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Democracy Doesn't Always Happen Over Night:

Regime Change in Stages and Economic Growth[*][†][‡] [§]

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Abstract:

We motivate and empirically analyse the idea that democratic regime change is not a discrete event but a two-stage process: in the first stage, autocracies enter into an 'episode' of political liberalization which can last for years or even decades; in the second stage, the ultimate outcome of the episode manifests itself and a nation undergoes regime change or not. Failure to account for this chronology risks biased estimates of the economic effects of democratic regime change since this ignores the relevance of the counterfactual group in which liberalisation did not culminate in a democratic transition. Using novel Varieties of Democracy (V-Dem) data on Episodes of Regime Transformation (ERT) for a large sample of countries from 1950 to 2014 we study this phenomenon in a repeated-treatment difference-in-difference framework which accounts for non-parallel pre-treatment trends and selection into treatment. Our findings suggest that a single event approach significantly underestimates the economic benefits from lasting democratic regime change.

1   Introduction

When Nelson Mandela became President of South Africa in 1994 the country had successfully overcome Apartheid following a decades-long struggle by the African National Congress (ANC) using first guerrilla tactics and then mass mobilisation in the form of boycotts, strikes and demonstrations. Lifting the ban on the ANC in 1990 then-President FW de Klerk embarked on negotiations with Mandela on behalf of the white minority to safeguard their dominant position in South African politics but ultimately the country adopted universal suffrage and became an electoral democracy in which De Klerk served as Deputy President alongside Thabo Mbeki.[1] The fate of the military leaders of 1980s Brazil tells a somewhat different story of transition to democracy: boosted by the 1960s 'miracle growth' and with a firm grasp on the polity President Ernesto Geisel embarked on a gradual process of political liberalisation, possibly aimed at cementing the role of the military in an envisaged electoral autocracy. By the late 1970s, however, economic hardship brought about by two oil crises as well as revelations of widespread corruption sparked large-scale strikes and under Geisel's successor João Figueiredo the country experienced mass mobilisations calling for direct elections. Since the military regime's leaders failed to agree on a candidate the 1985 elections were lost to the opposition, which later in the year paved the way for legislative elections and eventually a new constitution promulgated in 1988.[2]

What unites these two anecdotes is the common pattern of a drawn-out liberalisation process which eventually culminates in democratic regime change. This chronology of events is far from uncommon: in the 62 countries in our sample (1950-2014) which experienced democratic regime change the median length of time spent undergoing such a liberalisation process (henceforth 'democratisation episode') is four years — we elaborate below on definitions and data sources. The first contribution of this paper is to consider democratisation as a two-stage process of episode and regime change, and to accommodate this chronology in the empirical analysis of the democracy-growth nexus: countries select into democratisation episodes, and some select out of these episodes into democratic regime change. Our approach is hence situated between those studies which favour binary democracy indicators (e.g. Giavazzi & Tabellini 2005, Rodrik & Wacziarg 2005, Persson & Tabellini 2006, Papaioannou & Siourounis 2008, Acemoglu et al. 2019) and those which favour continuous measures in analysing the economic implications of democratic change (see Bollen & Jackman, 1989, Bühlmann et al. 2008, Coppedge et al. 2011 for motivation and Leblang 1997, Knutsen 2013, Murtin & Wacziarg 2014, and Madsen et al. 2015 for applications).[3]

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[1]We acknowledge Wilson et al. (2020) and the notes from Treisman (2020) in the narratives of our anecdotes.

[2]The subsequent presidency of José Sarney ended Brazil's military dictatorship but did little to prevent the clientelism which was to dominate post-military politics for the foreseeable future.

[3]A binary indicator is deemed too insensitive, especially when examining the subtleties of hybrid regimes and democratic or autocratic transitions (Mainwaring et al. 2007, Dahl et al. 2012). Some

What the above anecdotes do not capture, and what is largely ignored in the existing literature on democracy and growth, is the simple insight that not all democratic struggles end in successful regime change. Again, this happenstance is far from rare: there are 43 countries in our dataset which experienced (at times repeated) democratic episodes yet never became democracies. The second contribution of this paper is that we pay close attention to comparing and contrasting alternative specifications (democratic regime change as a conventional one-stage or novel two-stage process) and, implicit in this, alternative control groups in our investigation of the causal effect of democracy on economic development, which can highlight the significance of our democratisation chronology.

Our empirical approach builds on previous studies in this literature adopting difference-in-difference specifications (e.g. Giavazzi & Tabellini 2005, Persson & Tabellini 2006, Papaioannou & Siourounis 2008). Recent work on the causal analysis of treatment effects expresses serious reservations about the use of the two-way fixed effects estimator within the difference-in-difference framework when treatment effects are likely to be heterogeneous (Athey & Imbens 2018, De Chaisemartin & d'Haultfœuille 2020).[4] The novel empirical implementation by Chan & Kwok (2020) we adopt and extend in our analysis estimates the *country-specific* treatment effects and allows for non-parallel pre-treatment trends as well as endogenous selection into treatment. These implementations follow a very recent tradition which introduces the insights of the panel time series literature (e.g. Bai & Ng, 2004; Pesaran, 2006; Bai, 2009; see Chudik & Pesaran, 2015, for a survey) to the empirics of policy evaluation (e.g. Gobillon & Magnac 2016, Xu 2017). The third contribution of this paper is to tie the empirical results closer to individual countries, and not the average across or common estimate for all countries in the sample as is standard in much of the literature. Length of treatment varies greatly across countries, so that a pooled or Mean Group (Pesaran & Smith 1995) estimate would implicitly or explicitly average across some countries which experienced decades of democracy and others which are still only a few years past the transition period.[5] Instead, using running line regressions we show the central tendencies in estimated country treatment effects relative to the length of time spent in democracy, while accounting for some of the difficulties in sample make-up which naturally exist in cross-country data: the differential sample start date and the

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scholars, however, have argued that the distributions of most polychotomous indices "are actually bimodal, with a high concentration of cases in their low and high ends" (Cheibub et al. 2010, 77), thus adding little information over and above a dichotomous classification. Others have argued that this 'little added information' of a polychotomous index may be precisely what is needed for an examination of democratic and autocratic transitions (e.g. Gates et al. 2007).

[4]Existing research on democracy and growth has unanimously assumed a common democracy-growth nexus across countries, yet the same literature recognises the potential for cross-country heterogeneity as motivated by arguments for a 'democratic legacy' (Gerring et al. 2005) or threshold levels in economic or human development as necessary conditions for a positive democracy-growth nexus (Aghion et al. 2007, Madsen et al. 2015, Acemoglu et al. 2019).

[5]The pooled approach further largely ignores influential outliers by failing to carry out sample reduction robustness checks, with Papaioannou & Siourounis (2008) a notable exception — see also Eberhardt (2019) for a discussion of the robustness of the results in Acemoglu et al. (2019).

regime change history of each country in the sample. Furthermore, by conditioning on the frequency of democratic episodes, the years spent in episodes, and their estimated effect on development this approach allows us to account for the two-stage nature of democratic change we advocate.

The distinction between democratisation episode and democratic regime change is quantified in the Varieties of Democracy (V-Dem) Episodes of Regime Transformation (ERT) dataset (Edgell et al. 2020). Briefly, the definition of a democratisation episode requires (i) a small positive change in an electoral democracy index (V-Dem's polyarchy index), and (ii) a substantial cumulative change in the same measure over the length of the episode. An episode's end year is demarcated by either a 5-year stasis, a substantial single-year drop, or a cumulative drop over a number of years.[6] Democratic regime change is based on the V-Dem Regimes of the World (ROW) indicator for democracy but further requires a 'founding election' to take place — this assumes that simply abolishing an autocratic regime is not sufficient to constitute a democracy. Using these definitions our dataset from 1950 to 2014 contains 238 democratisation episodes and 79 democratic regime changes, taking place in 114 countries (of which 71 experienced regime change and 43 did not).[7]

Our implementation adopts the Principal Component Difference-in-Difference (PC-DID) estimator of Chan & Kwok (2020) which augments the country-specific equation in each treated country with common factors estimated from the control group sample of never-treated ones. This framework allows for a great deal of flexibility in terms of differential pre-treatment trends between treated and control samples as well as correlation between the additional covariates, common factors and the treatment variable (i.e. selection into treatment). The implementation just described applies to democracy as a single-stage process (henceforth Single PCDID) — we extend the approach to a two-stage/repeated-treatment Difference-in-Difference estimator (henceforth Double PCDID) for all countries which experienced both democratic episodes and regime change (separate treatment dummies) and augment the country-specific estimation equation with common factors extracted from the two respective control groups: (i) countries which never experienced a democratisation episode, and (ii) countries which experienced an episode but not regime change.

We find that failing to account for episodes and selection into regime change by adopting the appropriate counterfactual groups substantially *underestimates* the economic benefits of democratisation: first, positive economic effects emerge substantially earlier in

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[6]ERT also considers episodes within regimes which are already democratic, which are ignored in our analysis: we focus exclusively on political liberalisation in autocracies which do or do not result in democratic regime change.

[7]We cannot use all 71 countries with successful regime change in our analysis since 9 of them have no pre-episodal observations which prevents separate identification of episode and regime change effects; hence, our treated sample comprises 62 countries experiencing 70 regime changes and 141 episodes. The 43 control group countries experienced 86 episodes, the median rate of 2 episodes per country is identical across these two samples.

our Double PCDID results than in a standard model considering only regime change and ignoring the significance of countries with failed episodes as a relevant control group (Single PCDID); and second, the magnitude of these economic benefits from democratisation substantially diverge in that they continue to accrue with increasing number of years in democracy in our preferred Double PCDID model but plateau fairly soon after a small burst at around 25 years in the Single PCDID model.

The remainder of this paper is organised as follows: in the next section we discuss the conceptual foundations of political regime change as a non-binary event, introduce the data sources and present descriptive analysis of the patterns of democratic episodes and regime change over the sample period. Section 3 covers the common factor model setup and the empirical implementations in greater detail. Main results and robustness checks are presented in Section 4, Section 5 concludes.

2   Regime Change as a Two-Stage Process

In this section we provide a conceptual motivation for democratisation as a two-stage process. We then introduce the V-Dem ERT dataset and offer some descriptive analysis.

2.1   Conceptual Development

Our empirical implementation captures two important elements of democratisation which we seek to motivate in the following: first, a framework for the initiation and completion of democratic liberalisation and regime change with a particular focus on *time* (the rationale for 'episodes'); and second, a concern over those nations which initiated a process of substantive liberalisation but were unable or unwilling to translate this into democratic regime change (the rationale for an appropriate counterfactual to democratic regime change).[8]

Empirical studies of democratisation are commonly focused on the analysis of electoral autocracies, so-called 'hybrid regimes', which have occupied the political science literature for at least the past two decades (Diamond 2002, Brownlee 2009, Levitsky & Way 2010, Donno 2013, Geddes et al. 2014). These authors would appear to (tacitly) agree that democratisation is an event, a single moment of "dramatic upheaval" (Gunitsky 2014, 561) in the fashion of Huntington's (1991) 'democratic waves', and they merely disagree in the set of prescribed criteria required or the determining factors present for a nation to drag itself over the 'democracy' finishing line. This concept of 'transitions as events' (Wilson et al. 2020) is in stark contrast to the 'gradualist path' to stable electoral democracy envisaged by Robert Dahl (1971) which so fittingly described the Latin American experience during the 19th and early 20th centuries (Diamond et al. 1989). According to Diamond (2002, 167) "this gradualist path has been closed off" in the "contemporary

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[8]We do not seek to explain the onset of a democratic episode and/or its ultimate outcome; however, we assume that neither can be seen as exogenous and hence we must account for selection into episodes and regime change in our empirical implementation.

world of mass participation". Yet, this hardly justifies entirely ignoring the significance of time in the process of liberalisation and regime change. Democratic transitions are the result of a (potentially lengthy) process of political struggle between several actors (Rustow 1970, Acemoglu & Robinson 2006). Many formal models of nondemocratic politics can be argued to speak to this notion of the passing of time (Gehlbach et al. 2016): Liberalisation represents a period of uncertainty over the political trajectory of a country due to mass mobilisation or coalition formation (or its failure). 'Cascading' protests and revolutionary movements may take time to foment regime-busting power in the face of repression. Alternatively, successive 'colour revolutions' over time may reveal to the opposition that the governing regime is not the problem or obstacle to regime change. Existing research in the comparative case study literature provides a self-preserving rationale for autocracies to engage in liberalisation (Magaloni 2008, Levitsky & Way 2010, Frantz & Kendall-Taylor 2014), although they might end up as democracies 'by mistake' (Treisman 2020). Hence, while revolutions and other events of dramatic upheaval leading to democratic regime change undoubtedly do occur, these arguments would suggest that establishing the political institutions of democracy, in all their multifaceted complexity, *frequently* does not happen over night.

Recent work by Geddes et al. (2014) and an earlier tradition (e.g. O'Donnell & Schmitter 1986, Hadenius & Teorell 2007) highlights the relative ignorance in the empirical literature towards democratisation events which did *not* result in regime change, i.e. when autocratic regimes survive leadership challenges or are replaced by new autocratic regimes. Levitsky & Way (2010, 52) point to the record of democratic transition in hybrid regimes during the 1990s which makes "the unidirectional implications of the word 'transitional' misleading". The very presence of hybrid regimes and the uncertainty over their 'direction of travel' creates awkward questions for the empirical literature on the democracy-growth nexus employing binary representations of democratic regime change (e.g. Giavazzi & Tabellini 2005, Papaioannou & Siourounis 2008, Acemoglu et al. 2019): this practice requires that within-category subjects are homogeneous (Wilson et al. 2020) and hence all 'negative' cases of transition are lumped together.[9] It is a well-known empirical fact that the variation in growth outcomes is substantially higher among autocratic regimes, i.e. some autocracies have very high and others very poor growth outcomes (Persson & Tabellini 2009, Knutsen 2012). For the latter group, democracy can act as a 'safety net' against disastrous economic outcomes (Knutsen 2020) and hence they may attempt to undergo a process of liberalisation, while in the former an autocracy can perhaps 'grow itself' out of any demands for political liberalisation, like China arguably has done for the past three decades.

What is the appropriate control group when studying the economic implications of democratic regime change? Modelling regime change as a two-stage process identifies

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[9]In a separate literature which adopts *continuous* measures for democracy (e.g. Knutsen 2013, Murtin & Wacziarg 2014, Madsen et al. 2015) failed liberalisations remain similarly undistinguished.

clear 'treated' and 'control' groups, whereby first some autocracies select into liberalisation, whereas others (the first control group) do not; and subsequently, some liberalising autocracies select into regime change, whereas others (the second control group) do not. By failing to distinguish between those nations which attempted liberalisation and those that did not, conventional operationalisations capturing 'democratic transitions-as-events' ignore the endogenous selection into liberalisation, as well as the identity of the relevant counterfactual case for successful regime change. Both these omissions are likely to induce bias in the empirical estimates of the 'treatment effect' of democratic regime change.

2.2   Data Sources, Variable Transformations

We use democracy data from the V-Dem Episodes of Regime Transformation (ERT) dataset (Edgell et al. 2020), real per capita GDP and population from Bolt et al. (2018, the updated 'Maddison data'), and exports and imports from Fouquin & Hugot (2016, TRADHIST). For comparison we also employ the democracy data from Marshall et al. (2017, PolityIV), where a positive polity2 variable indicates democracy,[10] and from V-Dem's Regimes of the World (Lührmann et al. 2018, ROW).[11]

In line with the practice in Acemoglu et al. (2019) we log-transform real per capita GDP and multiply this by 100: results from our difference-in-difference models hence produce estimates of the percentage change in income as a result of regime change. We compute the population growth rate and add this as a covariate to the model together with the export/trade ratio, constructed by aggregating TRADHIST bilateral export and import flows at the country-year level. Population growth as covariate is justified by the use of *per capita* GDP as dependent variable,[12] while controlling for trade was found to have significant impact on the estimated magnitude of the democracy effect (e.g. Papaioannou & Siourounis 2008, Table 3 [5]; Acemoglu et al. 2019, Table 6 [6]).

We adopt the democratic regime transformation dummy from ERT (`reg_type`) alongside the democratisation episode dummy (`dem_ep`). An episode requires a (i) small increase (0.01) in the V-Dem polyarchy index[13] for a country classified as 'closed' or 'electoral democracy' following the V-Dem ROW grouping (Lührmann et al. 2018); and (ii) a total increase of at least 0.1 in the same measure over the course of the episode. Since autocracies have low index levels this cumulative growth amounts to a very substantial proportional increase.[14] An episode ends after a year with an increase of at least 0.01 if this is followed by a year-on-year drop of 0.03, a cumulative drop of 0.1 over several

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[10]While a 'democracy-threshold' of polity2$\geq$ 6 would achieve higher concept-measurement validity, it would make our results incomparable to previous studies (e.g. Persson & Tabellini 2006, Madsen et al. 2015, Acemoglu et al. 2019). We therefore adopt a democracy-threshold of polity2$>$ 0.

[11]The ROW is available as part of Coppedge et al. (2019).

[12]Population levels are likely integrated of order 2.

[13]This increment may seem small, 1% of the range of the entire index, yet between 1900 and 2018 over 70% of annual increments in the polyarchy index are between -0.01 and 0.01 (Wilson et al. 2020).

[14]However, no democratisation episode can leave a country in the ROW 'closed autocracy' category, since this would not constitute substantive change.

Figure 1: Some Examples of Democratisation Episodes
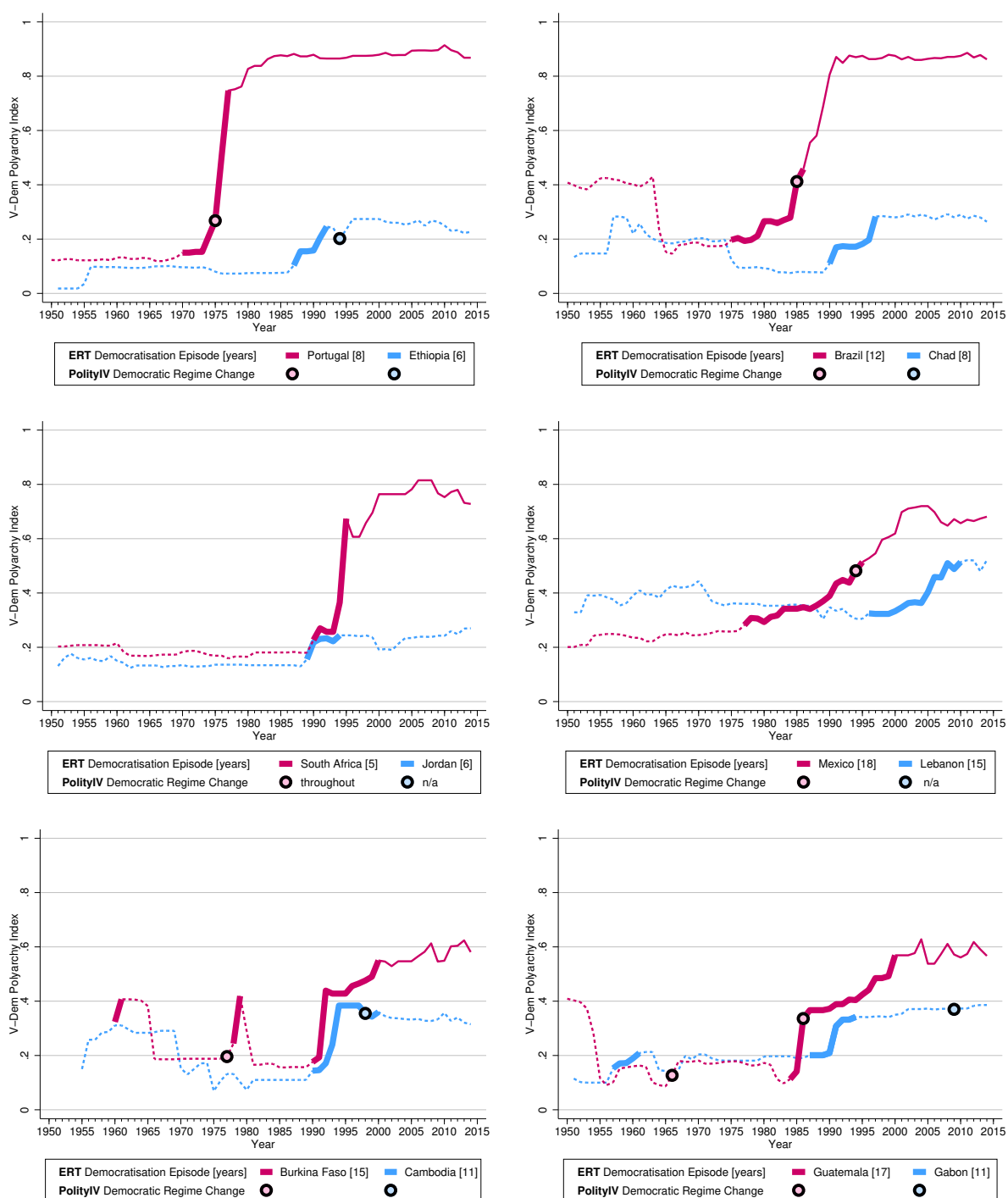
Notes: We present the V-Dem polyarchy index evolution for country pairs, where the country in dark pink experienced regime change and the country in light blue did not. The period highlighted by the thick line represents the democratisation episode, following ERT (the length of each episodes in years in indicated in the legend). The 'Eastern' end of the thick pink lines always coincides with the year of democratic regime change. A dashed (solid) thin line indicates the country regime is in autocracy (democracy) following the ERT definition. For reference we add a marker for the year in which the PolityIV polity2 index for the country turns positive. Note that for South Africa this index is positive throughout(!) the sample period. The two plots in the bottom panel highlight that many countries experienced multiple democratisation episodes.

years, or a 5-year stasis. The democratic regime change dummy builds on the ROW categorisation of democracy but further requires a founding democratic election to occur.

If democratic institutions keep improving, then in the standard ERT definition the episode dummy extends into periods when regime change has already taken place ('democratic deepening' — see middle panel of Figure 2). In order to obtain separate treatment effect estimates for episodes and regime changes we therefore adopt the subtype indicator for a 'liberalizing autocracy': our episode dummy always reverts from a 1 to a 0 in the first year of democracy.

All variables are available from 1901 to 2014, but here we limit our analysis to the 1950-2014 period: our methodology, which relies on common factors extracted from two sets of control groups, would not yield reliable results for the longer panel since only a handful of countries in the respective control groups have observations in the first half of the 20th century.[15] Our empirical approach forces us to consider the relative sample sizes of treated and various control groups, which we believe is a strength rather than a weakness of this implementation. Our 1950-2014 sample covers 62 'treated' countries which experienced episodes and regime change (n=3,724 observations), 43 autocratic countries which only experienced democratisation episodes (n=2,515; control group 2), and 15 autocratic countries which never experienced episodes (n=646; control group 1).

2.3   Descriptive Analysis: Democratic Episodes and Regime Change

Figure 1 charts the development of electoral democracy (V-Dem's polyarchy index, the basis for the episodes data) in six country pairs which experienced democratisation episodes (thick lines) but with differential outcomes (democratic regime change, solid thin line, or not, dashed thin line). Country pairs typically started out with near-identical polyarchy scores in the 1950s, but at times ended up at opposite ends of the scale in 2015. For reference we add to these plots the first year of democracy as defined by a positive polity2 score (PolityIV).

Figure 2 provides an overview of the distribution of democratic episodes and regime changes in our sample. In the top panel the histogram in light blue for the episodes highlights two peaks in the late 1950s/early 1960s, and in the 1990s, coinciding with the second and third waves of democracy (Huntington 1993). The lowest rate of ongoing democratisation episodes is in the mid-1960s and 1970s, with at times fewer than 20 countries experiencing an episode at any one time. The regime change events, in dark pink, clearly match these patterns for the second peak in the 1990s, but to a lesser extent for the early sample period in the 1950s and 1960s. The middle panel supports this notion of differential rates of episodes and episode outcomes over time: the share of episodes which did not lead to democratic transition (in pink) is particularly strong in the

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[15]For countries which never experienced a democratisation episode we have 48 observations for Taiwan and China ($N_C = 2$) prior to 1950. For countries which experienced episodes but not regime change we have 83 observations from Malaysia, Haiti and Cuba ($N_C = 3$) for the same time period.

Figure 2: Episodes and Regime Change (1950-2014)
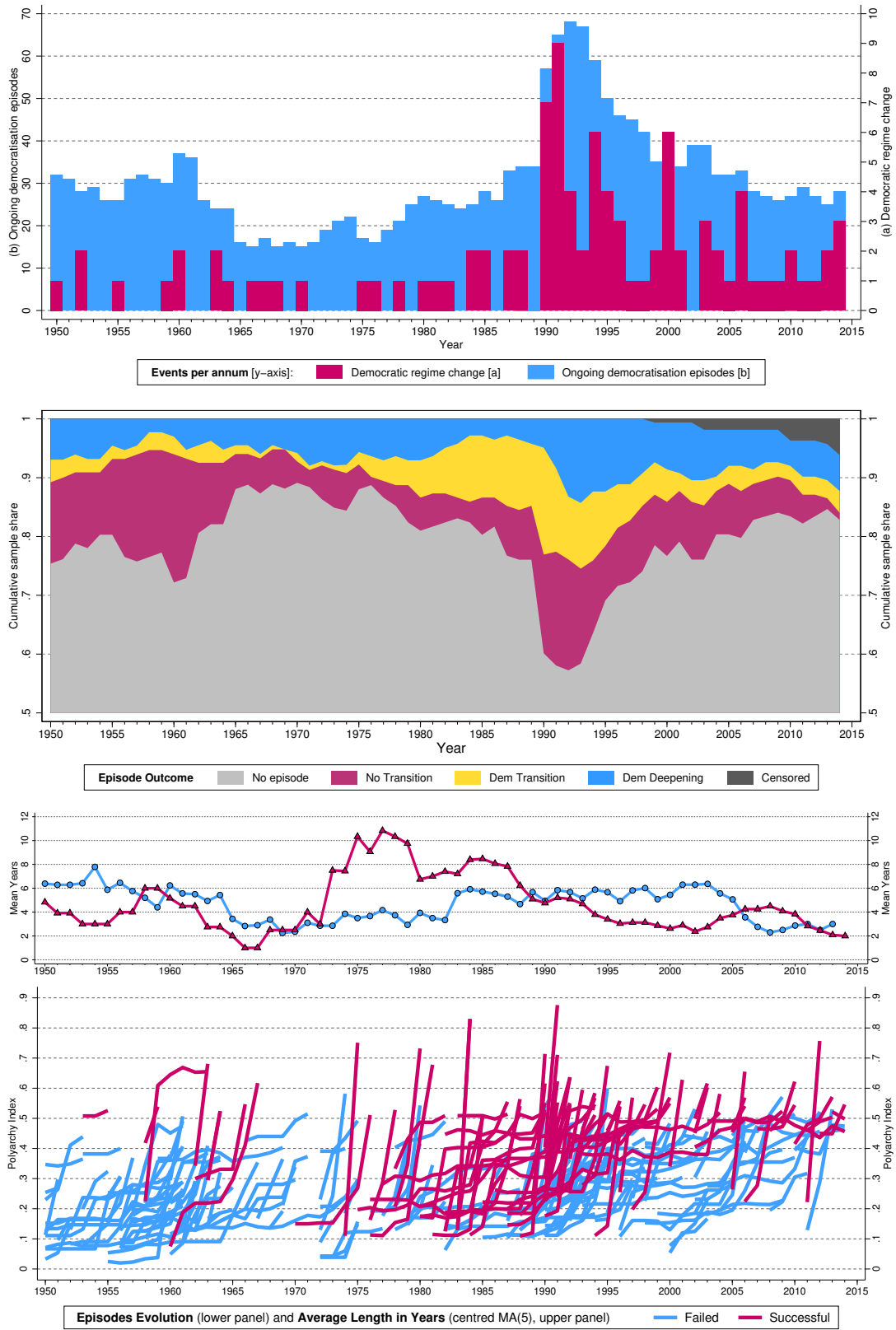
Notes: We present the distribution of democratisation episodes and regime changes in the top panel, the share of episode type in the middle panel, and the individual evolution of each episode in the lower plot along with the smoothed annual mean episode length (computed for episode start years) in the bottom panel.

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1950s and early 1960s, and again in the 1990s. Episodes culminating in regime change (in yellow) are only substantial in the late 1970s to early 1990s and are otherwise dominated by the former group.

The median episode length in treated countries is four years (stdev. 3.3), and six years (stdev. 3.4) in countries where episodes did not lead to regime change; in either group there were a median of two episodes per country (stdev. 1.1) — the bottom panel in Figure 2 charts the mean episode length over time and the evolution of each episode in our sample. The graphs for successful episodes are frequently very steep and hence of short duration, yet it would be misleading to claim that these trajectories *dominate* the treatment sample — see also the detailed analysis in Appendix A.

3   Empirical Strategies

In this section we introduce the two novel empirical implementations we employ to study the economic effect of democratisation when regime change is modelled as either a single or a repeated 'treatment'. We discuss the Principal Component Difference-in-Difference estimator by Chan & Kwok (2020, 'Single' PCDID) and subsequently our extension, the 'Double' PCDID, for these respective cases. The final part of this section introduces our novel visual presentation of heterogeneous treatment effects using predictions from running line regressions.

3.1   Single Treatment PCDID

Setup   Using potential outcomes, the observed outcome of a single treatment D_{it} for panel unit i at time T_0 can be written as

$$y_{it} = D_{it}y_{it}(0) + (1 - D_{it})y_{it}(1) = \Delta_{it}\mathbf{1}_{\{i \in E\}}\mathbf{1}_{\{t > T_0\}} + y_{it}(0) \tag{1}$$

$$\text{with} \quad y_{it}(0) = \varsigma_i + \beta_i' x_{it} + \mu_i' f_t + \widetilde{\epsilon}_{it}, \tag{2}$$

where the first and second indicator variables $\mathbf{1}_{\{\cdot\}}$ are for the panel unit and the time period treated, respectively, Δ_{it} is the time-varying heterogeneous treatment effect, x is a vector of observed covariates with associated country-specific parameters β_i,[16] $\mu_i' f_t$ represents a set of unobserved common factors f_t with country-specific factor loadings μ_i, and $\widetilde{\epsilon}_{it}$ is the error term.

The treatment effect is assumed to decompose into $\Delta_{it} = \overline{\Delta}_i + \widetilde{\Delta}_{it}$, with $E(\widetilde{\Delta}_{it}|t > T_0) = 0 \ \forall i \in E$ since $\widetilde{\Delta}_{it}$ is the demeaned, time-varying idiosyncratic component of Δ_{it}; we refer to $\overline{\Delta}_i$ as ITET, the treatment effect of unit i averaged over the post-intervention

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[16]We assume $\beta_i = \bar{\beta} + \tilde{\beta}_i$ where $E(\tilde{\beta}_i) = 0$ as is common in the literature (e.g. Pesaran 2006). Note that covariates x and factors f can be orthogonal or correlated (factor overlap).

period — this is our key parameter of interest. The reduced form model is then

$$y_{it} = \overline{\Delta}_i \mathbf{1}_{\{i \in E\}} \mathbf{1}_{\{t > T_0\}} + \varsigma_i + \beta_i' x_{it} + \mu_i' f_t + \epsilon_{it} \qquad \text{with} \qquad \epsilon_{it} = \widetilde{\epsilon}_{it} + \widetilde{\Delta}_{it} \mathbf{1}_{\{i \in E\}} \mathbf{1}_{\{t > T_0\}}, \quad (3)$$

where given the treatment effect decomposition the composite error ϵ_{it} has zero mean but can be heteroskedastic and/or weakly dependent (e.g. spatial or temporal correlation).

The factor structure has a long tradition in the panel time series literature to capture strong cross-section dependence (e.g. Pesaran 2006, Bai 2009), a form of unobserved, time-varying heterogeneity.[17] Strong correlation across panel members is distinct from weaker forms of dependence, such as spatial correlation, and if ignored can lead to serious (omitted variable) bias in the estimated coefficients on observable variables (Phillips & Sul 2003, Andrews 2005). Here, the combination of common factors and heterogeneous parameters also allows for potentially non-parallel trends across panel units, most importantly between treated and control units. The above setup can further accommodate endogeneity of treatment D_{it} in the form of *inter alia* correlation between treated units and factor loadings, the timing of treatment and factor loadings, or between observed covariates and timing or units of treatment. Finally, the implementation allows for non-stationary factors f.

Intuition and Assumptions The basic intuition for Chan & Kwok's (2020) PCDID estimator follows that of the control function approach in microeconometric analysis of production functions (Olley & Pakes 1996, Levinsohn & Petrin 2003) with factors taking on the role of the control functions: common factors are estimated from the control sample via Principal Component Analysis (PCA) and added to the country-specific estimation equation for the treated units as additional covariates. The main assumptions required for the consistency of ITET estimates are that the unobservables can be represented by a multi-factor error structure, $\mu_i' f_t$ ('interactive effects'), as in Athey et al. (2018) and the panel time series literature cited above, and that ϵ is orthogonal to all conditioning components in equation (4): all aspects of treatment endogeneity and nonparallel trends are assumed to be captured by the factor structure, the controls, and the deterministic term as well as their combinations/correlation with the treatment variable.[18] Since factor proxies are measured with error, the idiosyncratic errors $\widetilde{\epsilon}_{it}$ of treated and non-treated units may be correlated — this asymptotic bias is removed with a condition that asymptotically $\sqrt{T}/N_C \to 0$, where T is the time series dimension of the treated sample and N_C is the number of units in the control sample.

Application to the Democracy-Growth Nexus The 'single treatment' case is simply an endogenous selection into democratic regime change where pre-treatment trends

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[17] Eberhardt & Teal (2011) provide a detailed introduction to these models with discussion of empirical applications from the cross-country growth literature.

[18] Correlation between $\overline{\Delta}_i$ and x relaxes the stricter assumptions in Gobillon & Magnac (2016).

between treated and non-treated (never-regime changing) countries are potentially non-parallel. Our setup captures the possibility of a correlation between time-varying observed as well as unobserved determinants of economic development (absorptive capacity, institutions, culture, etc) and democratic regime change and hence of selection into treatment. The treatment is defined by some binary variable, such as a positive value in the polity2 variable of PolityIV, the V-Dem ROW categorisation of democracy, or the V-Dem ERT categorisation of democracy (regime change). The control group is the set of countries which remained autocratic throughout the sample period.

Implementation   The estimation of the country-specific treatment effect (ITET) $\overline{\Delta}_i$ proceeds in two steps: first, using PCA, we estimate proxies of the unobserved common factors from data in the control group equation; second, country-specific least squares regressions of treatment group countries are augmented with these factor proxies as additional covariates.

The estimation equation for treated country $i \in E$ is then:

$$y_{it} = b_{0i} + \delta_i \mathbf{1}_{\{t>T_0\}} + a_i' \hat{f}_t + b_{1i}' x_{it} + u_{it}, \tag{4}$$

where $\hat{f}$ are the estimated factors obtained by PCA of the residuals $\hat{e}$ from the heterogeneous regression of $y_{it} = b_{0i} + b_{1i}' x_{it} + e_{it}$ in the control group sample, and δ_i is the country-specific parameter of interest (regime change). We estimate (4) augmented with one to six common factors. See Section 3.3 for inference.

3.2   Repeated-Treatment PCDID

Setup   We extend the PCDID to a repeated-treatment Difference-in-Difference specification:

$$
\begin{aligned}
y_{it} &= \Delta_{it}^{\mathrm{A}} \mathbf{1}_{\{i \in E^*\}} \mathbf{1}_{\{t>T_0\}} + \Delta_{it}^{\mathrm{B}} \mathbf{1}_{\{i \in E^*\}} \mathbf{1}_{\{t>T_1>T_0\}} \\
&\quad + \varsigma_i + \beta_i' x_{it} + \mu_i^{\mathrm{A}\prime} f_t^{\mathrm{A}} + \mu_i^{\mathrm{A\,B}\prime} f_t^{\mathrm{A\,B}} + \tilde{\epsilon}_{it}.
\end{aligned}
\tag{5}
$$

We now distinguish two treatments: A for the treatment at some point T_0 and B for a second treatment at some later point $T_1 > T_0$, yet conditional on having received treatment A. The overall treatment group is now made up of those panel units which experienced *both* treatments ($i \in E^*$). Along with two treatments there are now two control groups: (1) all those units which never experienced treatment A, and (2) those units which experienced treatment A but not treatment B (see 'Implementation' below for notation). The setup can be thought of as a double-selection process where selected and 'discarded' units are possibly on different trajectories and selection itself may be correlated with observables and/or unobservables; or as a repeated-threshold regression

model where treated units are those which overcome both thresholds.[19] We now assume two sets of multi-factor error terms: one for each counterfactual group, respectively. The reduced form is now

$$
\begin{aligned}
y_{it} \;=\; & \overline{\Delta}_i^{\mathrm{A}} \mathbf{1}_{\{i \in E^*\}} \mathbf{1}_{\{t > T_0\}} + \overline{\Delta}_i^{\mathrm{B}} \mathbf{1}_{\{i \in E^*\}} \mathbf{1}_{\{t > T_1 > T_0\}} \\
& + \varsigma_i + \beta_i' x_{it} + \mu_i^{\mathrm{A}\prime} f_t^{\mathrm{A}} + \mu_i^{\mathrm{A\,B}\prime} f_t^{\mathrm{A\,B}} + \epsilon_{it}
\end{aligned}
\tag{6}
$$

using similar arguments as in the single intervention case.

Intuition The two sets of common factors account for non-parallel trends prior to the two treatments, and in analogy to the single treatment case in the PCDID these unobserved common factors can be correlated with treatments or observed covariates. Correcting for repeated treatment/selection requires the use of estimated common factors from two distinct control groups.

Application to the Democracy-Growth Nexus The 'repeated-treatment' case argues for democratic regime change as a repeated selection problem: (i) At a point in time T_0 an autocratic country sets out on a path towards democratic liberalisation, i.e. it endogenously selects into a 'democratisation episode' as defined by ERT. The control group for this first treatment are all autocratic countries which never experienced a democratic episode. Not only is the selection into episodes assumed endogenous, but we can further allow for non-parallel pre-treatment trends. (ii) Of those autocratic countries which did experience an episode of democratisation we find two types: first, those which successfully transitioned into democracy, and second, those which failed. From the pool of autocracies which experienced a democratic episode we thus have a country which at a point in time T_1 endogenously selects into 'democratic regime change' as defined by ERT. The control group for this second treatment constitutes all autocratic countries with at least one episode but which never transitioned into democracy. Again, we assume that the pre-treatment trends (i.e. during the democratic episode) are potentially non-parallel between these two groups. Most importantly, this approach postulates that the most relevant control group for countries successfully transitioning into democracy are not all those countries which never experienced regime change, but a strict subset of the latter which engaged in democratisation episodes: those that tried and failed, rather than a combination of those that tried and failed and those that never tried.

Implementation The estimation of the ITET $\overline{\Delta}_i$ again proceeds in two steps: first, using PCA, we separately estimate proxies of the unobserved common factors in the two control groups; second, country-specific least squares regressions of treatment group

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[19]Naturally, the methodology can be extended to cover the analysis of many thresholds/selection processes/treatments, provided that respective control samples are available and sufficiently large.

13

countries are augmented with the two sets of factor proxies as additional covariates. The estimation equation for treated country $i \in E^*$ is

$$y_{it} = b_{0i} + \delta_i^A \mathbf{1}_{\{t>T_0\}}^A + \delta_i^B \mathbf{1}_{\{t>T_1>T_0\}}^B + a_{1i}^{\mathsf{A}\prime} \hat{f}_t^{\mathsf{A}} + a_{2i}^{\mathsf{A}\ \mathsf{B}\prime} \hat{f}_t^{\mathsf{A}\ \mathsf{B}} + b_{1i}' x_{it} + e_{it}, \qquad (7)$$

where the $\hat{f}$ with the superscript A ($\mathsf{A}\ \mathsf{B}$) are the estimated factors obtained by PCA from the residuals $\hat{e}$ of a heterogeneous regression of $y_{it} = b_{0i} + b_{1i}' x_{it} + e_{it}$ in the first (second) control group sample, and δ_i^A and δ_i^B are the country-specific treatment parameters for episodes and regime change (ITET). We estimate (7) with one to six common factors extracted from each control group, respectively. See Section 3.3 for inference.

Treatment and Control Groups In an appendix we list the country makeup and further details of the three relevant samples for our analysis: (i) the first control group of autocratic countries which never experienced a democratisation episode (N=15 countries); prominent group members include China, Viet Nam, and a number of (oil-rich) Middle Eastern and Central Asian economies; (ii) the second control group of countries which remained autocratic throughout the sample period but experienced democratisation episodes (N=43 countries); many of these countries are in Africa and on average around 20% (st.dev. 14%) of their observations are in episodes; and (iii) the treated sample of countries which experienced democratisation episodes and regime change (N=62 countries). These spend on average 16% (st.dev. 9%) of their observations in episodes, 38% (22%) in democracy and 46% (19%) in autocracy.[20]

3.3   Presentation of Heterogeneous Treatment Effects and Inference

Given the decomposition of the treatment effect Δ_{it} a typically useful estimate would be the ATET, which in our setup would be $\overline{\overline{\Delta}} = E(\overline{\Delta}_i)$, the average of the ITET across treated units $i \in E$ or E^*. This makes sense in the context of a level effect of treatment which manifests itself after a small number of years, as one would expect in the context of many medical interventions. In the context of the democracy-growth nexus we instead argue for an alternative means of presentation, namely conditional running line plots of the estimated ITET for democratic regime change, $\hat{\delta}_i^B$, in relation to the years of treatment. This has the following advantages: (i) we do not average across different countries with dozens or just a handful of years in democracy; (ii) we can account for differential sample observations (e.g. different start years in the sample); (iii) we can account for multiple regime changes within a country;[21] (iv) we can condition on the novel two-stage setup

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[20]These numbers refer to the estimation sample: for an additional 9 countries we have no pre-episode observations in autocracy, hence we cannot separately estimate the episode and regime change effect.

[21]To the best of our knowledge any study in the existing literature on democracy and growth models democratisation as a one-off event, ignoring the empirical reality that some countries flip back and forth between regimes.

advocated here, by conditioning on the number of democratisation episodes, the years spent in these episodes, and the magnitude of the episode effect $\hat{\delta}_i^A$, and (v) we do not *a priori* impose the restriction that democracy only has a one-off levels effect on income as implied by an ATET approach.[22]

A running line regression smooths the dependent variable (here the estimated regime change effect: $\hat{\delta}_i^B$) against the independent variable (here the time spent in democracy) by using subsets of nearest neighbours in local linear regressions. In our presentation we can rely on simultaneous smoothing on multiple independent variables: hence we are able to add additional controls into this flexible running line regression to address the sample concerns as well as the idiosyncracies of countries' democratic histories with regard to episodes and regime changes.

Since in analogy to a standard Mean Group estimator the regular ATET in the Chan & Kwok (2020) PCDID is simply the average across all treated units i, with a non-parametric variance estimator following Pesaran (2006), we adopt running line regressions as 'local ATET', where 'local' refers to a similar number of years spent in democracy, and the standard errors from this methodology.[23]

4 Empirical Results

Benchmark results   Figure 3 presents the results from Single PCDID models for three democracy indicators: a dummy for a positive polity2 score (PolityIV), a dummy for the V-Dem ROW categorisation (ROW≥2), and the ERT regime type dummy. In all cases the democracy effect (in percent, y-axis) is smoothed over the years the country spent in democracy (x-axis) using multiple running line regression. Here, and in all other results graphs below, we further control for (i) the start year of the country series, and (ii) the number of times a country moved into or out of democracy. Filled (white) markers indicate statistically (in)significance at the 10% level. Panel (a) reports the full results, in panel (b) we focus on the first 25 years in democracy.[24]

The treatment effects and their relationship with length of time spent in democracy are largely identical across results for these three democratic regime type indicators: effects are moderately positive and statistically insignificant for the first 25 years, whereupon additional years spent in democracy are associated with a rise in income up until around 40 years of 'treatment', which is associated with a 12-14% higher per capita GDP. Thereafter the effect plateaus.

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[22]Existing work by Papaioannou & Siourounis (2008) concludes an annual *growth effect* of around 1%, whereas the work by Acemoglu et al. (2019) points more to a *levels effect*, albeit at 20-30% over 25 years, a very substantial one.

[23]Since these standard errors do not account in full for the correlation among all the regressors we employ bootstrap methods with 1,000 replications to show that using bias-corrected confidence intervals the patterns of statistical significance are very similar to those in the uncorrected results — see Appendix for detailed presentation.

[24]The sample size is limited to the 62 'treated' countries in the Double PCDID analysis below.

Figure 3: Democracy and Economic Development — Single PCDID
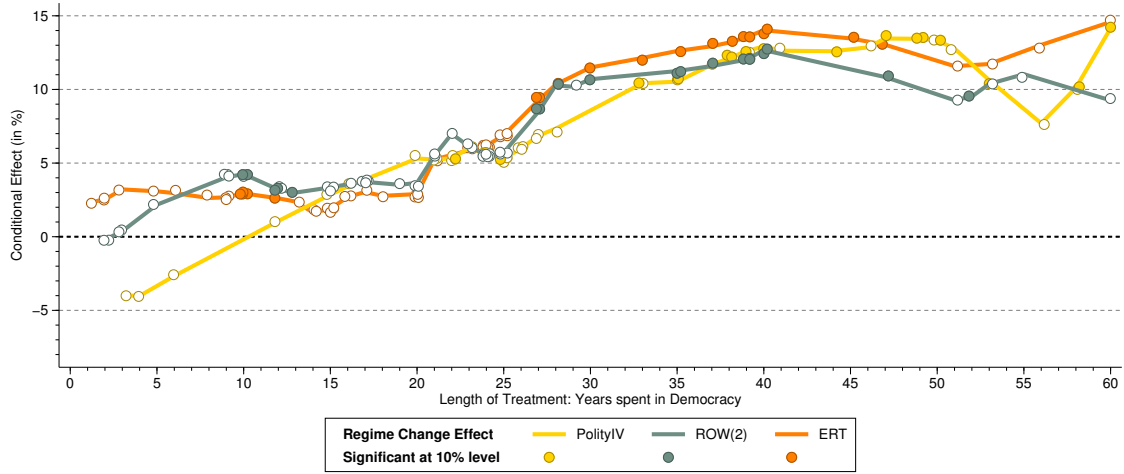
(a) Full Results
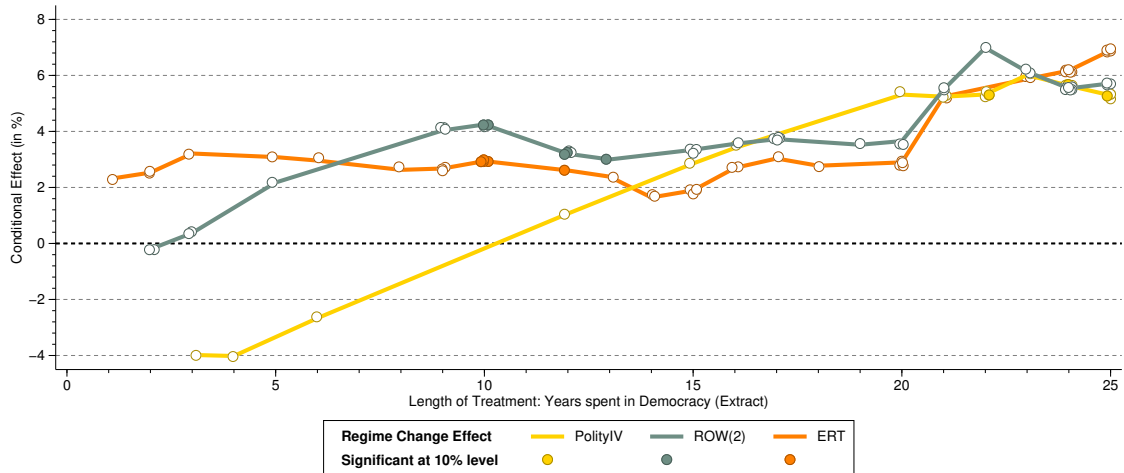
(b) Snapshot of the first 25 Years in Democracy

Notes: The plots in Panels (a) and (b) present the results from running line regressions of country-specific democracy coefficients, derived from Single PCDID estimates, on the years spent in democracy. All regressions further condition on the start year of the country series and the number of democratisations and reversals a country experienced. All results can be interpreted as local ATET, where local refers to the number of years spent in democracy. A solid (white) marker indicates statistically (in)significant difference from zero at the 10% level. The underlying PCDID estimates are for the positive polity2 variable (PolityIV), the V-Dem Regimes of the World definition of democracy (ROW2), and the V-Dem ERT dummy. Full results and an enlargement of the first 25 years are presented in (a) and (b), respectively. All results in these plots are for PCDID models augmented with 4 common factors. The sample is adjusted to be equal to that of the Double PCDID estimates for ERT presented in Figure 4.

Accounting for democratic episodes In Figure 4 we combine results from Single PCDID models with those from the Double PCDID. In the upper plot of panel (a) the orange and yellow lines are the running line estimates for the effect of democracy based on the PolityIV and the ERT definition of democracy using a Single PCDID model — these are the same as the results in Figure 3. The pink line presents the running line estimate for the ERT definition of democratic regime change in a Double PCDID model, while the blue line presents the result for the same definition of democracy but here the running line regression further accounts for country information on (i) the number of democratic episodes, (ii) the years spent in democratic episodes, and (iii) the coefficient estimate on the episodes dummy, $\hat{\delta}_i^B$. The blue line hence is the preferred specification since it accounts for the double-selection process inherent in democratic regime change. The lower plot in the same panel zooms into the first 25 years of the same relationship.

Comparing the blue and orange lines in these two plots it is obvious that the ERT definition of democracy implies a much more substantial long-run effect on development if we account for democratic episodes: in the early years of democracy this yields a statistically significant positive effect from around 12 years onwards (economic magnitude around 10% higher per capita GDP), rising almost linearly for further years spent in democracy and reaching around 30% higher per capita GDP after 50 years in democracy. In contrast, as established above, the Single PCDID estimates indicate a mostly insignificant effect of democracy up to almost 25 years and a flattening out beyond that at a maximum of 12-14% higher per capita GDP.

Robustness All of the above estimates are constructed from PCDID models where we include four common factors estimated from the covariates in the control group(s) to account for non-parallel trends and selection.[25] In panel (b) of Figure 4 we show the ERT estimate for the augmentation with four common factors in blue alongside alternative specifications with 1 to 6 common factors (i.e. 2 to 12 since this is the Double PCDID specification) — these running line estimates all account for episodes of democratisation. With only one or two common factors the estimate for the democracy-growth nexus is attenuated but still reaches 20% higher per capita GDP. Including three or more common factors leads to qualitatively identical results. This outcome is not surprising since research by Moon and Weidner (2015) suggests that including more common factors than necessary does not bias the results for the parameter of interest.

In additional robustness checks we explore the empirical reality that even countries which successfully transitioned to democracy often needed several attempts (episodes): only 25 of the 62 treated countries had a single democratisation episode, 21 had two, and 16 between three and five. We demonstrate that the strong positive effect in our main results in Figure 4 is mostly driven by countries which experienced one or two democrati-

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[25]In the Double PCDID this means four factors constructed from the control group which 'never experienced an episode' and a further four factors constructed from the control group which 'experienced democratisation episodes but never experienced regime change'.

Figure 4: Democracy and Economic Development — Single vs. Double PCDID
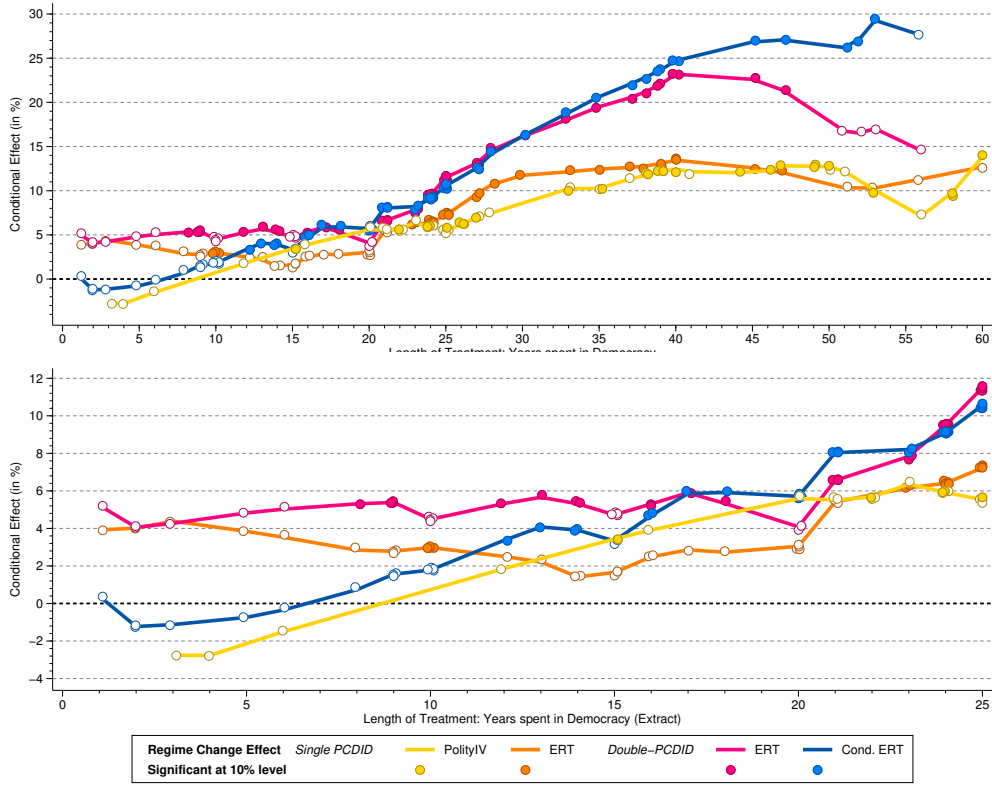
(a) Full Results (top) and Snapshot of the first 25 Years in Democracy (bottom)
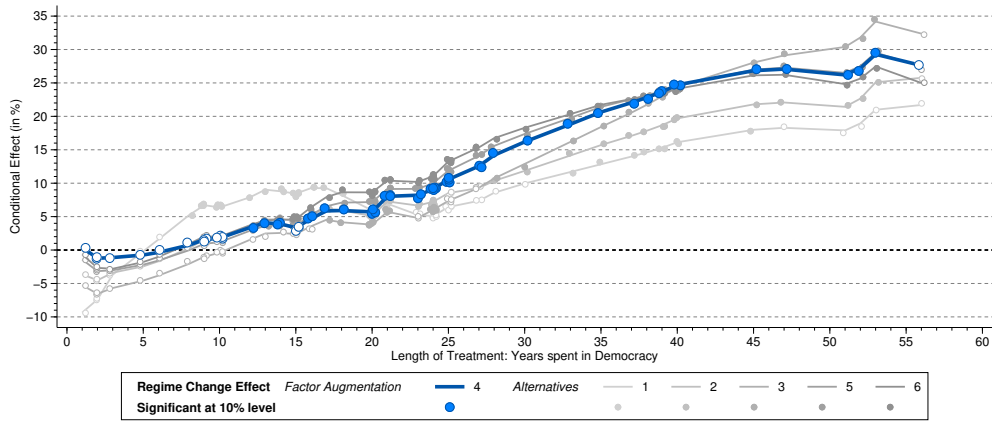
(b) Alternative Factor Augmentations: Conditional ERT

Notes: The plots in Panel (a) present the results from running line regressions of country-specific democracy coefficients, derived from Single or Double PCDID estimates, on years spent in democracy. All regressions further condition on the start year of the country series and the number of regime changes a country experienced. A solid (white) marker indicates statistically (in)significant difference from zero at the 10% level. The Single PCDID estimates are for the positive polity2 variable (PolityIV) and the V-Dem ERT dummy – these are the same as presented in Figure 3 above. The Double PCDID estimates control for selection into a democratisation episode and separately into democratic regime change. We present the estimates for the ERT dummy, with the running line model labelled 'Cond. ERT' further conditioning on the country estimates for a democratic episode ($\hat{\delta}_i^B$), the years spent in democratic episodes, and the number of democratic episodes. Full results and an enlargement of the first 25 years are presented. All results in these plots are for PCDID models augmented with 4 common factors (hence 8 in the Double PCDID); in Panel (b) we report Cond. ERT results from Double PCDID models augmented with 1 to 6 factors (2-12).

sation episodes. Nevertheless, the divergence between Single and Double PCDID results remains in *all* groups (see Appendix Figure B-2).

Furthermore, the above results employ a model with additional covariates. We demonstrate that a 'plain vanilla' version of the Single and Double PCDID excluding these produces identical relative patterns in running line regressions (Appendix Figures B-3 and B-4).

We know from our descriptive analysis of democratisation episodes and regime change that these events are not uniformly distributed over time, so we explore alternative start (1950-1970) and end years (1995-2014) for robustness. The significant deviation between the economic effects of modelling a simple model and our two-stage model of regime change remains, regardless of the start year or end year adopted in our robustness exercise (see Appendix Figures B-5 and B-6).

Finally, we estimate a Single PCDID model for all countries which experienced regime change (defined by ERT) but use the group of countries which experienced episodes but no regime change as control group to construct the factors — this model hence only differs from the Single PCDID of the ERT dummy (the orange line estimates in Figures 3 and 4) by the choice of counterfactual/control group: in the 'benchmark' model these are all 58 countries which never experienced regime change as defined by V-Dem's ERT, in the robustness check this covers only a subset of 43 countries which never experienced regime change but did experience democratic episodes. The running line plots for these two alternative models show substantial deviation (see Appendix Figure B-7): the counterfactual clearly matters.

5 Conclusion

This paper speaks to recent efforts in the analysis of the democracy-growth nexus which emphasise that greater care needs to be taken in defining democratic regime change events (Papaioannou & Siourounis 2008, Acemoglu et al. 2019). In contrast to these studies which employ binary regime change indicators we motivate and empirically implement regime change as a two-stage process, made up of a liberalisation episode and regime change. Our main concern is the selection bias implicit in existing studies which model democratisation as a single event. Instead, we propose an alternative approach which uses all those countries which embarked on an ultimately unsuccessful liberalisation episode as a counterfactual to the group of countries which became democracies. We do so adopting a repeated-treatment Difference-in-Difference estimator adapted from Chan & Kwok (2020) which allows for heterogeneous treatment effects, and compare the outcomes using the implementation which assumes a single treatment. Focusing on the distributional features of the individual treatment effects, our findings suggest that ignoring the two-stage nature of democratisation and hence adopting the wrong control sample substantially *underestimates* the economic effect of democracy on economic development.

Returning to our main results in the top panel of Figure 4, the deviation between Single and Double PCDID results could potentially suggest a very different effect of democracy, depending on whether regime change is modelled as a single or two-stage process: the clearly concave nature of the orange Single PCDID results implies that shifting from autocracy to democracy creates a *one-off levels effect* of around 12-14% higher income per capita; the petering out of any growth effect is apparent from around 30 years in democracy onwards. In contrast, the Double PCDID results in blue hint at a much more linear relationship, which would imply that democracy can exert a perpetual growth effect on per capita income.

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Appendix — Not Intended For Publication

A   Data Appendix

We provide detailed information of the makeup of three samples: in Table A-3 we study the 'treated' sample, the countries which experienced democratic episodes and democratic regime change. In Table A-2 we report details on the countries which experienced democratic episodes but never realised regime change, while Table A-1 covers all those countries which remained autocracies throughout their sample period and never had any democratic episodes.

Our choice of data sources (Maddison, TRADHIST) enables analysis from 1950-2014, but excludes a number of countries which are available in ERT from inclusion in the treatment or control groups: ten small treated economies (Bhutan, Fiji, Guyana, Kosovo, Maldives, PNG, Solomon Islands, Suriname, Timor-Leste, Vanuatu); five small (historical) economies with failed episodes: Zanzibar, Somaliland, Somalia, Republic of (South) Vietnam, GDR; and three autocratic economies with no episodes: South Yemen, Gaza/Palestine, Eritrea.

Our 1950-2014 sample covers 62 'treated' countries which experienced episodes and regime change (n=3,724 observations), 43 autocratic countries which only experienced democratisation episodes (n=2,515; control group 2), and 15 autocratic countries which never experienced episodes (n=646; control group 1). Four democracies reverted to autocracy and subsequently had unsuccessful democratisation episodes (n=75 observations); 9 countries had episodes and regime change but no pre-episode data (n=399) — both sets of observations are excluded from the analysis. The balance to arrive at 161 countries in the full available sample (n=8,770) is made up by 28 countries which were democracies throughout the sample period, which are also excluded. In practice the minimum number of time series observations for inclusion in our analysis is $n = 21$. This is in line with the practice in Giavazzi & Tabellini (2005), Persson & Tabellini (2006) and Papaioannou & Siourounis (2008). Note that Eberhardt (2019) demonstrates the fragility of results in Acemoglu et al. (2019) when countries with 'small N' are excluded from analysis, highlighting the overall lack of robustness in these authors' findings.

Table A-1: Sample Makeup: Control Group 1 (never experienced a democratisation episode)

Country	ISO	Total obs	Country	ISO	Total obs
United Arab Emirates	ARE	21	North Korea	PRK	35
Azerbaijan	AZE	21	Qatar	QAT	40
China	CHN	64	Saudi Arabia	SAU	64
Cuba	CUB	65	Tajikistan	TJK	21
Djibouti	DJI	64	Turkmenistan	TKM	21
Iran	IRN	64	Uzbekistan	UZB	21
Kazakhstan	KAZ	21	Viet Nam	VNM	60
Mozambique	MOZ	64			

Notes: This table provides details on the sample-makeup of the first control group sample, made up of the 15 countries which never experienced a democratic episode (and of course also no regime change).

Table A-2: Sample Makeup: Control Group 2 (never democratised)

Country	ISO	Total obs	Years in ep	Share	Avg length	Count	1st	2nd	3rd	4th	5th	Years in auto	Share
					Episodes (all failed)							Autocracy	
Afghanistan	AFG	59	5	8%	5.0	1	2002					54	92%
Angola	AGO	39	4	10%	4.0	1	2008					35	90%
Burundi	BDI	55	17	31%	5.7	3	1982	1992	1999			38	69%
Bahrain	BHR	44	6	14%	3.0	2	1972	2000				38	86%
Central African Republic	CAF	64	21	33%	5.3	4	1956	1987	2005	2014		43	67%
Cameroon	CMR	52	4	8%	4.0	1	1990					48	92%
DR of Congo	COD	64	18	28%	9.0	2	1955	1998				46	72%
Congo	COG	64	11	17%	3.7	3	1957	1990	2002			53	83%
Algeria	DZA	44	6	14%	2.0	3	1977	1990	1995			38	86%
Egypt	EGY	64	10	16%	10.0	1	1956					54	84%
Ethiopia	ETH	64	6	9%	6.0	1	1987					58	91%
Gabon	GAB	64	13	20%	6.5	2	1957	1987				51	80%
Guinea	GIN	64	24	38%	8.0	3	1957	1985	2010			40	63%
Gambia	GMB	64	13	20%	3.3	4	1960	1966	1996	2014		51	80%
Guinea-Bissau	GNB	64	21	33%	5.3	4	1973	1990	2005	2014		43	67%
Equatorial Guinea	GNQ	55	15	27%	7.5	2	1968	1982				40	73%
China, Hong Kong	HKG	64	8	13%	8.0	1	1985					56	88%
Haiti	HTI	65	12	18%	2.4	5	1951	1987	1991	1993	2006	53	82%
Iraq	IRQ	64	8	13%	8.0	1	2004					56	88%
Jordan	JOR	64	6	9%	6.0	1	1989					58	91%
Kenya	KEN	64	29	45%	9.7	3	1956	1990	2010			35	55%
Kyrgyzstan	KGZ	23	11	48%	11.0	1	2003					12	52%
Cambodia	KHM	60	11	18%	11.0	1	1990					49	82%
Kuwait	KWT	40	16	40%	8.0	2	1981	1991				24	60%
Lao PDR	LAO	60	4	7%	4.0	1	1955					56	93%
Lebanon	LBN	64	15	23%	15.0	1	1996					49	77%
Libya	LBY	62	3	5%	3.0	1	2011					59	95%
Morocco	MAR	64	15	23%	7.5	2	1963	1993				49	77%
Myanmar	MMR	64	8	13%	8.0	1	2010					56	88%
Mauritania	MRT	55	10	18%	3.3	3	1987	2007	2010			45	82%
Malaysia	MYS	65	27	42%	13.5	2	1972	1999				38	58%
Oman	OMN	57	4	7%	4.0	1	2000					53	93%
Pakistan	PAK	64	32	50%	10.7	3	1962	1985	2002			32	50%
Rwanda	RWA	55	21	38%	7.0	3	1979	1991	2003			34	62%
Sudan	SDN	64	23	36%	7.7	3	1965	1986	1996			41	64%
Singapore	SGP	55	1	2%	1.0	1	1960					54	98%
Swaziland	SWZ	55	6	11%	6.0	1	1964					49	89%
Seychelles	SYC	55	29	53%	9.7	3	1963	1979	1991			26	47%
Syrian Arab Repu	SYR	64	5	8%	2.5	2	1953	1961				59	92%
Chad	TCD	64	8	13%	8.0	1	1990					56	88%
Uganda	UGA	64	16	25%	5.3	3	1953	1981	1989			48	75%
Yemen	YEM	52	6	12%	6.0	1	1988					46	88%
Zimbabwe	ZWE	64	3	5%	3.0	1	1979					61	95%

Notes: This table provides details on the sample-makeup of the second control group sample, made up of the 43 countries which experienced at least one democratic episode but never realised democratic regime change.

Table A-3: Sample Makeup: Treated Countries

Country	ISO	Total obs	Years in ep	Share	Avg length	Count	1st	2nd	3rd	4th	5th	Count Failed	Avg length Failed	Years in dem	Share	Count	1st	Ep Length	2nd	Ep Length	Years in auto	Share
Albania	ALB	60	10	17%	3.3	3	1991	1998	2005			2	5.0	10	17%	1	2005	0			40	67%
Argentina	ARG	65	10	15%	2.5	4	1957	1963	1972	1983		2	4.0	33	51%	2	1964	1	1984	1	22	34%
Armenia	ARM†	21	8	38%	4.0	2	1998	2010				2	4.0	2	10%	0					11	52%
Benin	BEN	64	15	23%	7.5	2	1952	1990				1	13.0	23	36%	1	1992	2			26	41%
Burkina Faso	BFA	55	14	25%	4.7	3	1960	1978	1990			2	2.0	15	27%	1	2000	10			26	47%
Bangladesh	BGD	42	17	40%	4.3	4	1973	1977	1984	2009		3	3.0	10	24%	1	1992	8			15	36%
Bulgaria	BGR	64	1	2%	1.0	1	1990					0		24	38%	1	1991	1			39	61%
Bosnia & Herzeg.	BIH^a	19	1	5%	1.0	1	1996					0		18	95%	1	1997	1			0	0%
Belarus	BLR†	21	0	0%		0						0		3	14%	0					18	86%
Bolivia	BOL	65	13	20%	6.5	2	1952	1983				1	11.0	30	46%	1	1985	2			22	34%
Brazil	BRA	65	12	18%	12.0	1	1975					0		28	43%	1	1987	12			25	38%
Barbados	BRB^b	64	9	14%	9.0	1	1951					0		55	86%	1	1960	9			0	0%
Botswana	BWA^c	55	7	13%	7.0	1	1960					0		48	87%	1	1967	7			0	0%
Chile	CHL	65	3	5%	1.5	2	1958	1988				0		39	60%	2	1959	1	1990	2	23	35%
Côte d'Ivoire	CIV	64	17	27%	4.3	4	1990	1995	2001			3	3.3	2	3%	1	2008	7			45	70%
Colombia	COL	65	25	38%	8.3	3	1958	1972	1982			2	8.0	24	37%	1	1991	9			16	25%
Comoros	COM	55	7	13%	2.3	3	1990	1997	2002			2	1.5	9	16%	1	2006	4			39	71%
Cabo Verde	CPV	57	7	12%	2.3	3	1972	1980	1990			2	3.0	24	42%	1	1991	1			26	46%
Cyprus	CYP	64	2	3%	2.0	1	1960					0		45	70%	1	1960	0			17	27%
Dominican Rep.	DOM	64	13	20%	3.3	4	1961	1966	1978	1995		2	4.0	27	42%	2	1982	4	1996	1	24	38%
Ecuador	ECU	65	9	14%	3.0	3	1950	1967	1978			2	3.5	35	54%	1	1980	2			21	32%
Spain	ESP	65	2	3%	2.0	1	1976					0		37	57%	1	1978	2			26	40%
Georgia	GEO^b	21	10	48%	10.0	1	1994					0		11	52%	1	2004	10			0	0%
Ghana	GHA	64	7	11%	1.8	4	1951	1969	1979	1993		3	2.0	21	33%	1	1994	1			36	56%
Greece	GRC	65	5	8%	2.5	2	1950	1974				1	4.0	40	62%	1	1975	1			20	31%
Guatemala	GTM	65	16	25%	16.0	1	1984					0		15	23%	1	2000	16			34	52%
Honduras	HND	65	13	20%	4.3	3	1950	1971	1980			2	1.5	18	28%	1	1990	10			34	52%
Croatia	HRV^d	22	7	32%	7.0	1	1993					0		15	68%	1	2000	7			0	0%
Hungary	HUN	65	2	3%	2.0	1	1988					0		25	38%	1	1990	2			38	58%
Indonesia	IDN	65	10	15%	5.0	2	1950	1997				1	7.0	15	23%	1	2000	3			40	62%

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(iv)

Table A-3: Sample Makeup: Treated Countries (continued)

			Episodes (successful or failed)											Regime change to democracy							Autocracy	
Country	ISO	Total obs	Years in ep	Share	Avg length	Count	1st	2nd	3rd	4th	5th	Count Failed	Avg length Failed	Years in dem	Share	Count	1st	Ep Length	2nd	Ep Length	Years in auto	Share
India	IND[e]	65	2	3%	2.0	1	1950					0		63	97%	1	1952	2			0	0%
Jamaica	JAM	64	2	3%	2.0	1	1953					0		56	88%	1	1955	2			6	9%
Japan	JPN[e]	65	2	3%	2.0	1	1950					0		63	97%	1	1952	2			0	0%
South Korea	KOR	64	13	20%	6.5	2	1964	1976				1	1.0	27	42%	1	1988	12			24	38%
Liberia	LBR	64	7	11%	2.3	3	1985	1997	2005			2	3.0	9	14%	1	2006	1			48	75%
Sri Lanka	LKA	65	8	12%	4.0	2	1983	2011				1	4.0	51	78%	1	1987	4			6	9%
Lesotho	LSO	55	12	22%	4.0	3	1960	1992	2002			2	5.5	12	22%	1	2003	1			31	56%
Moldova	MDA	23	4	17%	4.0	1	2006					0		16	70%	1	2010	4			3	13%
Madagascar	MDG	64	20	31%	5.0	4	1956	1985	2003	2013		2	4.0	10	16%	2	1994	9	2006	3	34	53%
Mexico	MEX	65	18	28%	18.0	1	1977					0		20	31%	1	1995	18			27	42%
Macedonia	MKD	22	6	27%	6.0	1	1993					0		14	64%	1	1999	6			2	9%
Mali	MLI	55	3	5%	1.5	2	1960	1992				1	2.0	20	36%	1	1993	1			32	58%
Malta	MLT	57	1	2%	1.0	1	1962					0		52	91%	1	1963	1			4	7%
Montenegro	MNE†	10	0	0%		0						0		3	30%	0					7	70%
Mongolia	MNG[a]	24	1	4%	1.0	1	1990					0		23	96%	1	1992	2			0	0%
Mauritius	MUS	64	3	5%	1.5	2	1959	1968				1	3.0	47	73%	1	1968	0			14	22%
Malawi	MWI	58	13	22%	6.5	2	1992	2005				1	9.0	6	10%	1	2009	4			39	67%
Namibia	NAM	35	3	9%	1.5	2	1989	1995				1	3.0	20	57%	1	1995	0			12	34%
Niger	NER	64	12	19%	3.0	4	1957	1988	1993	1997		3	3.7	15	23%	1	1994	1			37	58%
Nigeria	NGA	64	11	17%	3.7	3	1976	1998	2010			2	4.0	2	3%	1	2013	3			51	80%
Nicaragua	NIC	65	10	15%	10.0	1	1980					0		17	26%	1	1990	10			38	58%
Nepal	NPL	52	5	10%	2.5	2	1990	2006				1	3.0	5	10%	1	2008	2			42	81%
Panama	PAN	65	6	9%	2.0	3	1950	1953	1990			2	2.5	24	37%	1	1991	1			35	54%
Peru	PER	65	17	26%	4.3	4	1950	1964	1976	1994		3	4.0	25	38%	1	1981	5			23	35%
Philippines	PHL	65	9	14%	4.5	2	1982	2007				0		21	32%	2	1988	6	2010	3	35	54%
Poland	POL	64	10	16%	10.0	1	1980					0		25	39%	1	1990	10			29	45%
Portugal	PRT	65	6	9%	6.0	1	1970					0		39	60%	1	1976	6			20	31%
Paraguay	PRY	65	4	6%	4.0	1	1990					0		21	32%	1	1994	4			40	62%
Romania	ROU	60	1	2%	1.0	1	1990					0		24	40%	1	1991	1			35	58%
Russia	RUS†	23	0	0%		0						0		2	9%	0					21	91%

Continued overleaf

(v)

Table A-3: Sample Makeup: Treated Countries (continued)

Country	ISO	Total obs	Years in ep	Share	Avg length	Count	1st	2nd	3rd	4th	5th	Count Failed	Avg length Failed	Years in dem	Share	Count	1st	Ep Length	2nd	Ep Length	Years in auto	Share
									Episodes (successful or failed)							Regime change to democracy					Autocracy	
Senegal	SEN	64	7	11%	2.3	3	1960	1978	1990			1	7.0	25	39%	2	1960	0	1990	0	32	50%
Sierra Leone	SLE	64	13	20%	3.3	4	1958	1994	2002	2013		3	4.0	9	14%	1	2003	1			42	66%
El Salvador	SLV	65	12	18%	6.0	2	1982	1991				1	4.0	16	25%	1	1999	8			37	57%
São Tomé & Príncipe	STP	55	9	16%	4.5	2	1972	1987				1	4.0	23	42%	1	1992	5			23	42%
Togo	TGO	64	21	33%	5.3	4	1956	1991	2005	2012		3	6.3	1	2%	1	2014	2			42	66%
Thailand	THA	64	22	34%	4.4	5	1974	1978	1992	2008	2010	4	4.0	8	13%	1	1998	6			34	53%
Trinidad & Tobago	TTO^f	64	9	14%	9.0	1	1951					0		55	86%	1	1960	9			0	0%
Tunisia	TUN	64	6	9%	3.0	2	1956	2011				1	5.0	3	5%	1	2012	1			55	86%
Turkey	TUR	65	13	20%	4.3	3	1950	1962	1983			1	2.0	38	58%	2	1966	4	1990	7	14	22%
Tanzania	TZA	64	17	27%	8.5	2	1958	1986				1	7.0	13	20%	1	1996	10			34	53%
Ukraine	UKR	21	1	5%	1.0	1	2005					0		10	48%	1	2006	1			10	48%
Uruguay	URY	65	4	6%	4.0	1	1981					0		53	82%	1	1985	4			8	12%
Venezuela	VEN	65	5	8%	5.0	1	1958					0		40	62%	1	1963	5			20	31%
South Africa	ZAF	64	5	8%	5.0	1	1990					0		20	31%	1	1995	5			39	61%
Zambia	ZMB	58	8	14%	2.7	3	1961	1990	2000			1	8.0	14	24%	2	1961	0	2000	0	36	62%

Notes: This table provides details on the sample-makeup of the 'treated' sample, i.e. the set of countries which experienced at least one democratisation episode followed by a regime change. There are 75 countries in this table, but only 62 of them have estimates for both the episode dummy and the democratic regime change dummy — these countries have their country names highlighted in bold. The remaining 13 countries have the following characteristics: four countries (marked in the 'ISO' column with †) experienced a reversal to autocracy followed by an unsuccessful democratisation episode. Nine countries (marked in the 'ISO' column with superscripts a-f) do not have any pre-episode data (and in some cases additionally experienced episodes lasting only one or two years), hence the regime change or the episode dummy is unidentified. In some more detail:

a) No pre-episode data, one-year episode before democratic regime change (BIH,MNG)

b) No pre-episode data, ten-year episode before democratic regime change, no regime change estimate (BRB, GEO)

c) No pre-episode data, seven-year episode before democratic regime change, no episode estimate (BWA)

d) No pre-episode data, seven-year episode before democratic regime change, no regime change estimate (HRV)

e) No pre-episode data, two-year episode before democratic regime change, no regime change estimate (IND, JPN)

f) No pre-episode data, nine-year episode before democratic regime change, no regime change estimate (TTO)

The first set of columns after the country name, ISO code and total observation count refers to information on the total number of episodes, their average length, and timing as well as the count and average length for failed episodes. The next set of columns refers to successful regime changes, how long countries spent in democracy (the 'years of treatment') and the length of the associated democratisation episodes (in years). The final two columns report the information on the pre-episode data. For years in episodes, democracy, and autocracy we report the share of total years, which adds up to 100% (even though of course episodes are *nominally* within the autocratic regime but we separate them out here).

(vi)

B Additional Figures and Tables

Figure B-1: Democracy and Economic Development — Bootstrap Inference for Single and Double PCDID
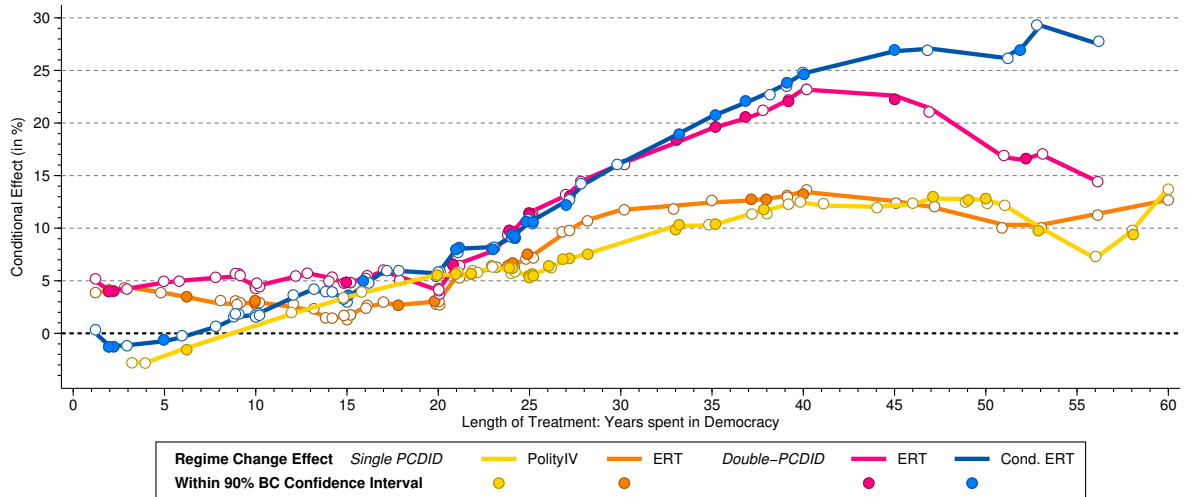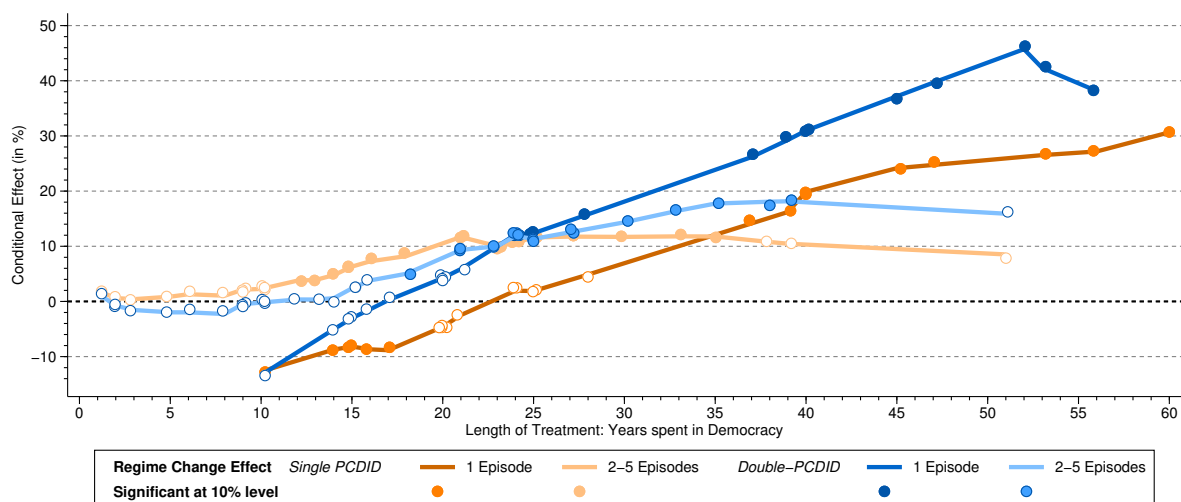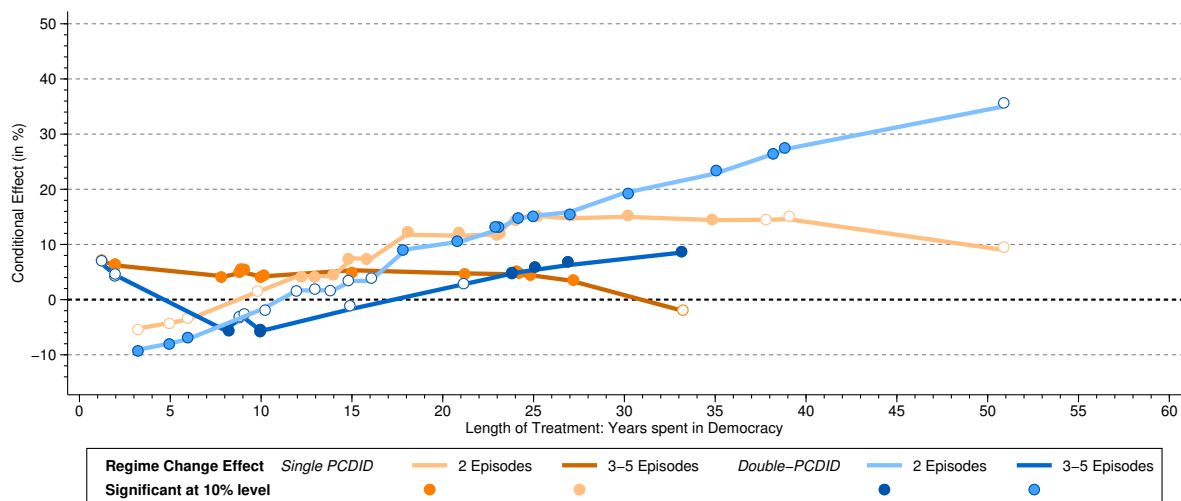

(a) Full Results
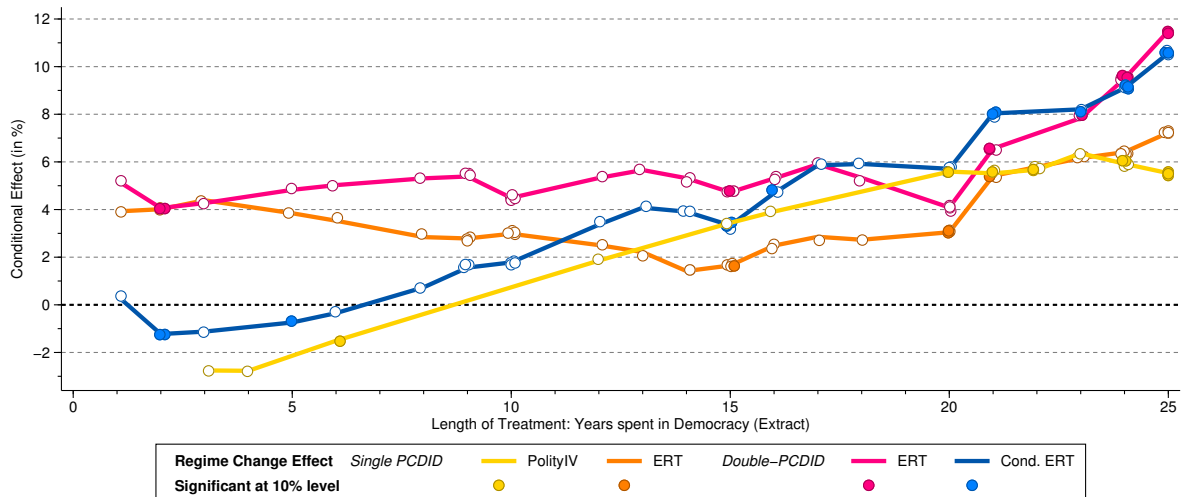
(b) Zooming in on the first 25 years in Democracy

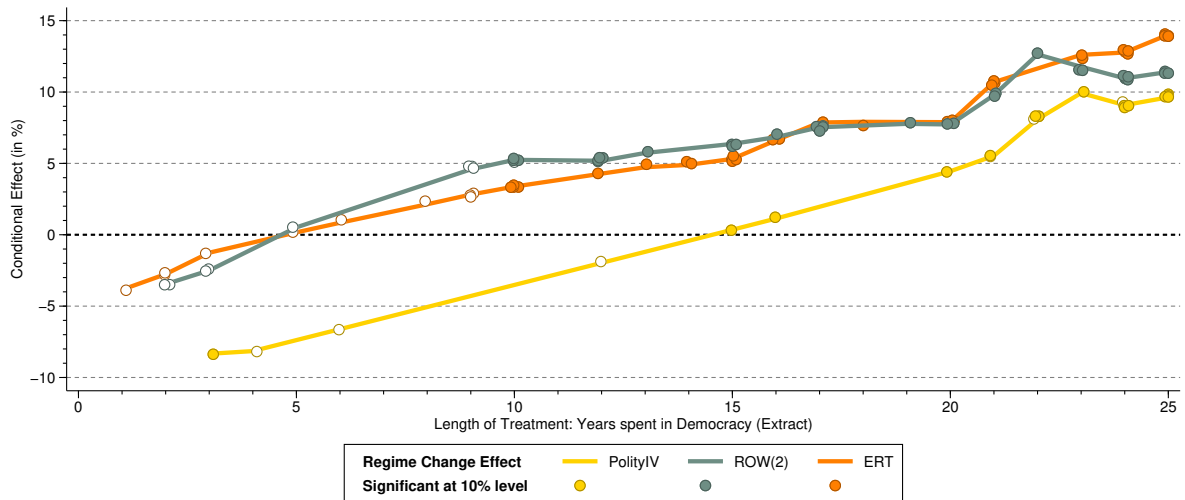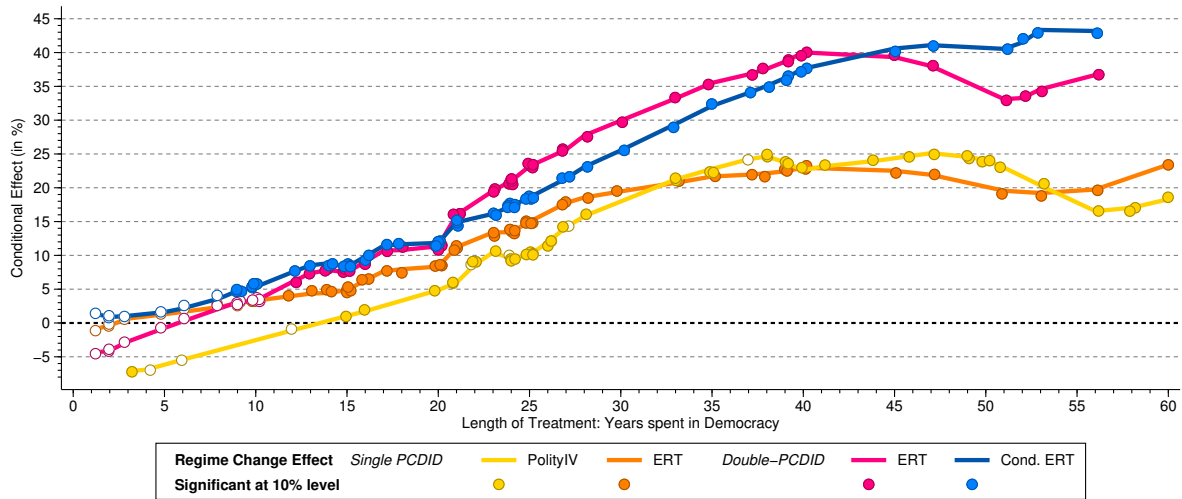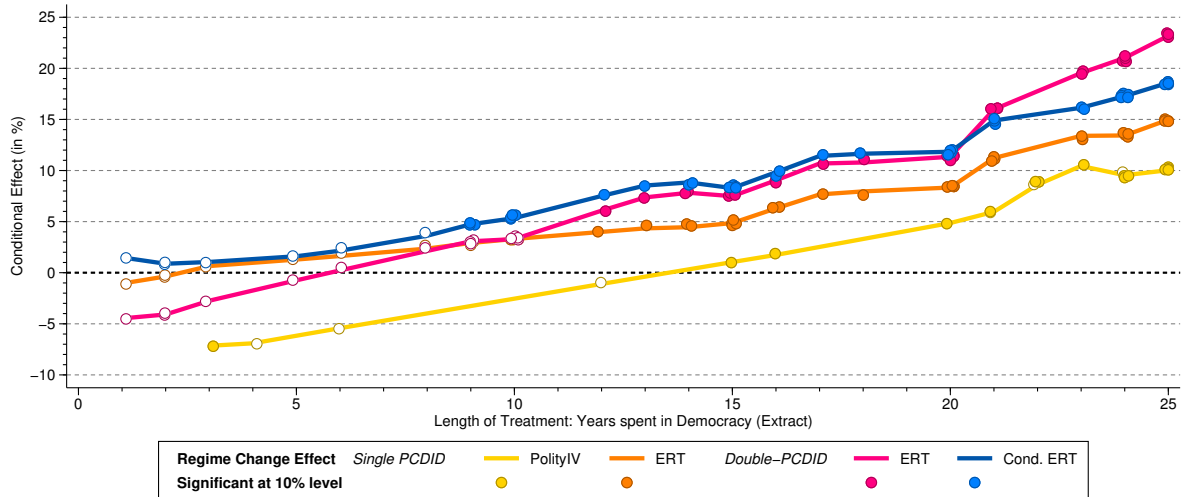**Notes**: These plots presents the results from running line regressions of country-specific coefficients on the democracy (ERT) dummy, derived from Single and Double PCDID estimates. These are the results using bias-corrected 90% confidence intervals (via 1,000 bootstrap replications) for inference. Panel (a) presents the results for all treatment lengths, Panel (b) focuses on fewer than 25 years in democracy.

Figure B-2: Democracy and Economic Development — Single vs Multiple Episodes Groups

(a) Single vs Multiple Episodes

(b) Two vs More Episodes

Notes: These plots present the results from running line regressions of country-specific coefficients on the democracy dummy, derived from Single and Double PCDID regressions (these are the 'Conditional ERT' estimates for the latter). In the upper panel we split the sample into those countries which only experienced one democratisation episode ($N = 25$) and those which experienced several ($N = 37$), in the lower panel we further split the latter into those with 2 ($N = 21$) and with 3-5 episodes ($N = 16$), respectively. The Double PCDID estimates are still conditioned on the number episodes experienced for the latter group.

**Figure B-3:** Democracy and Economic Development — Plain Vanilla Single PCDID
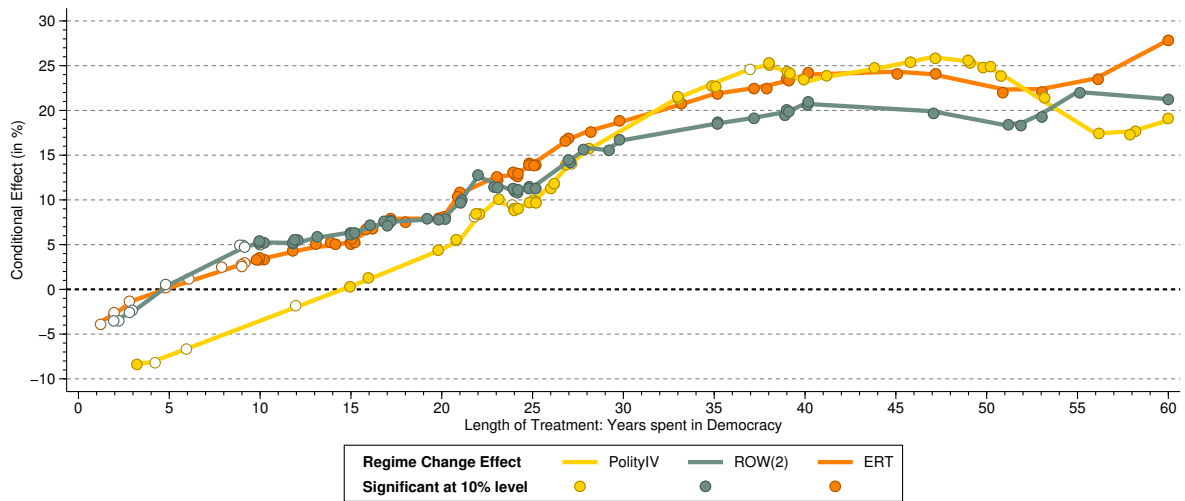
(a) Full Results

(b) Zooming in on the first 25 years in Democracy

Notes: The plots present the results from running line regressions of country-specific coefficients on the democracy (ERT) dummy, derived from Single PCDID regressions which do not include additional covariates (population growth, export-trade-ratio). These regressions condition on (i) the country series start year, and (ii) the number of times a country experienced regime change. In Panel (a) we present the full results, in Panel (b) we focus on the first 25 years of countries in democracy.

Figure B-4: Democracy and Economic Development — Plain Vanilla Double PCDID
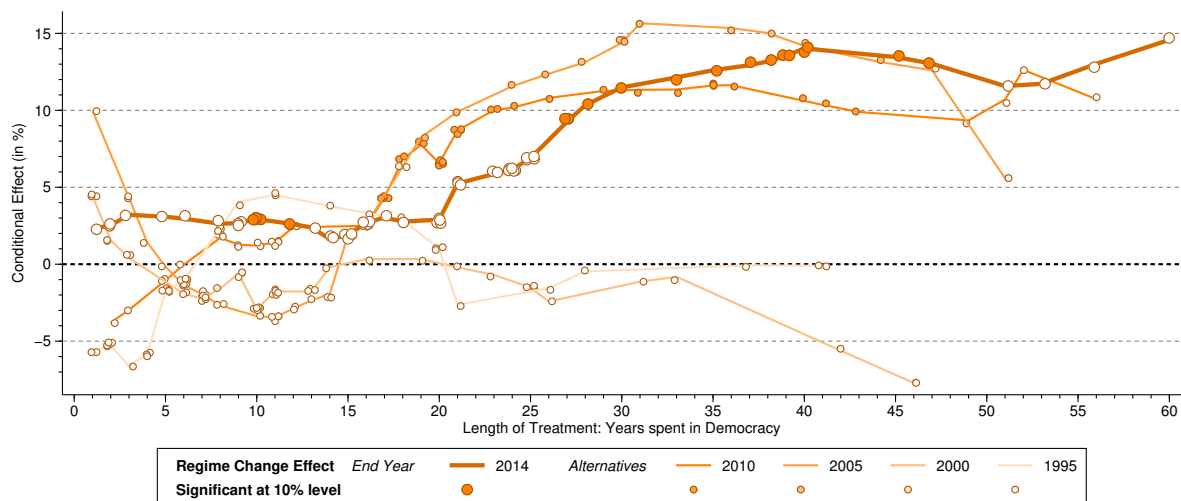

(a) Full Results

(b) Zooming in on the first 25 years in Democracy

Notes: The plots present the results from running line regressions of country-specific coefficients on the democracy (ERT) dummy, derived from Double PCDID regressions which do not include additional covariates (population growth, export/trade ratio). These regressions condition on (i) the country series start year, and (ii) the number of times a country experienced regime change. In Panel (a) we present the full results, in Panel (b) we focus on the first 25 years of countries in democracy.

Figure B-5: Democracy and Economic Development — Robustness Check for Single PCDID
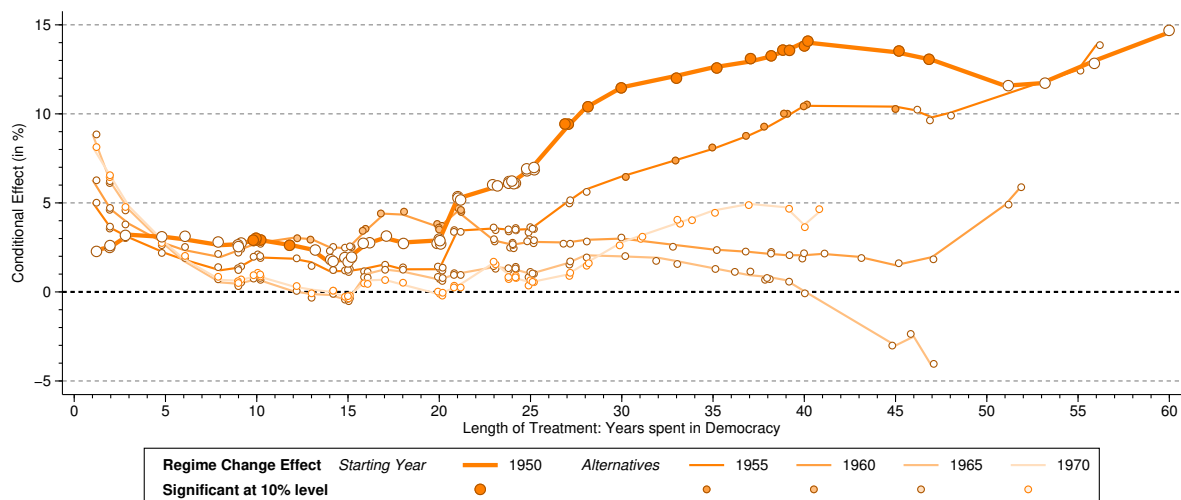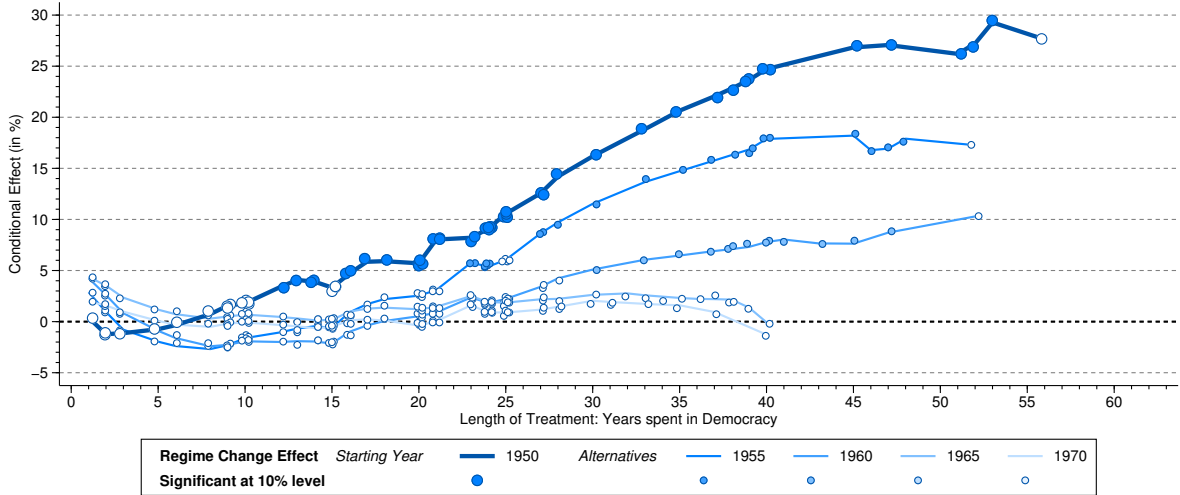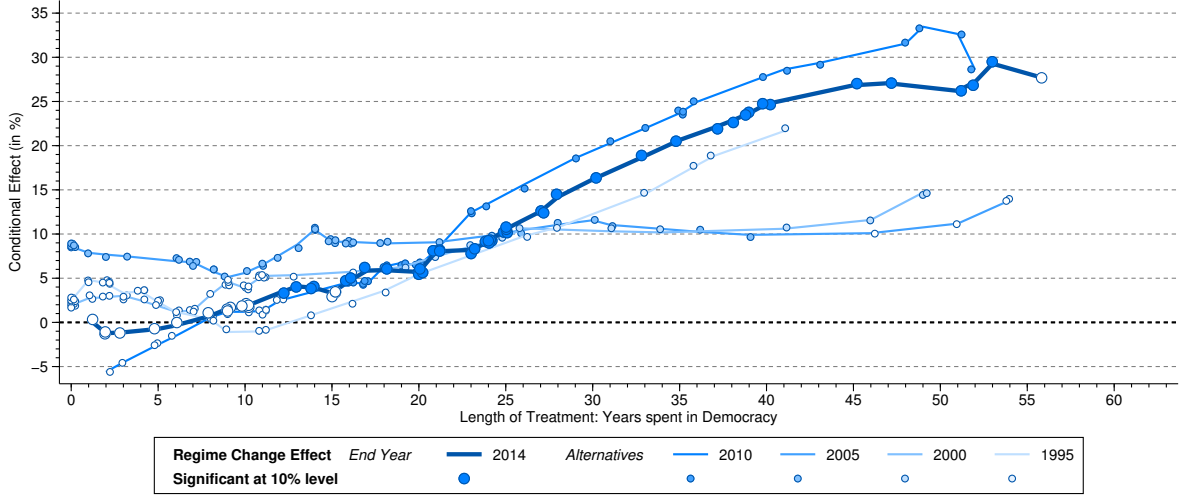

(a) Reducing the sample: different start years

(b) Reducing the sample: different end years

Notes: The plots present the results from running line regressions of country-specific coefficients on the democracy (ERT) dummy, derived from Single PCDID estimates. These regressions condition on (i) the country series start year, and (ii) the number of times a country experienced regime change. In Panel (a) we vary the start year, in Panel (b) the end year of the full 1950-2014 panel.

**Figure B-6:** Democracy and Economic Development — Robustness Check for Double PCDID

(a) Reducing the sample: different start years

(b) Reducing the sample: different end years

Notes: The plots present the results from running line regressions of country-specific coefficients on the democracy (ERT) dummy, derived from Double PCDID estimates which account for selection into a democratic episode and separately into democratic change, on the number of years spent in democracy. The running line regressions condition on (i) the country series start year, (ii) the number of times a country experienced regime change, (iii) the country estimate for a democratic episode, (iv) the years spent in democratic episodes, and (v) the number of democratic episodes. In Panel (a) we vary the start year, in Panel (b) the end year of the sample. Note that the sample reductions substantially curtail the treated and control sample sizes. For the start years ('control 1' refers to the episodes counterfactual, 'control 2' to the regime change counterfactual): *1955* -6% treated, -4% control 1; *1960* -12% treated, -10% control 2; *1965* -20% treated, -17% control 2; and *1970* -27% treated, -24% control 2. For the end years: *2010* -7% treated, -9% control 1; *2005* -15% treated, -21% control 1; *2000* -23% treated, -33% control 1; and *1995* -32% treated, -44% control 1.

Figure B-7: Democracy and Economic Development — Single PCDID for alternative Control Groups
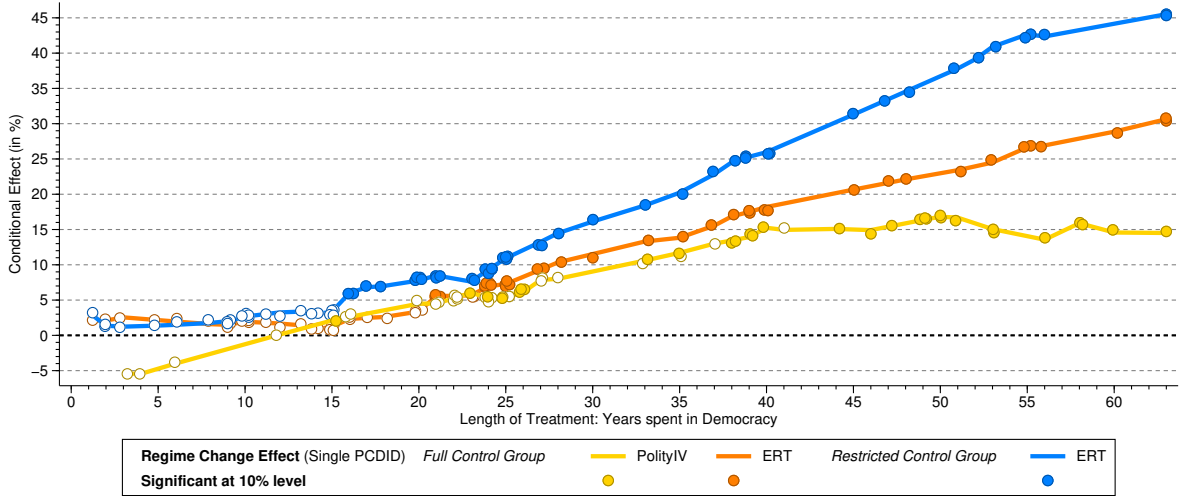
Notes: The plot presents the results from running line regressions of country-specific coefficients on the democracy dummy, derived from Single PCDID regressions. The yellow line uses the results for an indicator of a positive polity2 score (PolityIV) — this is included here for comparative purposes. The orange and blue lines are for the V-Dem ERT regime change dummy but differ in the control group adopted in the PCDID regressions: the orange line is based on estimates using as control group all those countries which never experienced regime change (as defined by ERT, $N = 58$); the blue line is based on estimates using a sub-sample of countries which never experienced regime change but did experience episodes of democratisation ($N = 43$).