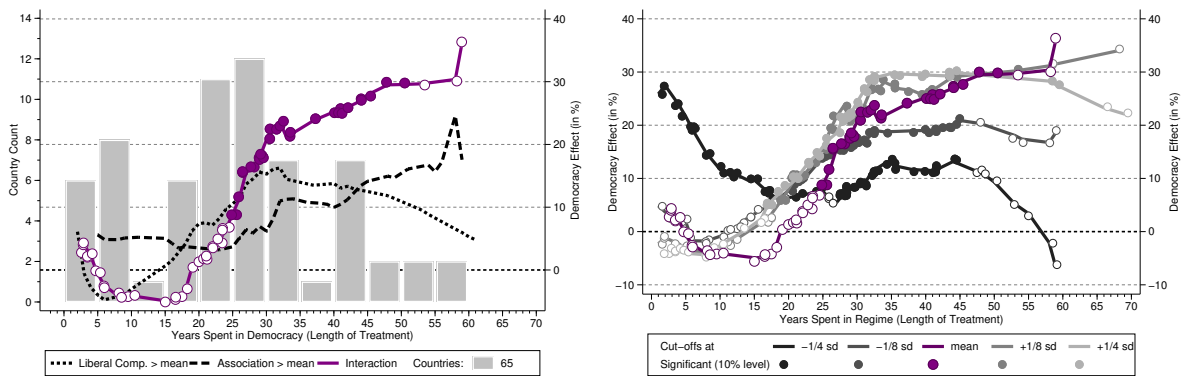
(b) F'dom of Assoc'n × Lib. Component vs its comp's (left, $N = 65$), altern. cutoffs (right)
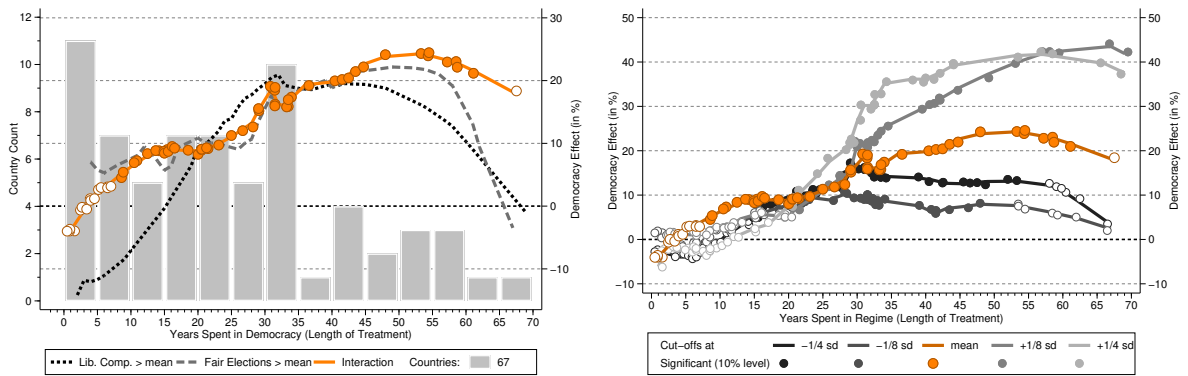
(c) Free and Fair Elections × Lib. Comp. vs its comp's (left, $N = 67$), altern. cutoffs (right)

Notes: The plots in this figure present running line regressions for three sub-components of polyarchy (freedom of expression and association, respectively; free and fair elections). In each case of the left panel we show the sample-specific running line estimates for the liberal component (short-dashed line), that for the sub-component (dashed line) and that for a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constant. The grey bars in these plots indicate the sample distribution (countries) for the interaction model. In each plot of the right panel we investigate different cutoffs to create the standardised 'regime change' dummies in the interaction model: mean, mean $\pm 1/8$ sd, mean $\pm 1/4$ sd.

E   PCDID Results – simpler interaction model

Figure E-1: Mid-Level Democracy Indicators: Interaction
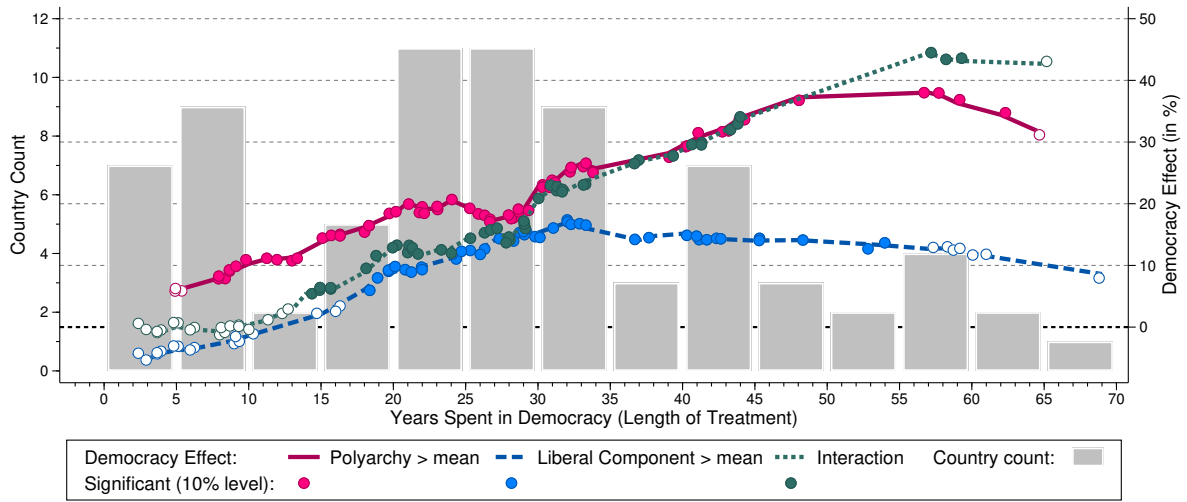
(a) Liberal Component × Polyarchy vs its components ($N = 66$)
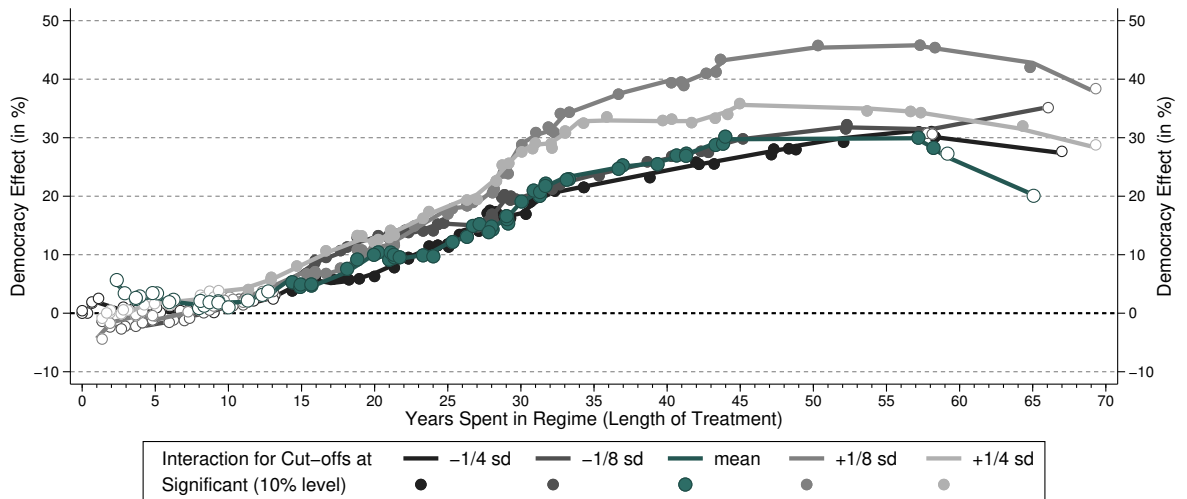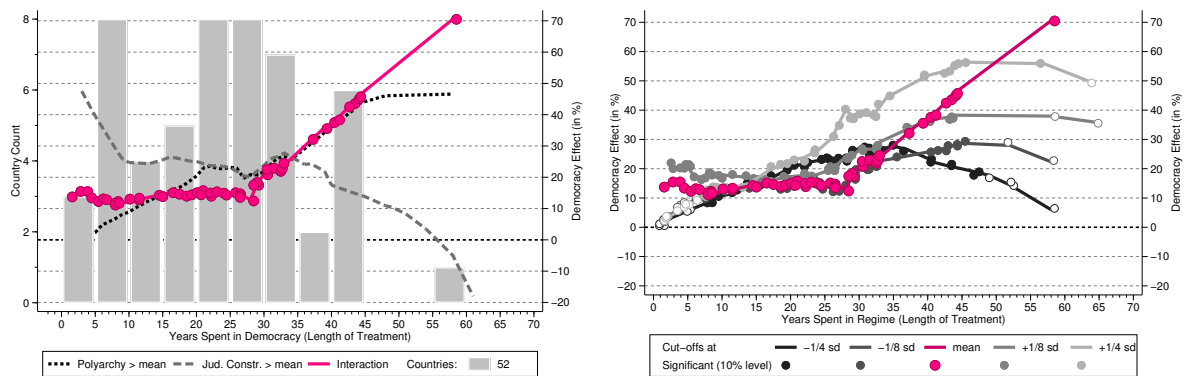

(b) Various cutoffs

Notes: The plot in panel (a) of this figure presents sample-specific running line estimates for polyarchy (short-dashed line), for the liberal component (dashed line) and for a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constant. The grey bars in these plots indicate the sample distribution (countries). In panel (b) we investigate different cutoffs to create the standardised 'regime change' dummies in the interaction model: mean, mean ±1/8 sd, mean ±1/4 sd. The results in this figure are based on the specification in equation (8), which includes factors from one control group (those countries w/out regime change in polyarchy *and* liberal component). Results for the alternative (less restrictive) specification in equation (9) can be found in Figure D-1.
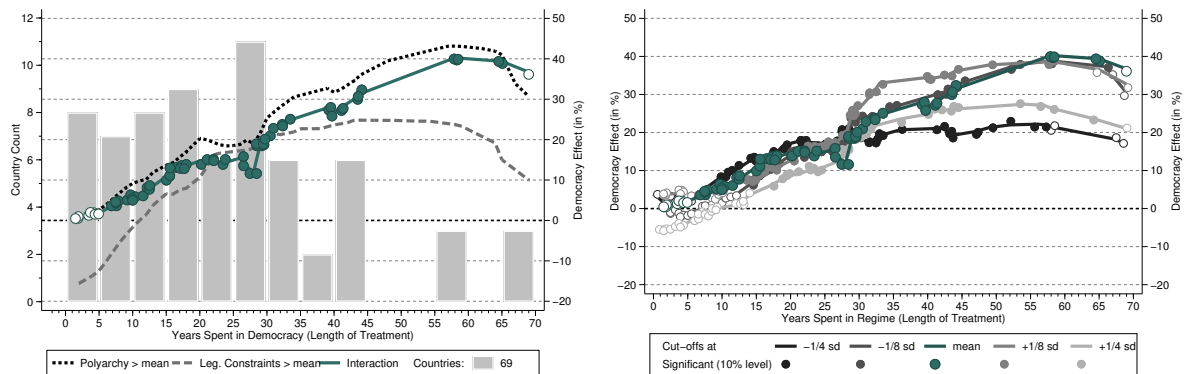
Figure E-2: Indicators from Low-Level Democracy Indices (liberal comp't): Interaction w/ Polyarchy
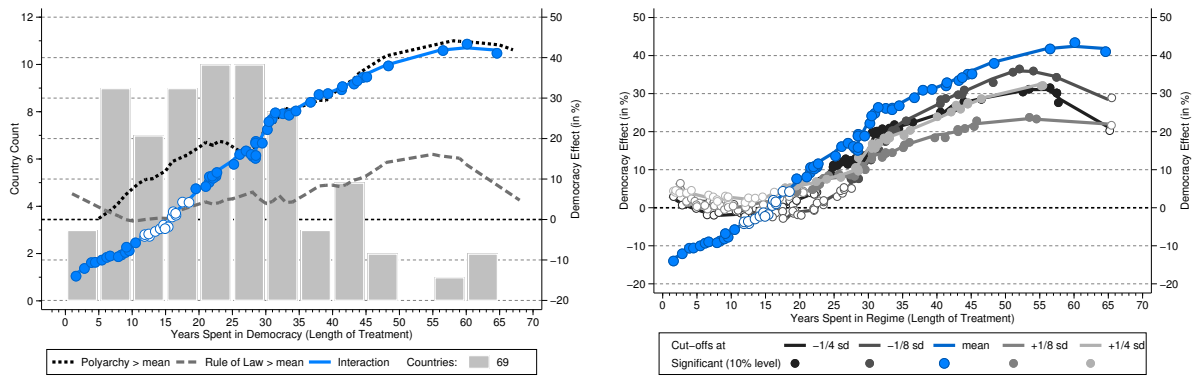
(a) Rule of Law × Polyarchy vs its comp's (left, $N = 69$), altern. cutoffs (right)

(b) Judicial Constraints × Polyarchy vs its comp's (left, $N = 52$), altern. cutoffs (right)

(c) Legislative Constraints × Polyarchy vs its comp's (left, $N = 69$), altern. cutoffs (right)

Notes: The plots in this figure present running line regressions for three sub-components of the liberal component (Rule of Law, Judicial Constraints on the Executive, and Legislative Constraints on the Executive). In each case of the left panel we show the sample-specific running line estimates for polyarchy (short-dashed line), that for the sub-component (dashed line) and that for a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constant. The grey bars in these plots indicate the sample distribution (countries). In each plot of the right panel we investigate different cutoffs to create the standardised 'regime change' dummies in the interaction model: mean, mean $\pm 1/8$ sd, mean $\pm 1/4$ sd. All interaction models presented in this figure adopt the 'simple' empirical implementation in equation (8) of the paper. The 'alternative' specification in equation (9) is presented in Figure D-2.
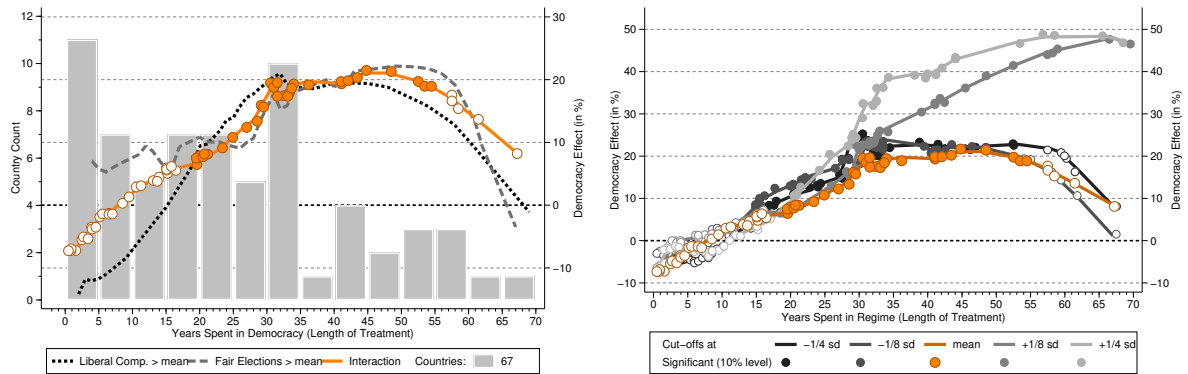
(xxiv)

Figure E-3: Indicators from Low-Level Indices of (Electoral) Democracy: Interaction with the Liberal Component
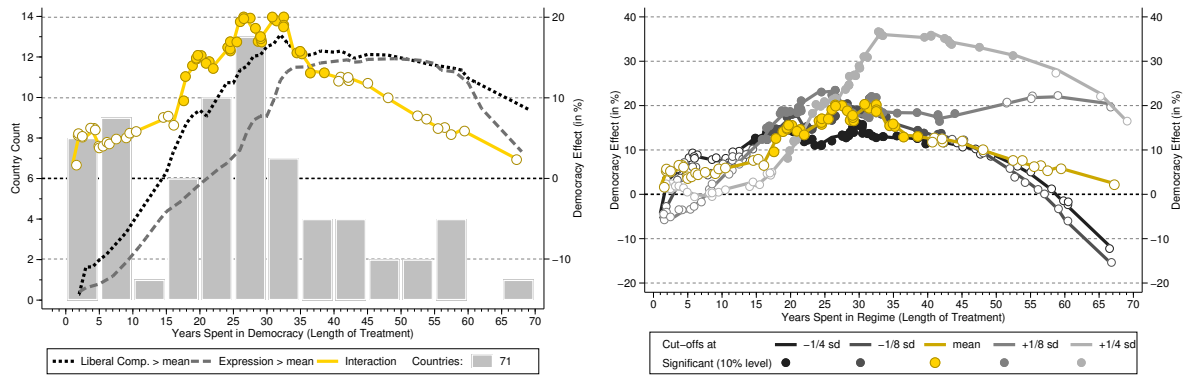
(a) F'dom of Expression × Lib. Comp. vs its comp's (left, $N = 71$), altern. cutoffs (right)
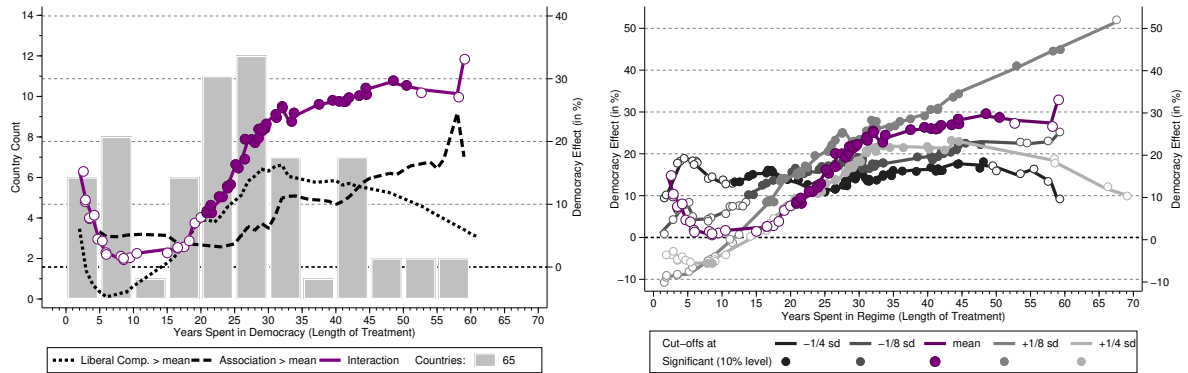
(b) F'dom of Association × Lib. Comp. vs its comp's (left, $N = 65$), altern. cutoffs (right)

(c) Free and Fair Elections × Lib. Comp. vs its comp's (left, $N = 67$), altern. cutoffs (right)

Notes: The plots in this figure present running line regressions for three sub-components of polyarchy. In each case of the left panel we show the sample-specific running line estimates for the liberal component (short-dashed line), that for the sub-component (dashed line) and that for a specification adopting an interaction between the two (solid coloured line; filled markers indicate statistical significance at the 10% level), holding the sample constxant. The grey bars in these plots indicate the sample distribution (countries). In each plot of the right panel we investigate different cutoffs to create the standardised 'regime change' dummies in the interaction model: mean, mean $\pm 1/8$ sd, mean $\pm 1/4$ sd. All interaction models presented in this figure adopt the 'simple' empirical implementation in equation (8) of the paper. The 'alternative' specification in equation (9) is presented in Figure D-2.