Executive Constraints and Economic Growth

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Abstract

Despite extensive research on the relationship between democracy and development, the specific democratic features driving economic growth remain unclear. This paper examines the impact of two forms of executive constraints: horizontal constraints, parliamentary oversight over the executive, and vertical constraints, citizen accountability through competitive elections. While previous work emphasizes horizontal constraints for property rights protection, I argue that vertical constraints drive the democracy effect on growth by fostering human development. Using dynamic panel analysis, I find that vertical constraints consistently increase real GDP per capita in the short and long run, whereas horizontal constraints have a negligible effect. I further explore causal mechanisms, showing that horizontal constraints promote capital investment while vertical constraints enhance living conditions, leading to higher education, increased public spending, and lower infant mortality rates. These findings suggest that democracy's growth-enhancing effects stem more from citizen accountability rather than institutional checks on executive power.

Keywords: Democracy, executive constraints, institutions, economic growth

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Introduction

A growing body of evidence points toward democracy as a fundamental cause of growth (Acemoglu et al. 2019; Colagrossi, Rossignoli, and Maggioni 2020; Knutsen 2021; Gerring, Knutsen, and Berge 2022). Proponents argue that democratic institutions secure property rights, ensure steady economic policies, and promote investment in both physical and human capital (North 1990; Knutsen 2013). Yet, empirical findings on the democracy-growth link remain mixed, with studies reporting negative effects (Barro 1996) to no significant correlation (Przeworski et al. 2000; Gerring et al. 2005; Doucouliagos and Ulubaşoğlu 2008). To reconcile these discrepancies, scholars increasingly examine specific features of democratic governance, such as government structures and electoral rules (Persson and Tabellini 2005), party strength (Bizzarro et al. 2018), bureaucracies (Cornell, Knutsen, and Teorell 2020), or executive constraints (Cox and Weingast 2018). While consensus has emerged that democracy matters for development, questions remain as to which democratic institution(s) matter the most.

Much of the theoretical work on democratic institutions has focused on executive constraints. A prominent line of research argues that horizontal constraints on the executive, such as legislatures, are sufficient to promote economic growth by fostering capital investment (North and Weingast 1989). Related scholarship contends that vertical constraints – electoral institutions – can threaten property rights and hinder growth by generating pressures for wealth redistribution (Przeworski and Limongi 1993). However, many scholars challenge this view, suggesting that free and fair elections align government policies toward majority preferences (Acemoglu and Robinson 2005). Consequently, vertically constrained governments prioritize the provision of goods with positive externalities such as education and health, improving living conditions for most the population and ultimately fostering economic growth (Lake and Baum 2001; Baum and Lake 2003; Besley and Kudamatsu 2006; Wang, Mechkova, and Andersson 2019; Gerring et al. 2021).

In this article, I examine the relationship between economic growth and vertical and horizontal constraints, challenging the conventional view that horizontal constraints are the primary link between democracy and economic performance. Using a panel of 182 countries from 1950 to 2020, I find that while horizontal constraints increase capital investment – consistent with previous research – they do not significantly impact real GDP per capita in the short or long term once vertical constraints are accounted for. Instead, my findings strongly suggest that vertical constraints drive growth, increasing real GDP per capita by roughly one percent in the short run and about 30 percent in the long run. I also explore a plausible mechanism behind this relationship: vertical constraints are strongly associated with human capital development, leading to higher education levels, increased public spending, and lower infant mortality rates. These results remain robust across different model specifications, variable choices, and econometric assumptions. Collectively, they indicate that electoral contestation, rather than horizontal accountability, is the key driver of democracy's positive effects on economic and human development.

1 Two forms of executive constraints

Executive constraints are institutions that reduce rulers' discretionary use of power. These institutions can take two forms. Horizontal constraints provide checks on executive behavior by splitting the power of the government into relatively autonomous branches. They thus often take the form of legislative control over the executive or an independent judiciary with legal instruments to review rulers' decisions. On the other hand, vertical constraints hold leaders accountable to their citizens through contested multi-party elections and extensive franchise rights (Dahl 1971). Institutions providing electoral oversight allow for vertical accountability, in which citizens can evaluate and accordingly sanction their rulers.[1] Both constraints have distinct theoretical links to development: horizontal constraints can facilitate financial development, whereas vertical constraints enhance public good provision and, thereby, human development.

1. While classic work pinpoints contestation and participation as fundamental democratic dimensions, Boese et al. (2022) suggest that constraints on rulers should be treated as a third fundamental component of democracy. Accordingly, my approach treats both the contestation and participation dimensions of democracy as vertical constraints because they facilitate vertical accountability. Vertical constraints include both the right to compete for votes for public office (contestation) and the right to vote in this competition (participation).

1.1 Investment without electoral democracy?

A large body of scholarship examines the role of horizontal constraints in establishing the incentives for financial development. North and Weingast (1989) suggest that introducing a Parliament with binding powers discouraged the English Crown from engaging in predatory behavior after the Glorious Revolution. Other work generalizes this argument, suggesting that these institutions give investors a "credible signal that the state will not confiscate investment returns via taxation or frequent policy changes" (Wright 2008, 336). Accordingly, scholars have found that horizontal constraints positively influence private investment (Stasavage 2002; Wright 2008), while other authors suggest that they mitigate the investment downturns produced by electoral cycles (Canes-Wrone and Park 2014; Canes-Wrone, Ponce de León, and Thieme 2023).

The cornerstone of the "commitment" argument is that institutions providing horizontal checks on rulers protect property rights, which generates a more predictable business environment. Investors require certainty that they can own the benefits of their productive operations once earned. This connection has led some scholars to argue that as long as there is some credible commitment institution, there is no need for other democratic features to ensure prosperity. Indeed, there is a long tradition of political philosophers and scientists considering democratic institutions outside of horizontal constraints as a *threat* to property rights protection. In their view, electoral democracy generates demands for immediate public consumption, threatening the profits of capital holders, which reduces investment and retards growth (Przeworski and Limongi 1993).

These arguments indicate that horizontal constraints should be positively correlated with investment. Indeed, scholars have found that introducing checks and balances increases private investment across countries (Stasavage 2002). However, this finding belies that observations coded as having a strong legislature constraining the executive may also have strong participatory institutions providing electoral accountability. Consequently, the alleged impact of horizontal constraints could be absorbing not only the overall effect of democracy but also the potential impact of other sets of institutions.

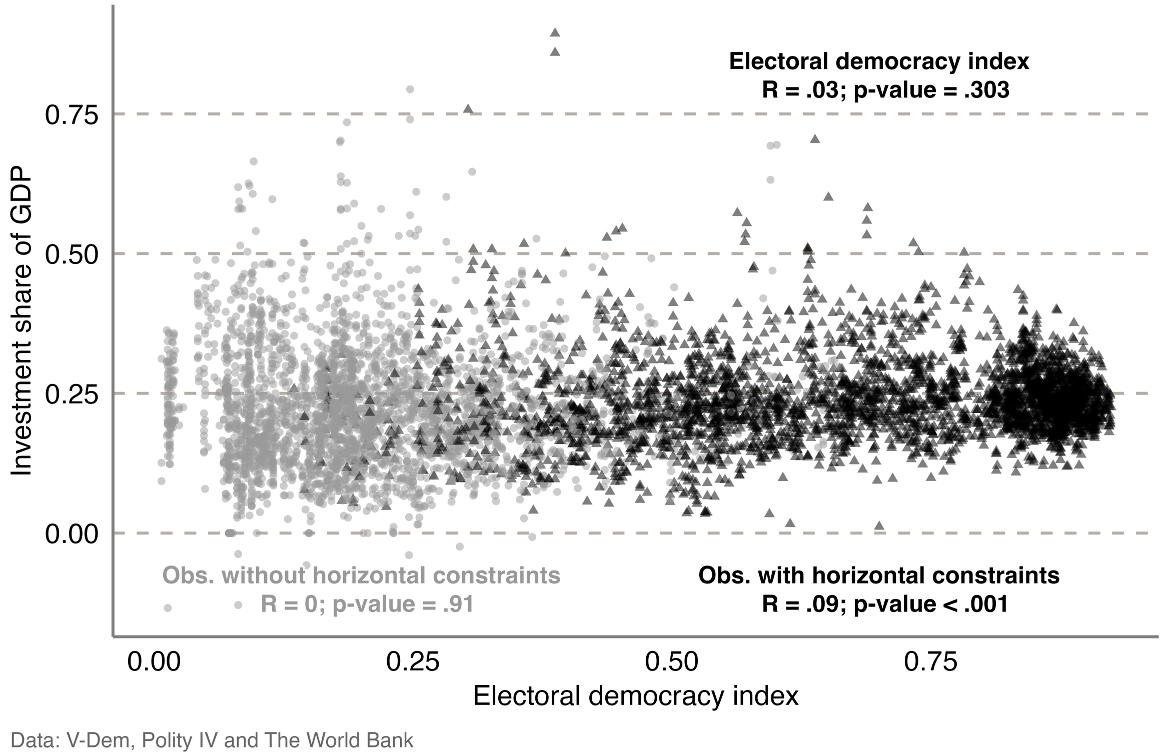

Figure 1: The relationship between horizontal constraints and capital investment

Figure 1 provides a nuanced picture of the relationship between horizontal constraints and investment in a sample of 169 countries between 1950 and 2018. This graph shows the correlation between the V-Dem electoral democracy index and investment share of GDP, distinguishing the observations coded as having or not horizontal constraints based on Polity IV.[2] I also report Pearson correlation coefficients for observations with and without such constraints, and the electoral democracy index. As shown, only country-year observations with horizontal constraints are positively associated with greater capital investment. These results provide some empirical support for the commitment literature, as the correlation between the democracy index and investment is negligible.

1.2 Electoral institutions in action

While the relationship between democracy and private investment remains contested and results are very mixed (Gerring, Knutsen, and Berge 2022), there is less disagreement

2. I create dichotomous indicators for both types of constraints following Cox and Weingast (2018) and Acemoglu et al. (2019) using data from Polity IV. I thoroughly describe these variables in the Data and Methods section.

regarding the effects of vertical constraints on human capital. Studies have found a strong relationship between electoral democracy and outcomes such as life expectancy (Besley and Kudamatsu 2006) and greater social spending in health and education (Lindert 2004; Mulligan, Gil, and Sala-i-Martin 2004; Haggard and Kaufman 2020). Wang, Mechkova, and Andersson (2019) show that the quality of competitive elections consistently negatively affects infant mortality rates. Gerring et al. (2021) suggest that competitive elections are more strongly associated with human development than other aspects of democracy. Miller (2015) stresses that contested elections, both in autocracies and democracies, promote human development through health, education, gender equality, and civil liberties.

Prominent studies identify human capital as the primary channel through which democracy fosters economic growth (Lake and Baum 2001). Baum and Lake (2003) emphasize that when participation barriers and costs are low, the state functions as a regulated monopoly, supplying a larger quantity of goods at lower prices. Pinto and Timmons (2005) further argue that vertical constraints enhance human capital by reducing entry barriers to power, enabling citizens to register their preferences, select their leader and demand for goods and services. Electoral competition shift government policy toward the preferences of the median voter. Under inclusive institutions, these preferences reflect a broader segment of the population, which tends to favor the demands of goods with positive externalities, such as education and healthcare. Therefore, voting serves as an accountability mechanism when leaders fail to meet citizens' welfare expectations (Ferejohn 1986, 1999; Barro 1973), and curb predatory behavior (Benhabib and Przeworski 2010). Finally, participatory institutions improve resource allocation and public goods provision by solving collective action problems (Besley et al. 2005, 2007; Gonçalves 2014; Touchton, Wampler, and Peixoto 2021).

Figure 2 provides observational evidence that vertical constraints are associated with lower infant mortality rates, a standard indicator to measure living conditions cross-nationally. Observations with vertical constraints have lower infant mortality rates than observations without constraints. Indeed, the correlation between electoral democracy

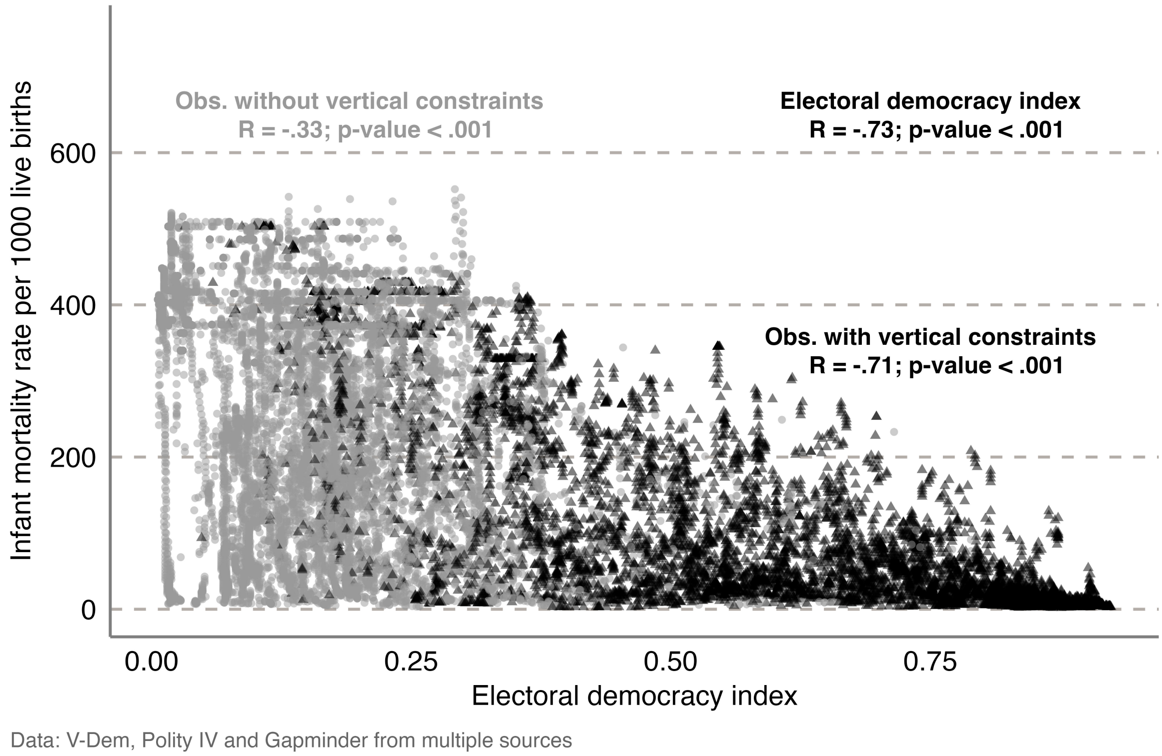

Figure 2: The relationship between vertical constraints and infant mortality

and infant mortality is also strong and significant. These findings indicate that vertical constraints can improve living conditions but are more ambiguous about their strength in isolation.

The empirical assessments presented in Sections 1.1 and 1.2 provide evidence that there is a correlation between both horizontal and vertical constraints and the proposed mechanisms by which they facilitate development. Figure 3 shows information about the interactive direct effects of both constraints on real GDP per capita. The left panel presents this interaction effect considering vertical constraints as the moderating factor, whereas the right panel describes this effect using the other constraint as the moderating factor. As shown, observations with both constraints are positively correlated with higher GDP per capita, while the only presence of horizontal constraints do not appear to affect growth significantly. Conversely, the only presence of vertical constraints appear to be positively correlated with GDP growth. This observation provides empirical evidence for the argument that polyarchy components have a interactive and complementary relationship concerning their impact on economic development (Gerring et al. 2021).

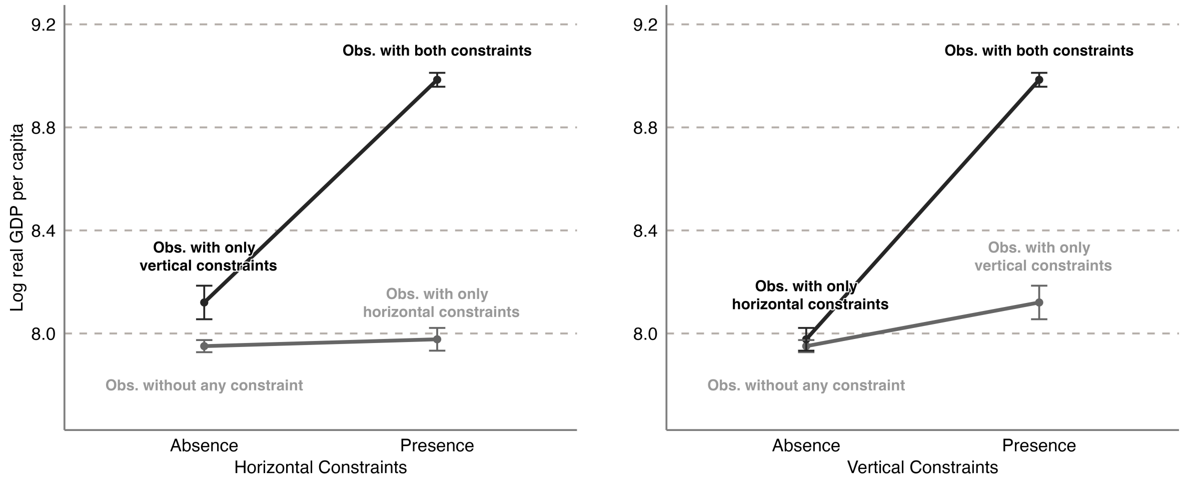

Figure 3: Interactive effect of horizontal and vertical constraints on growth

In isolation, each constraint perform a substitutory economic role, enhancing a specific growth source such as physical investment and human capital. When combined, both constraints complement each other to reinforce the overall economic effect of democracy.

2 Data and Methods

Here, I present the empirical strategy to assess the direct and indirect effects of executive constraints on economic development. Crucially, I use a modified version of Acemoglu et al. (2019) canonical model specification to first examine whether horizontal and vertical constraints have significant effects on growth itself, and then I assess the specific mechanisms by which these constraints are hypothesized to affect growth such as private investment, education enrollment, public spending and infant mortality.

I construct a dataset covering 182 countries from 1900 to 2020, capturing information from 18962 country-year observations during the three waves of democratization. I restrict the baseline analysis to the period between 1950 to 2020 due to data availability and panel data modeling constraints. As my primary dependent variable, I use the natural logarithm of real gross domestic product (GDP) per capita, measured in 2011 U.S. dollars, obtained from the Maddison Project Database version 2023 (Bolt and Zanden 2024).[3] This variable is available for 169 countries and the period up to 2022.

3. Level measures of GDP per capita are frequently used in economic research (e.g. Acemoglu et

Following Cox and Weingast (2018) and Acemoglu et al. (2019), I code a country as having horizontal constraints on the executive when there are institutional constraints imposing "substantial limitations" on the use of power by a country's chief executive, as measured by the Polity IV project (Marshall and Gurr 2020). Again following Cox and Weingast 2018, I code a country as having vertical constraints on the executive when at least one of the chief executives was elected by a competitive election according to Polity.

I use dichotomous indicators for both constraints to facilitate the interpretation of their effects on economic outcomes, particularly over time. With this approach is more intuitive to assess the short-term impact of having – or not having – a specific constraint rather than interpreting effects based on varying yearly institutional levels. However, to address potential measurement errors, I conduct several robustness tests using alternative measurement strategies. My findings remain consistent across multiple specifications, including a binary indicator based on an artificial cut-off that combines Lührmann, Marquardt, and Mechkova (2020) accountability indicators and Polity IV.[4] Additional robustness tests include using Fjelde, Knutsen, and Nygård (2021) constraints indicators derived from V-Dem mid-level democracy indices, a binary indicator combining the Miller, Boix, and Rosato (2022) democracy indicator and Polity IV, and varying the cut-offs in the Polity IV measures used to construct Cox and Weingast (2018) constraints variables.

2.1 Econometric model

I use a dynamic linear regression model with unit and time-fixed effects, replicating the baseline model proposed by Acemoglu et al. (2019). Unit fixed effects absorb country-specific characteristics that do not vary over time, such as geography, natural resources, social norms, and even the long-term impact of colonization strategies that may have influenced both the economic and political development of countries (Papaioannou and Siourounis 2008). Unit-invariant time-fixed effects capture influences of global trends on

al. 2019). Although widely unnoticed, this decision may explain why economists tend to be more optimistic on the relationship between democracy and growth than political scientists (Cruz, Gerring and Knutsen 2024).

4. Indeed, Appendix Figure A2 shows that Polity IV variables strongly correlate the V-Dem horizontal and vertical accountability indexes created by Lührmann, Marquardt, and Mechkova (2020).

growth common to all countries in the sample, such as the impacts produced by the two oil shocks that occurred in the 1970s (Cox and Weingast 2018). The following equation illustrates the model:

$$y_{ct} = \alpha_c + \delta_t + \xi C_{ct} + \sum_{j=1}^{4} \gamma_j y_{ct-j} + \varepsilon_{ct} \quad (1)$$

y_{ct} is the natural logarithm of real gross domestic product (GDP) per capita measured in 2011 U.S. dollars for country $_c$ and time $_t$. α_c and δ_t are country and year-fixed effects. ξ is the impact of horizontal and/or vertical constraints C_{ct} based on Polity IV indicators, and γ_j reports coefficients for up to four lags of the dependent variable y_{ct-j}.

Following Acemoglu et al. (2019), I include up to four lags of GDP per capita in the right-hand side of Equation 1. It is well known that growth outcomes such as GDP exhibit persistence over time, meaning that current values of GDP are influenced by their past values. While standard dynamic panel data analyses incorporate one or two lags to address such temporal dynamics, Acemoglu et al. (2019) include up to eight lags, assuming that there is a temporary dip in GDP occurring between four and five years before a democratization process as depicted in Appendix Figure A3. Accordingly, I also assume that there is a dip in GDP prior to "minor" political transitions characterized by changes in the presence of horizontal or vertical constraints.[5] The four lags in my model thus account for both GDP dynamics, and the economic downturns that characterize such political transitions.

This dynamic panel model also assumes a standard sequential exogeneity, which implies that the error term is independent of past GDP as well as current and past values of constraints and covariates. This model thus requires sufficient GDP lags to eliminate the residual serial correlation in the error term. However, this inclusion also introduces two key econometric challenges: endogeneity and potential unobserved heterogeneity of past covariates. Even thought the latter is addressed by country-fixed effects, the model could have an asymptomatic bias of order 1/T, or also called the Nickel bias (Nickell 1981). Accordingly, past levels of GDP could be correlated with the error term (violating the

5. Appendix Figures A4 and A5 present empirical evidence justifying this assumption.

exogeneity assumption), leading to biased and inconsistent estimates. To address these issues, I employ the Difference Generalized Method of Moments (GMM) estimators developed by Arellano and Bond (1991).[6] However, these estimators only provide additional robustness tests for the results in the within estimator since the temporal scale in my sample is fairly large (each country is observed 54.6 times on average), meaning that the dynamic panel bias is likely to be insignificant.

3 Estimation results

Using the model in Equation 1, I report estimation results showing the empirically relevant interplay between executive constraints and economic development. The first set of analyses demonstrate that vertical - not horizontal - constraints correlate with growth overall. However, and consistent with the literature, a second set of analyses shows that both forms of constraints are correlated with relevant growth sources such as physical and human capital. These findings hold regardless model specifications, variable choices and econometric assumptions.

Table 1 reports estimates of the effect of executive constraints on log real GDP per capita using the dichotomous measures of these constraints drawn from Polity IV. All columns show results including controls for a full set of country and year fixed effects and four lags of log real GDP per capita. I multiply the reported coefficients by 100 to ease interpretation.[7] I also report robust standard errors to account for heteroskedasticity and serial correlation at the country level in parentheses. Columns 1 through 3 describe results using the within estimator, and columns 4 through 6 using the Arellano and Bond (1991) GMM estimator. In the first two columns from each panel, I describe the respective long-run effects for horizontal and vertical constraints, whereas in the third column I report this effect for both constraints.[8]

6. Appendix A3.2. provides a detailed discussion about sequential exogeneity. Appendix A3.3. tests model sensitivity to different GMM assumptions and provide a comprehensive discussion about the problem of too many instruments.

7. Because of Y's logarithmic transformation, the equation's functional form corresponds to a log-level model. The interpretation of β_1 follows the form $\%\Delta y = (100 \times \beta_1)\Delta x$ as described in Wooldridge (2020).

8. Under sequential exogeneity, persistency and stationarity of the time series, I can estimate Equation 1 with the standard within estimator (Acemoglu et al. 2019). Consistent with the stationarity

Table 1: The effect of executive constraints on (log) real GDP per capita

	Within estimates			Arellano-Bond estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
Horizontal constraints	.380 (.207)		–.238 (.339)	1.18 (.344)		–.113 (.433)
Vertical constraints		.605 (.236)	.787 (.382)		1.22 (.375)	1.39 (.488)
Log GDP, first lag	1.17 (.045)	1.17 (.045)	1.17 (.045)	1.13 (.046)	1.13 (.046)	1.14 (.045)
Log GDP, second lag	–.114 (.058)	–.113 (.058)	–.113 (.058)	–.102 (.056)	–.104 (.056)	–.107 (.057)
Log GDP, third lag	–.019 (.027)	–.018 (.026)	–.018 (.026)	–.017 (.025)	–.017 (.025)	–.017 (.026)
Log GDP, fourth lag	–.060 (.018)	–.060 (.018)	–.060 (.018)	–.054 (.019)	–.053 (.019)	–.056 (.019)
Effect after 25 years	9.22 (5.17)	14.65 (5.98)	19.05 (9.45)	22.14 (6.85)	22.98 (7.11)	27.75 (9.51)
Long-run effect	14.76 (8.78)	23.48 (10.48)	30.50 (15.91)	28.00 (9.29)	29.16 (9.60)	36.28 (12.58)
Persistence of GDP	.974 (.004)	.974 (.004)	.974 (.004)	.957 (.007)	.958 (.007)	.961 (.006)
Unit root test t-statistics p-value (reject unit root)	–5.28 .00	–5.35 .00	–5.39 .00			
Lags used for instruments				70	70	70
GMM total instruments				4,628	4,672	5,995
AR2 test p-value				.104	.132	.159
Observations Countries in the sample	8,519 156	8,519 156	8,519 156	8,362 156	8,362 156	8,362 156

Note.– The table presents estimates of the effect of executive constraints on log real GDP per capita. Reported coefficients are multiplied by 100. Robust standard errors against heteroskedasticity and serial correlation at the country level are reported in parentheses. All specifications are controlled for a complete set of country and year fixed effects and four lags of log GDP per capita. Columns 1-3 report results using the within estimator, and columns 4-6 using the Arellano and Bond (1991) GMM estimator. The AR2 row reports the p-value for a test of serial correlation in the residuals of the GDP series, AR1 test p-value is omitted; still, all values are less than .00. The first two columns report long-run effects for horizontal and vertical constraints correspondingly, whereas the third column reports this effect for vertical constraints.

In the model in Column 3 of Table 1, which includes both horizontal and vertical constraints, the presence of vertical constraints is positive and significant, with a coefficient of .787 (standard error = .382).[9] By contrast, horizontal constraints have a weak and statistically insignificant relationship with real GPD per capita. Indeed, even in the model presented in Column 1 of Table 1, that estimate the relationship between horizontal constraints and growth in isolation, this effect is statistically insignificant.

These results imply that introducing institutions providing electoral accountability increases real GDP per capita by roughly .8 percent in the short run, conditional on the negative but insignificant effect of horizontal constraints. Vertical constraints also consistently increase real GDP per capita by 30.5 percent in the long run (standard error = 15.91).[10] Accordingly, even in the model presented in Column 2 of Table 1, which estimates the relationship of vertical constraints and GDP per capita in isolation, the effect of these constraints is slightly attenuated but remains statistically significant. The results reported using Arellano and Bond (1991) GMM estimator (Columns 4-6 in Table 1) provide an additional robustness to endogeneity concerns due to the inclusion of GDP lags. Patterns observed in the within estimator remain even when addressing the "problem of too many instruments" (Roodman 2007) by capping and collapsing available lags for instrumentation:[11] vertical constraints increase growth, whereas the effect of horizontal ones is insignificant.

assumption, the AR2 row reports the p-value for a test of serial correlation in the residuals of the GDP series, the AR1 test p-value is omitted; still, all values are less than .00, suggesting that the time-series is stationary.

9. Appendix A4.4. provides additional robustness including several additional covariates, such as log of population, log of population below 16 years old, trade volume as fractions of GDP, and a dichotomous measure of social unrest.

10. Appendix Table A11 provides an additional robustness using a latent variable measure of GDP per capita based on the information from the most widely used indicators (Fariss et al. 2022). Main patterns remain insensitive, even when including an interaction term between both constraints and using a sample with all available data from the 20th century (see Appendix Tables A10 to A12).

11. An issue widely noticeable in the GMM estimator is the high proliferation of instruments, also called the "problem of too many instruments" (Roodman 2007). Because the number of instruments grows with T and all available lags included in the estimation equation, the GMM becomes inconsistent as the number of instruments becomes too large (Mehrhoff 2009). Even though there is no rule of thumb to select the "optimal set of instruments" for GMM estimation, Roodman (2007) suggests some minimally arbitrary robustness and specification tests for the GMM by reducing the instrument count by either limiting the lag depth or "collapsing" the instrument set (Mehrhoff 2009). Appendix A3.3. discusses this problem and shows that my findings remain robust to any of these strategies.

3.1 Long-run effects

Here I show how the cumulative long-run effects of executive constraints on growth are derived from Equation 1. This helps to differentiate the long-run effects between countries with cumulative years of having only horizontal or vertical constraints. My findings suggest that the long-run effect of horizontal constraints is negligible, whereas introducing vertical constraints has an consistently positive impact on long-run economic growth. Because Equation 1 describes a dynamic panel model, key coefficients are interpreted as contemporaneous effects. Thus, the cumulative long-run effects are obtained by iterating the short-run estimates based on the dynamics modeled in Equation 1. This effect is given by the following formula:

$$\frac{\hat{\xi}}{1 - \sum_{j=1}^{4} \hat{\gamma}_j} \tag{2}$$

Where $\hat{\xi}$ denotes the parameter estimates of executive constraints, and $\hat{\gamma}$ denotes the parameter estimates of the lagged values of real GDP per capita. Applying this formula to the estimates in Column 3 of Table 1, my findings suggest that the introduction of institutions providing electoral accountability consistently increase real GDP per capita by roughly 31 per cent in the long run (standard error = 15.91). Remarkably, the presence of institutions providing horizontal accountability does not affect significantly long-term development. These findings are plotted in Figure 4, which shows the estimated log real GDP per capita change caused by transitions with vertical and horizontal constraints. Yearly effects are obtained by forward iteration of the estimated process modeled in Equation 2. As shown, countries with cumulative years of having vertical constraints experience consistent over-time growth, whereas countries with cumulative years of having horizontal constraints do not experience any significant change in their growth levels.

3.2 The effect on sources of growth

This final section examines whether there is a relationship between both types of constraints and several growth channels. Horizontal constraints should enhance growth

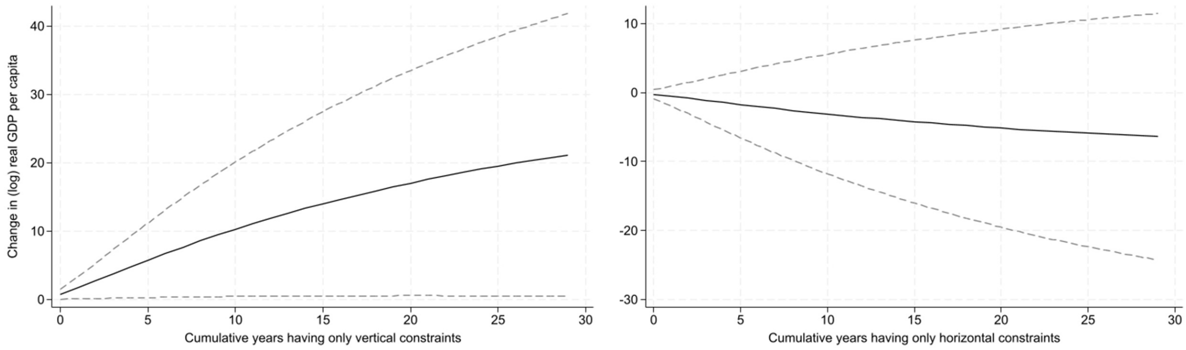

Figure 4: Dynamic panel model estimates of the over-time effects of executive constraints on log real GDP per capita

through private investment, while vertical constraints should promote growth through human development indicators, such as education and health. I draw again on Acemoglu et al. (2019) to use the following dynamic model to evaluate these potential mechanisms:

$$\mathrm{m_{ct}} = \alpha_c + \delta_t + \xi C_{ct} + \sum_{j=1}^{p} \gamma_j y_{ct-j} + \sum_{j=1}^{p} \eta_j m_{ct-j} + \varepsilon_{ct} \tag{3}$$

Where m_{ct} corresponds to one of several potential mechanisms depicted in the literature: investment as gross capital formation as a percentage of GDP from the WDI of the World Bank, the percentage of primary school-aged population enrolled in primary education from Barro and Lee (2013) in the V-Dem Dataset Coppedge et al. (2023), tax revenues as percentage of GDP from Hendrix (2010), and the infant mortality rate per 1000 live births from Gapminder compiled from the UNICEF dataset on infant mortality, Mitchell (1998) historical statistics and the Human Mortality Database . This model assumes the same dynamic properties of Equation 1, with the exception that it includes lagged values of real GDP per capita on the right hand-side to control for the mechanical effect of the level of development on each mechanism.

Table 2 shows that both horizontal and vertical constraints appear to affect the channels depicted by the literature, particularly those findings suggested by Cox and Weingast (2018) and Gerring et al. (2021). In the table I report three sets of analyses for each outcome: an analysis that includes only horizontal constraints in the first columns, another for only vertical constraints in the second columns, and an analysis including both constraints in the third columns. Results shown in Column 3 of Table 2 suggest that horizontal constraints significantly increase private investment by 2.13 per cent in the short run (standard error = 1.08), and by 9.25 per cent in the long run (standard error = 4.61); vertical constraints show no significant relationship with this outcome in either model that includes them.

On the other hand, results presented in Column 6 of Table 2 suggest that vertical constraints significantly increase primary-school enrollment by .244 percent in the short run (standard error = .101) and 10.09 percent in the long run (standard error = 4.20). Horizontal constraints do not have a statistically significant effect on education once controlled by vertical constraints. In a similar vein, Column 9 of Table 2 shows that the presence of vertical constraints increases tax revenue by 3.93 per cent in the short run (standard error = 1.62) and roughly by 17 per cent in the long run (standard error = 6.62). Horizontal constraints show no significant relationship with tax revenue in either model. Finally, Column 12 of Table 2 suggests that vertical constraints significantly decrease child mortality rate by .613 in the short run (standard error = .232) and 36.54 in the long run (standard error = 12.18). Horizontal constraints once again show no significant relationship with infant mortality once controlled by the effect of vertical constraints.

Table 2: The effect of executive constraints on growth sources

	Log of investment share in GDP			Primary-school enrollment			Log of Tax share in GDP			Child mortality rate		
	Within estimates											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Horizontal constraints	2.12		2.13	.150		-.047	2.24		-1.06	–.256		.224
	(1.04)		(1.08)	(.057)		(.105)	(1.53)		(1.99)	(.140)		(.192)
Vertical constraints		1.70	-.008		.206	.244		3.14	3.93		–.442	–.613
		(1.12)	(1.27)		(.055)	(.101)		(1.32)	(1.62)		(.165)	(.232)
Effect after 25 years	9.17	7.39	9.20	5.61	7.64	9.04	9.56	13.36	16.70	–8.09	–13.91	–19.30
	(4.25)	(4.70)	(4.58)	(2.12)	(2.02)	(3.72)	(6.62)	(5.59)	(6.57)	(4.13)	(4.44)	(6.22)
Long-run effect	9.22	7.44	9.25	6.25	8.54	10.09	9.62	13.45	16.81	–15.40	–26.31	–36.54
	(4.26)	(4.72)	(4.61)	(2.37)	(2.28)	(4.20)	(6.67)	(5.63)	(6.62)	(7.87)	(8.49)	(12.18)
Persistence of outcome variable	.770	.772	.770	.976	.976	.976	.767	.766	.766	.983	.983	.983
	(.019)	(.019)	(.019)	(.003)	(.003)	(.003)	(.039)	(.039)	(.039)	(.003)	(.003)	(.003)
Observations	5,797	5,797	5,797	5,474	5,474	5,474	4,747	4,747	4,747	8,520	8,520	8,520
Countries in the sample	146	146	146	103	103	103	120	120	120	156	156	156

Note.– The table presents estimates of the effect of executive constraints on several growth channels. Reported coefficients are multiplied by 100. Robust standard errors against heteroscedasticity and serial correlation at the country level are reported in parenthesis. All specifications are controlled for a full set of country and year fixed effects and four lags of log real GDP per capita. Columns 3 reports the long-run effects for horizontal constraints, whereas columns 6, 9 and 12 report this information for vertical constraints.

Conclusion

This article challenges the conventional wisdom that horizontal constraints on rulers, such as checks and balances, are a sufficient or the most important condition for growth (Cox and Weingast 2018). Building on Acemoglu et al. (2019) dynamic panel models, I show that horizontal constraints do not significantly affect short and long-run economic growth. Instead, my findings suggest that vertical constraints are the driving force through which democracy fosters economic and human development. Two arguments explain these findings. First, studies such as Gehlbach and Keefer (2011) show that horizontal constraints on rules are not the only institution that can resolve commitment problems between investors and the predatory state. Strong and institutionalized political parties may provide mechanisms for protecting private interests, particularly in non-democracies. Thus, commitment-enhancing mechanisms are not exclusive to horizontal constraints, and even the presence of vertical ones may be more important for such a mechanism to occur.

Secondly, proponents of the commitment argument have relied heavily upon cases such as the English Glorious Revolution to explain how horizontal constraints influence economic development. Studies surrounding such a case pinpoint how important it was to allow the formation of representative institutions that ceded power to a broader segment of society (Cox 2012). However, these approaches do not examine the fact that all of those actors represented in the English Parliament after the Revolution already had economic and political privileges that the majority of the population didn't have: barely two percent of the population could vote in the 18th century (Acemoglu and Robinson 2012, 230). Polities with only horizontal constraints are indeed cases characterized by having profoundly unequal societies and exclusive political systems. Horizontal accountability may still produce the correct incentives for investment, but these institutions do not enhance other outcomes that may be strongly correlated with steady economic development such as the provision of public goods. Even though executive constraints foster growth by solving collective action problems, it seems that vertically constrained rulers are better able to do so than horizontally constrained ones.

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APPENDIX FOR "EXECUTIVE CONSTRAINTS AND ECONOMIC GROWTH"

A1. Sample construction and descriptive statistics

I constructed a dataset comprising a total of 196 countries ranging from 1789 to 2022. The dataset captures information from 27555 country-year observations and it compiles data from arround 70 different variables obtained from the following sources: V-Dem, Polity IV, Boix , Miller and Rosato (2020), The World Bank, Penn World Tables, Hendrix (2010), and Bolt and Zanden (2024). I compiled this data based on country-year pairs using the Correlates of War country codes as main unit identifiers whenever was possible. When this code was not available, I manually revised and change the name of the country using R code. The full data and the code are available online in the following link. Table A1 at the end of the Appendix provides a full list of country units and their year coverage.

Table A2. Descriptive Statistics of key variables

Variable	N	Mean	St. Dev.	Min	Median	Max
Executive constraints, Polity IV	16,213	3.816	2.391	1	3	7
Competitivesness, Polity IV	16,213	1.581	1.048	0	1	3
Horizontal constraints	16,213	0.412	0.492	0	0	1
Vertical constraints	16,213	0.409	0.492	0	0	1
GDP per capita	15,953	8,137.4	11,821.5	377.6	3,609	160,051.2
Investment share of GDP	7,771	0.231	0.090	−0.134	0.225	0.894
Primary-school enrollment rate	15,957	51.336	37.299	0.003	54.430	99.997
Tax revenue share of GDP	5,836	0.180	0.099	0.002	0.161	0.703
Child mortality per 1,000 births	24,844	235.310	165.912	1.470	239.0	756.0
Horizontal accountability, LMM	19,183	0.494	0.293	0.008	0.480	0.991
Vertical accountability, LMM	19,183	0.502	0.306	0.053	0.513	0.964

Table A2 describes summary statistics for key variables. The first two rows describe information from the Polity IV original variables I used to construct Cox and Weingast (2018) dichotomous indicators for horizontal and vertical constraints. Even though data coverage is fairly equitable across most variables, the World Bank and Hendrix (2010) only covers information from the second half of the 20th century. Given this data constraint, I restrict my main analyses for the period raging 1950 to 2020. This approach ensures that findings related to the direct effect of executive constraints on growth and on different growth channels are derived from the same time period.

A2. Constraints as Components of Democracy

Regime evolution is a complex phenomena to the extent that countries might experience political transformations in very different forms and degrees. Most of the heterogeneous results that have characterized the relationship between democracy and growth can be attributed to institutional variation across regimes. To account for this concern, several studies have desegregated regimes into features such as political accountability (Lührmann, Marquardt, and Mechkova 2020), and polyarchy dimensions (Boese et al. 2022; Boese and Wilson 2023). In this paper I take a similar approach by focusing in two forms of executive constraints. I treat both the contestation and participation dimensions of democracy as vertical constraints because the direction of accountability these institutions produce is vertical. This approach also allows me to incorporate electoral institutions into important discussions about the impact of liberal democracy on economic development. In particular, how democratic politics influence property right's protection and how they may control ruler's predatory behavior to improve citizens' welfare.

Here I provide more details about the dichotomous measures of executive constraints I constructed from Polity IV indicators. Table A3 provides GDP summaries for each category in the two original Polity IV variables. Observations of my binary indicator for executive constraints is evenly distributed in the aggregated categories. For horizontal constraints, I coded 9,537 country-year observations as not having these institutions and 6,676 observations as having these constraints. On the other hand, I coded 9,589 country-year observations has not having vertical constraints, and 6,624 observations as having these constraints.

Table A3. GDP per capita by Category of Executive Constraints (Polity IV)

Executive Constraints (Decision Rules)	Mean	St. Dev.	N	Prop.
Unlimited Executive Authority	5362.986	12620.742	4584	0.166
Intermediate category one	5653.388	8045.191	968	0.035
Slight to Moderate Limitations	5234.089	9881.236	3624	0.132
Intermediate category two	5862.566	5747.317	361	0.013
Substantial Limitations	4410.969	3935.098	1454	0.053
Intermediate category three	9056.805	7854.082	799	0.029
Executive Parity or Subordination	14508.763	12818.683	4423	0.161

Sample size: 144 countries and a total of 16213 country-year observations.

A puzzling fact is that empirical evidence suggests that there is no regular pattern to the sequence in which both forms of executive constraints emerge across societies. For example, there are institutional configurations with the presence of both constraints, such as democratic political systems with an effective division of powers and free and

Table A4. GDP per capita by Category of Competitiveness (Polity IV)

Competitiveness of Executive Recruitment	Mean	St. Dev.	N	Prop.
Not Regulated Transfers	4007.324	5952.112	2066	0.075
Hereditary Succession/Designation	5536.737	11356.412	7523	0.273
Dual/Transitional	6196.609	7694.756	1767	0.064
Election	13620.108	12457.367	4857	0.176

Sample size: 144 countries and a total of 16213 country-year observations.

fair elections. Other configurations may present different combinations of both types of institutions such as systems with weak checks and balances, but where regular elections are held, or settings in which the leader is controlled neither by the parliament nor by the citizenry.

The interaction between horizontal and vertical constraints forms at least four institutional configurations built accordingly to all their possible combinations. These settings determine the extent to which a ruler is committed to protecting rights and / or is responsible for citizens' sanctions. Therefore, my dataset contains information for 5,829 country-year observations of cases with the presence of both constraints; 847 observations of cases with the presence of horizontal and the absence of vertical ones; 795 observations of cases with the absence of horizontal and the presence of vertical constraints; and 9,490 observations of cases with neither form of constraint. The following tables give a detailed description of each country-year observation coded within these four institutional configurations.

Figure A1: Interaction Plot between Horizontal and Vertical Constraints

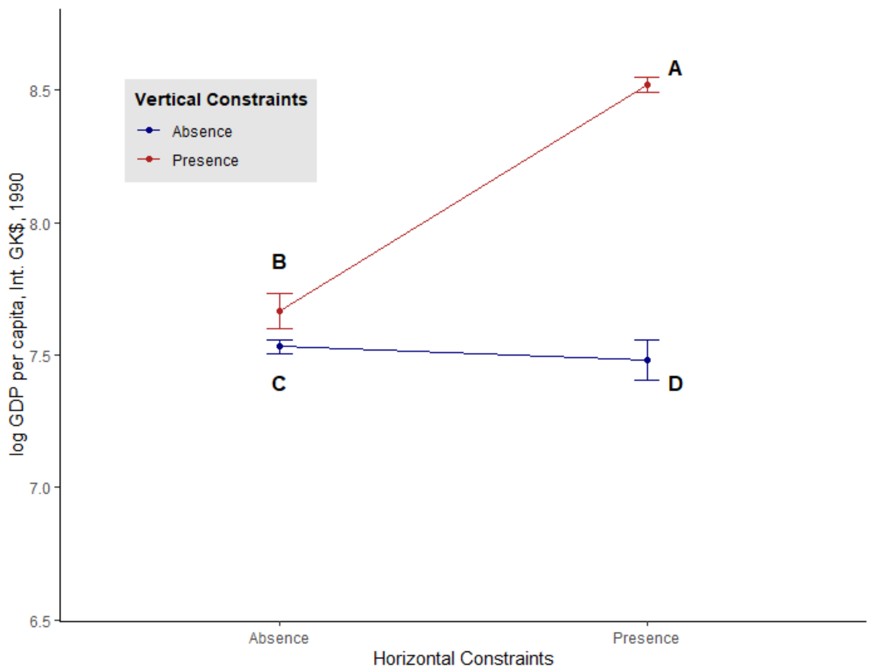


Table A5. Country-year observations coded as not having either constraint

Country	Coverage
Afghanistan	1800–2018
Albania	1915–1989
Albania	1991
Algeria	1962–2003
Angola	1975–2018
Argentina	1825–1879
Argentina	1930–1936
Argentina	1943–1957
Argentina	1966–1972
Argentina	1976–1982
Armenia	1996–1997
Austria	1919
Austria	1933–1938
Austria	1945
Azerbaijan	1991
Azerbaijan	1993–2018
Baden	1819–1871
Bahrain	1971–2018
Bangladesh	1975–1990
Bangladesh	2007–2008
Bangladesh	2018
Bavaria	1800–1871
Belarus	1996–2018
Belgium	1830–1846
Belgium	1914
Belgium	1940–1943
Benin	1963–1990
Bhutan	1907–2007
Bolivia	1825–1872
Bolivia	1876–1879
Bolivia	1936–1951
Bolivia	1964–1981
Bosnia & Herz.	1992–2018
Brazil	1824–1945
Brazil	1964–1973
Bulgaria	1879–1917
Bulgaria	1919–1989
Burkina Faso	1960–1977
Burkina Faso	1980–2014
Burma/Myanmar	1958–1959
Burma/Myanmar	1962–2015
Burundi	1962
Burundi	1966–2004
Burundi	2015–2018
Cambodia	1953–1992
Cambodia	1997–2012
Cambodia	2017–2018
Cameroon	1966–2018
Central Afr. Rep.	1960–1992
Central Afr. Rep.	2003–2015

Country	Coverage
Chad	1960–2018
Chile	1818–1850
Chile	1924–1934
Chile	1973–1988
China	1800–1911
China	1913–2018
Colombia	1860–1866
Colombia	1886–1899
Colombia	1904–1929
Colombia	1948–1956
Comoros	1975–1977
Comoros	1982–1989
Comoros	1995
Comoros	1999–2001
Comoros	2018
Costa Rica	1838–1889
Costa Rica	1917–1919
Croatia	1991–1999
Cuba	1952–2018
Cyprus	1963–1967
Cyprus	1974
Czechia	1938–1945
Czechia	1948–1988
Congo Dem.Rep.	1960–2005
Congo Dem.Rep.	2016–2018
Denmark	1800–1848
Denmark	1866–1914
Denmark	1940–1944
Djibouti	1977–1998
Dominican Rep.	1844–1977
Ecuador	1830–1947
Ecuador	1963–1967
Ecuador	1972–1978
Egypt	1928–1934
Egypt	1952–2018
El Salvador	1841–1983
Equ. Guinea	1969–2018
Eritrea	1993–2018
Estonia	1918
Estonia	1933–1939
Eswatini	1968–2018
Ethiopia	1930–1993
Fiji	1987–1989
Fiji	2000
Fiji	2006–2017
Finland	1930
France	1800–1829
France	1851–1868
France	1870–1876
France	1940–1946

Country	Coverage
France	1958
Gabon	1960–2008
Georgia	1992–1994
German East	1949–1990
Germany	1800–1908
Germany	1918
Germany	1933–1944
Ghana	1964–1969
Ghana	1972–1978
Ghana	1982–2000
Greece	1827–1863
Greece	1916–1919
Greece	1922–1925
Greece	1936–1943
Greece	1967–1974
Guatemala	1839–1878
Guatemala	1896–1897
Guatemala	1900–1920
Guatemala	1931–1943
Guatemala	1954–1965
Guatemala	1974–1985
Guinea	1958–2009
Guinea-Bissau	1974–1999
Guinea-Bissau	2003–2004
Guinea-Bissau	2012–2013
Guyana	1980–1991
Haiti	1820–1933
Haiti	1950–1956
Haiti	1961–1993
Haiti	1999–2005
Haiti	2010–2016
Honduras	1839–1847
Honduras	1852–1853
Honduras	1864–1893
Honduras	1907
Honduras	1912
Honduras	1919
Honduras	1924
Honduras	1936–1981
Hungary	1867–1987
Hungary	1989
India	1947–1951
Indonesia	1945
Indonesia	1957–1998
Iran	1800–1940
Iran	1953–1996
Iran	2004–2018
Iraq	1924–2009
Italy	1861–1899
Italy	1922–1947

Country	Coverage
Ivory Coast	1960–1999
Ivory Coast	2002–2010
Japan	1800–1867
Japan	1945–1951
Jordan	1946–1955
Jordan	1957–2018
Kazakhstan	1991–2018
Kenya	1964–1996
Kosovo	1999
Kuwait	1963–2018
Kyrgyzstan	1991–2004
Kyrgyzstan	2010
Laos	1959–2018
Latvia	1934–1939
Lebanon	1975–2004
Lesotho	1970–1992
Liberia	1890–1996
Liberia	2003–2005
Libya	1951–2018
Lithuania	1926–1939
Luxembourg	1940–1944
Madagascar	1972–1991
Malawi	1964–1993
Mali	1960–1991
Mali	2012
Mauritania	1962–2006
Mauritania	2008–2018
Mexico	1822–1993
Modena	1815–1859
Mongolia	1924–1989
Morocco	1800–1912
Morocco	1956–2018
Mozambique	1975–1993
Nepal	1800–1958
Nepal	1960–1980
Nepal	2002–2005
Netherlands	1815–1847
Netherlands	1940–1944
Nicaragua	1838–1989
Niger	1960–1992
Niger	1996–1998
Niger	2009
Nigeria	1966–1978
Nigeria	1984–1998
North Korea	1948–2018
Norway	1814–1872
Norway	1940–1944
Oman	1800–2018
Pakistan	1972
Pakistan	1977–1987

Country	Coverage
Pakistan	1999–2007
Panama	1903–1954
Panama	1968–1988
Papal States	1815–1860
Paraguay	1811–1936
Paraguay	1940–1988
Parma	1815–1859
Peru	1821–1827
Peru	1835–1885
Peru	1919–1932
Peru	1948–1955
Peru	1962
Peru	1968–1979
Peru	1992–2000
Philippines	1941–1943
Philippines	1972–1986
Poland	1935–1938
Poland	1944–1988
Portugal	1800–1835
Portugal	1842–1889
Portugal	1907
Portugal	1910
Portugal	1926–1975
Qatar	1971–2018
Rep. of Vietnam	1955–1975
Rep. of Congo	1963–1991
Rep. of Congo	1997–2018
Romania	1864–1989
Russia	1800–1922
Rwanda	1961–2018
Saudi Arabia	1926–2018
Saxony	1806–1867
Senegal	1962–1977
Senegal	1981–1999
Serbia	1929–1938
Serbia	1941–1991
Sierra Leone	1967
Sierra Leone	1971–1995
Sierra Leone	1997–2001
Singapore	1965–2004
Solomon Islands	2000–2003
Somalia	1969–2011
South Africa	1992–1993
South Korea	1948–1959
South Korea	1961–1962
South Korea	1972–1987
South Sudan	2011–2018
South Yemen	1967–1990
Spain	1800–1836
Spain	1845–1870

Country	Coverage
Spain	1873–1875
Spain	1923–1930
Spain	1939–1977
Sudan	1958–1964
Sudan	1969–1985
Sudan	1989–2011
Suriname	1980–1986
Suriname	1990
Sweden	1800–1869
Sweden	1907–1916
Syria	1949–1953
Syria	1958–2018
Taiwan	1949–1991
Tajikistan	1991–2018
Tanzania	1961–1994
Thailand	1800–1968
Thailand	1971–1973
Thailand	1976–1977
Thailand	1991
Thailand	2006–2007
Thailand	2014–2018
The Gambia	1994–2016
Togo	1960–2018
Tunisia	1956–2013
Turkey	1800–1908
Turkey	1918–1945
Turkey	1960
Turkey	2016–2018
Turkmenistan	1991–2018
Tuscany	1815–1860
Two Sicilies	1816–1860
Uganda	1966–1979
Uganda	1985–2018
United Arab Em.	1971–2018
Uruguay	1830–1918
Uruguay	1934–1951
Uruguay	1971–1984
Uzbekistan	1991–2018
Venezuela	1830–1957
Venezuela	2009–2012
Venezuela	2017–2018
Vietnam	1954–1976
Würtemberg	1800–1818
Yemen	1918–1961
Yemen	1966–2011
Yemen	2014–2018
Zambia	1972–1990
Zimbabwe	1987–2008
Total:	9,490 obs.

Table A6. Country-year observations coded as having only vertical constraints

Country	Coverage
Albania	1990
Argentina	1880–1929
Argentina	1937–1942
Armenia	1995
Azerbaijan	1992
Bangladesh	1974
Bangladesh	2014–2017
Belarus	1995
Benin	1960–1962
Bhutan	2008–2012
Bolivia	1873–1875
Bolivia	1880–1935
Brazil	1961–1963
Brazil	1974–1984
Bulgaria	1918

Country	Coverage
Cambodia	1993–1996
Chile	1851–1887
Chile	1935–1963
Colombia	1832–1859
Colombia	1930–1947
Cuba	1902–1951
Czechia	1989
Djibouti	1999–2018
Ecuador	1948–1962
Ecuador	1970–1971
Ecuador	2007–2018
Equatorial Guinea	1968
France	1959–1964
Gabon	2009–2018
Georgia	1991

Country	Coverage
Ghana	1960–1963
Greece	1915
Greece	1920–1921
Guatemala	1879–1895
Guatemala	1898–1899
Guatemala	1921–1930
Guatemala	1944–1953
Guatemala	1966–1973
Guatemala	1986–1995
Guinea	2010–2018
Haiti	1935–1945
Honduras	1904–1906
Hungary	1988
Iran	1997–2003
Iraq	2010–2013

Country	Coverage
Kenya	1997–2001
Kyrgyzstan	2005
Kyrgyzstan	2007–2009
Lebanon	1943–1974
Liberia	1997–2002
Madagascar	1960–1971
Malawi	2001–2002
Malaysia	1969–1970
Malaysia	1996–2007
Mexico	1994–1996
Mozambique	1994–2012
Nepal	1959
Nepal	1981–1989
Paraguay	1937–1939
Paraguay	1989–1991

Country	Coverage
Peru	1886–1918
Peru	1933–1947
Philippines	1935–1940
Philippines	1944–1949
Philippines	1969–1971
Poland	1989–1990
Rep. of Congo	1960–1962
Russia	1993–1999
Russia	2007–2018
Senegal	1960–1961
Senegal	1978–1980
Sierra Leone	1968–1970
Singapore	2005–2018
South Korea	1963–1971
Sri Lanka	2010–2014

Country	Coverage
Suriname	1987–1989
Tanzania	1995–2018
Thailand	1969–1970
Thailand	1974–1975
Thailand	1978–1990
Turkey	1971–1972
Turkey	1980–1982
Turkey	2014–2015
Uganda	1980–1984
Venezuela	2006–2008
Venezuela	2013–2016
Zambia	1964–1971
Zimbabwe	1983–1986
Zimbabwe	2009–2012
Total:	795 obs.

Table A7. Country-year observations coded as having only horizontal constraints

Country	Coverage
Albania	1914
Albania	1996
Algeria	2004–2018
Cambodia	2013–2016
Cape Verde	1975–1990
Chile	1891–1923
China	1912
Colombia	1900–1903
Comoros	1978–1981

Country	Coverage
Comoros	2002–2005
Costa Rica	1948
Denmark	1849–1865
Egypt	1922–1927
Egypt	1935–1945
Ethiopia	1855–1929
Fiji	2018
France	1830–1847
France	1869

Country	Coverage
Germany	1909–1917
Guyana	1966–1979
Honduras	1848–1851
Honduras	1854–1863
Indonesia	1946–1956
Iran	1941–1945
Italy	1900–1921
Japan	1868–1944
Liberia	1884–1889

Country	Coverage
Luxembourg	1867–1889
Madagascar	2009–2013
Mauritania	1960–1961
Netherlands	1848–1916
Niger	2010
Norway	1873–1897
Poland	1926–1934
Portugal	1836–1841
Portugal	1890–1906

Country	Coverage
Portugal	1908–1909
Romania	1859–1863
Serbia	1921–1928
Serbia	1939–1940
South Korea	1800–1905
Spain	1837–1844
Spain	1871–1872
Spain	1876–1899
Sweden	1870–1906

Country	Coverage
Turkey	1909–1917
United Kingdom	1800–1836
Uruguay	1919–1933
Würtemberg	1819–1871
Yemen	1962–1965
Yemen	2012–2013
Zambia	1996–2000
Total:	847 obs.

Table A8. Country-year observations coded as having both constraints

Country	Coverage
Albania	1992–1995
Albania	1997–2018
Argentina	1958–1965
Argentina	1973–1975
Argentina	1983–2018
Armenia	1991–1994
Armenia	1998–2018
Australia	1901–2018
Austria	1920–1932
Austria	1946–2018
Bangladesh	1972–1973
Bangladesh	1991–2006
Bangladesh	2009–2013
Belarus	1991–1994
Belgium	1847–1913
Belgium	1915–1939
Belgium	1944–2018
Benin	1991–2018
Bhutan	2013–2018
Bolivia	1952–1963
Bolivia	1982–2018
Botswana	1966–2018
Brazil	1946–1960
Brazil	1985–2018
Bulgaria	1990–2018
Burkina Faso	1978–1979
Burkina Faso	2015–2018
Burma/Myanmar	1948–1957
Burma/Myanmar	1960–1961
Burma/Myanmar	2016–2018
Burundi	1963–1965
Burundi	2005–2014
Cameroon	1961–1965
Canada	1867–2018
Cape Verde	1991–2018
Central Afr. Rep.	1993–2002
Central Afr. Rep.	2016–2018
Chile	1888–1890
Chile	1964–1972
Chile	1989–2018

Country	Coverage
Colombia	1867–1885
Colombia	1957–2018
Comoros	1990–1994
Comoros	1996–1998
Comoros	2006–2017
Costa Rica	1890–1916
Costa Rica	1920–1947
Costa Rica	1949–2018
Croatia	2000–2018
Cyprus	1960–1962
Cyprus	1968–1973
Czechia	1918–1937
Czechia	1946–1947
Czechia	1990–2018
Congo Dem. Rep.	2006–2015
Denmark	1915–1939
Denmark	1945–2018
Dominican Rep.	1978–2018
Ecuador	1968–1969
Ecuador	1979–2006
Egypt	1951
El Salvador	1984–2018
Estonia	1919–1932
Estonia	1991–2018
Fiji	1970–1986
Fiji	1990–1999
Fiji	2001–2005
Finland	1917–1929
Finland	1931–2018
France	1848–1850
France	1877–1939
France	1947–1957
France	1965–2018
Georgia	1995–2018
Germany	1919–1932
Germany	1949–2018
Ghana	1970–1971
Ghana	1979–1981
Ghana	2001–2018
Greece	1864–1914

Country	Coverage
Greece	1926–1935
Greece	1944–1966
Greece	1975–2018
Guatemala	1996–2018
Guinea-Bissau	2000–2002
Guinea-Bissau	2005–2011
Guinea-Bissau	2014–2018
Guyana	1992–2018
Haiti	1934
Haiti	1946–1949
Haiti	1957–1960
Haiti	1994–1998
Haiti	2006–2009
Haiti	2017–2018
Honduras	1894–1903
Honduras	1908–1911
Honduras	1913–1918
Honduras	1920–1923
Honduras	1925–1935
Honduras	1982–2018
Hungary	1990–2018
India	1952–2018
Indonesia	1999–2018
Iran	1946–1952
Iraq	2014–2018
Ireland	1921–2018
Israel	1948–2018
Italy	1948–2018
Ivory Coast	2000–2001
Ivory Coast	2011–2018
Jamaica	1959–2018
Japan	1952–2018
Jordan	1956
Kenya	1963
Kenya	2002–2018
Kosovo	2000–2006
Kyrgyzstan	2006
Kyrgyzstan	2011–2018
Laos	1953–1958
Latvia	1920–1933

Country	Coverage
Latvia	1991–2018
Lebanon	2005–2018
Lesotho	1966–1969
Lesotho	1993–2018
Liberia	1847–1883
Liberia	2006–2018
Lithuania	1918–1925
Lithuania	1991–2018
Luxembourg	1890–1939
Luxembourg	1945–2018
Madagascar	1992–2008
Madagascar	2014–2018
Malawi	1994–2000
Malawi	2003–2018
Malaysia	1957–1968
Malaysia	1971–1995
Malaysia	2008–2018
Mali	1992–2011
Mali	2013–2018
Mauritania	2007
Mauritius	1968–2018
Mexico	1997–2018
Moldova	1991–2018
Mongolia	1990–2018
Montenegro	2008–2018
Mozambique	2013–2018
Namibia	1990–2018
Nepal	1990–2001
Nepal	2006–2018
Netherlands	1917–1939
Netherlands	1945–2018
New Zealand	1857–2018
Nicaragua	1990–2018
Niger	1993–1995
Niger	1999–2008
Niger	2011–2018
Nigeria	1960–1965
Nigeria	1979–1983
Nigeria	1999–2018
North Macedonia	1991–2018

Country	Coverage
Norway	1898–1939
Norway	1945–2018
Pakistan	1973–1976
Pakistan	1988–1998
Pakistan	2008–2018
Panama	1955–1967
Panama	1989–2018
Papua New-Guinea	1975–2018
Paraguay	1992–2018
Peru	1828–1834
Peru	1956–1961
Peru	1963–1967
Peru	1980–1991
Peru	2001–2018
Philippines	1950–1968
Philippines	1987–2018
Poland	1918–1925
Poland	1991–2018
Portugal	1911–1925
Portugal	1976–2018
Rep. of Congo	1992–1996
Romania	1990–2018
Russia	1992
Russia	2000–2006
Senegal	2000–2018
Sierra Leone	1961–1966
Sierra Leone	1996
Sierra Leone	2002–2018
Slovakia	1993–2018
Slovenia	1991–2018
Solomon Islands	1978–1999
Solomon Islands	2004–2018
Somalia	1960–1968
Somalia	2012–2018
South Africa	1910–1991
South Africa	1994–2018
South Korea	1960
South Korea	1988–2018
Spain	1900–1922
Spain	1931–1938

Country	Coverage
Spain	1978–2018
Sri Lanka	1948–2009
Sri Lanka	2015–2018
Sudan	1956–1957
Sudan	1965–1968
Sudan	1986–1988
Suriname	1975–1979
Suriname	1991–2018
Sweden	1917–2018
Switzerland	1848–2018
Syria	1944–1948
Syria	1954–1957
Taiwan	1992–2018
Thailand	1992–2005
Thailand	2008–2013
The Gambia	1965–1993
The Gambia	2017–2018
Timor-Leste	2002–2018
Trinidad & Tobago	1962–2018
Tunisia	2014–2018
Turkey	1946–1959
Turkey	1961–1970
Turkey	1973–1979
Turkey	1983–2013
Uganda	1962–1965
Ukraine	1991–2018
United Kingdom	1837–2018
USA	1800–2018
Uruguay	1952–1970
Uruguay	1985–2018
Venezuela	1958–2005
Zambia	1991–1995
Zambia	2001–2018
Zimbabwe	1980–1982
Zimbabwe	2013–2018
Total:	5,829 obs.

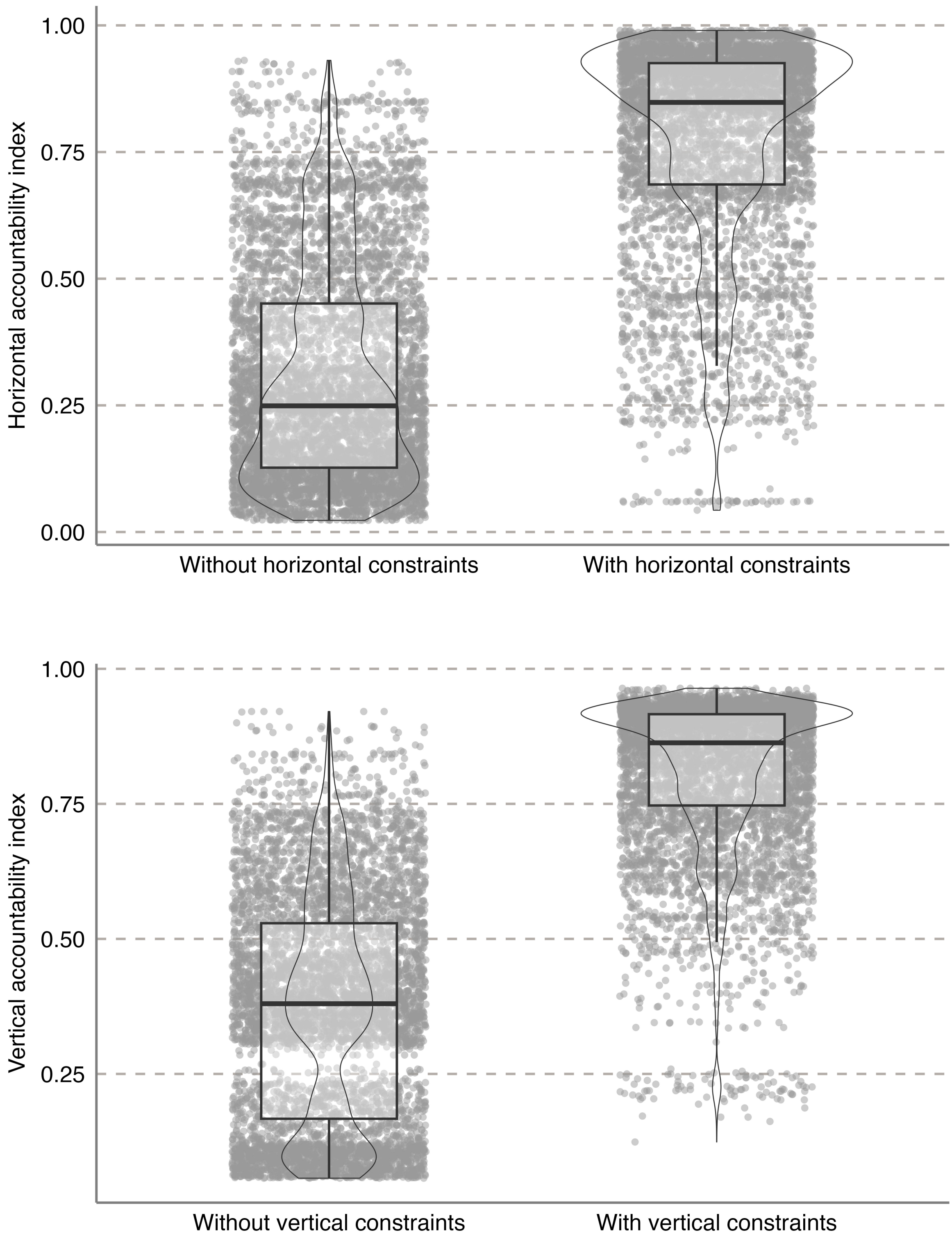
A2.1. Comparison to Alternative Measures of Constraints

There are two prominent measures of executive constraints: the dichotomous measure I created following Cox and Weingast (2018) based on Polity IV, and the political accountability indexes constructed by Lührmann, Marquardt, and Mechkova (2020). Both sets of indicators capture information about how political institutions may constrain rulers' behavior. As described in the paper, I code a country as having horizontal constraints when there are substantial limitations for exercising power by the chief executive according to Polity IV. Similarly, I code a country as having vertical constraints when at least one of the chief executives was elected by a competitive election according to Polity IV. By comparison, Lührmann, Marquardt, and Mechkova (2020) describe three forms of accountability: horizontal, vertical and diagonal. The horizontal accountability index measures the extent to which state institutions hold the executive accountable and incorporates data regarding the degree to which institutions such as legislatures, judiciaries, and other oversight agencies demand information and punish improper behavior. The vertical accountability index reflects the ability of the population to hold its government accountable though popular elections and political parties.

My decision to focus on a measure based on Polity IV variables was based on its binary treatment effect rather than a continuous treatment effect. Specifically, my model estimates the short-run effects within country-years observations that has been treated with a institutional change. This interpretation becomes very difficult when this institutional change is measured as continuous, as in the 0-1 scale on the Lührmann, Marquardt, and Mechkova (2020) accountability indexes: unit changes in this scale do not give clear information about the specific institutional change that a country experienced in terms of accountability during the year observed. In simple words, continuous treatments make it impossible to determine what specific political change can be attributed to the short-run - and long-run - effects for a unit increase in the political accountability index. On the other hand, with a binary treatment, these effects can be attributed to a clear change from having or not having a certain type of institution.

Nevertheless, it is worth highlighting that V-Dem and Polity-derived measures closely align. Figure A1 describes the correlation between Polity IV based measures for executive constraints and Lührmann, Marquardt, and Mechkova (2020) accountability indexes. The figure shows that higher levels of horizontal and vertical accountability are strongly associated with the presence of horizontal and vertical constraints correspondingly. This means that both variables are capturing similar information using different measures.

Figure A2: Political accountability vs. Executive constraints



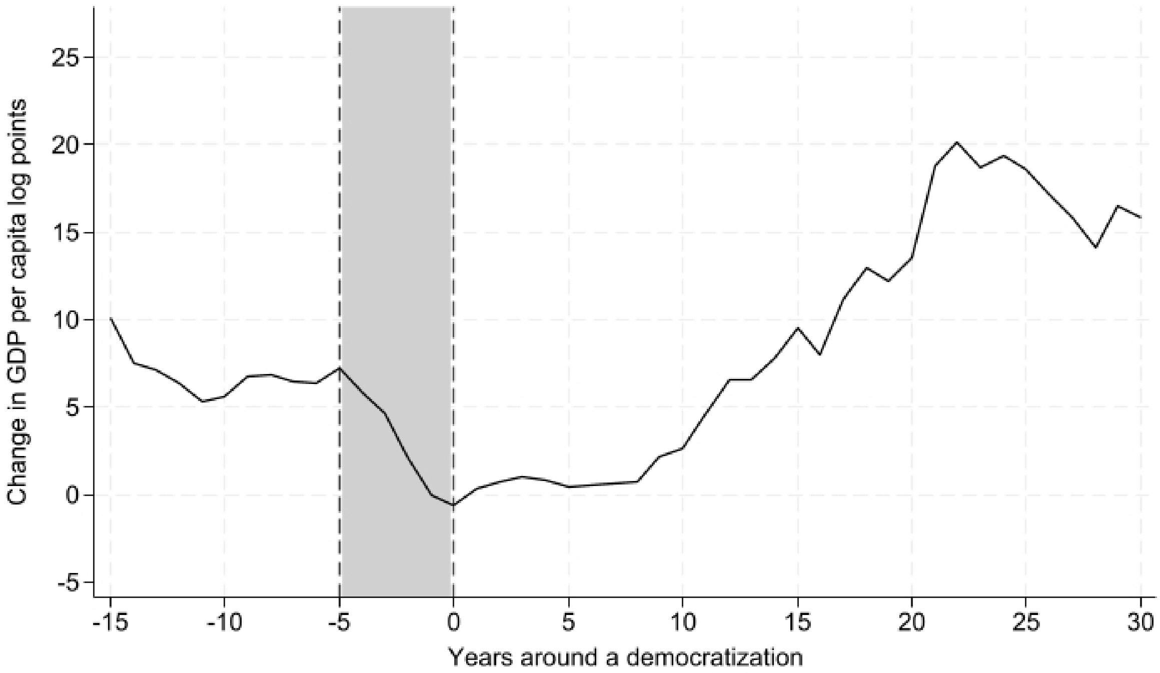
Data: Lührmann, Marquardt, and Mechkova (2020) and Polity IV

A3. Econometric assumptions

Now I focus on giving more detailed discussions on important assumption that construct Equation 1. First, I explain why Acemoglu et al. (2019) panel model relies on GDP lags to control for growth dynamics. Then, I describe the sequential exogeneity assumption implied in this model and provide more information for the GMM estimator.

A3.1. Do countries experience economic recessions before democracy take place?

Figure A3: The temporary dip of GDP preceding democratization

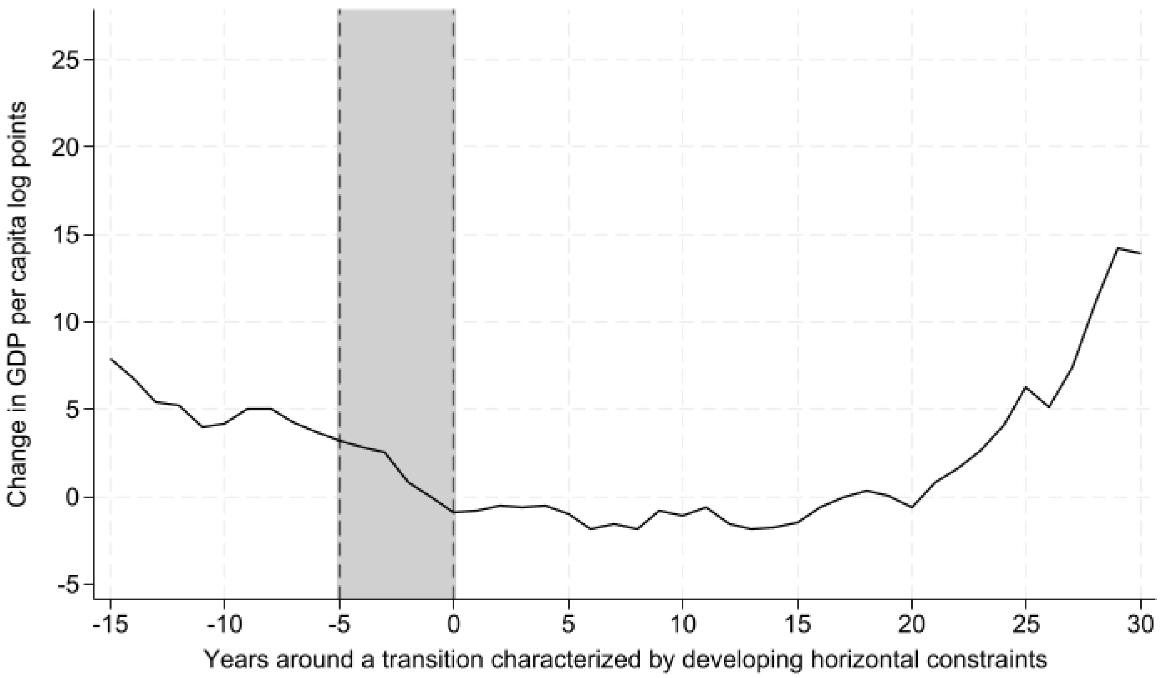


Note.– The graph illustrates GDP before and after a democratization takes place. Particularly, it plots logged real GDP per capita around a democratic transition, conditional on countries remaining non democratic in the same year. Log real GDP per capita is normalize to 0 in the year preceding the democratization. Time in years relative to the year of democratization in represented in the horizontal axis. The shaded gray area illustrates the GDP dip preceding democratization, an important assumption in the models presented by Acemoglu et al. (2019).

Acemoglu et al. (2019) dynamic panel model heavily relies on the assumption that democratizations are on average preceded by a temporary dip in GDP (Acemoglu et al. 2005; Brückner and Ciccone 2011). Similarly, Papaioannou and Siourounis (2008) observed that transitions to democracy tend to occur during economic recessions. After the transition, there seems to be an immediate increase in economic performance, which fluctuates in subsequent years. However, when democracy consolidates (during the fifth, sixth and seventh post-transition year), growth stabilizes at higher rates than in the pre-transition period. Figure A2 depicts this phenomenon, graphing how GDP behaves in countries that democratized at year 0 relative to countries that remained as non democracies at the time. As observed by the gray area, there is indeed a GDP downturn within the five years range before democracy takes place. According to Acemoglu et al. (2019), failing to control for such dynamics has lead to biased estimates of democracy on GDP, explaining the divergent results found in the literature.

Because democracy is defined as an institutional arrangement that comprises several components, it makes sense to assume that this phenomenon can also occur when countries experience other types of political transitions, such as those characterized by developing horizontal or vertical constraints. Acemoglu et al. (2019) illustrate how these two institutions vary during a democratization process. In their Online Appendix, they show the behavior of several democracy components after a transition. They demonstrate that transitions to democracy are characterized by improvements in horizontal and vertical checks on rulers. These patterns suggest that transitions to democracy typically entail institutional changes characterized by more legislatures imposing checks and balances on rulers', and a greater likelihood that people may choose their leader through popular elections. Figures A3 and A4 show GDP dips for observations coded as having horizontal or vertical constraints in my sample. As observed, there seems to be economic recessions before such "minor" political transitions.

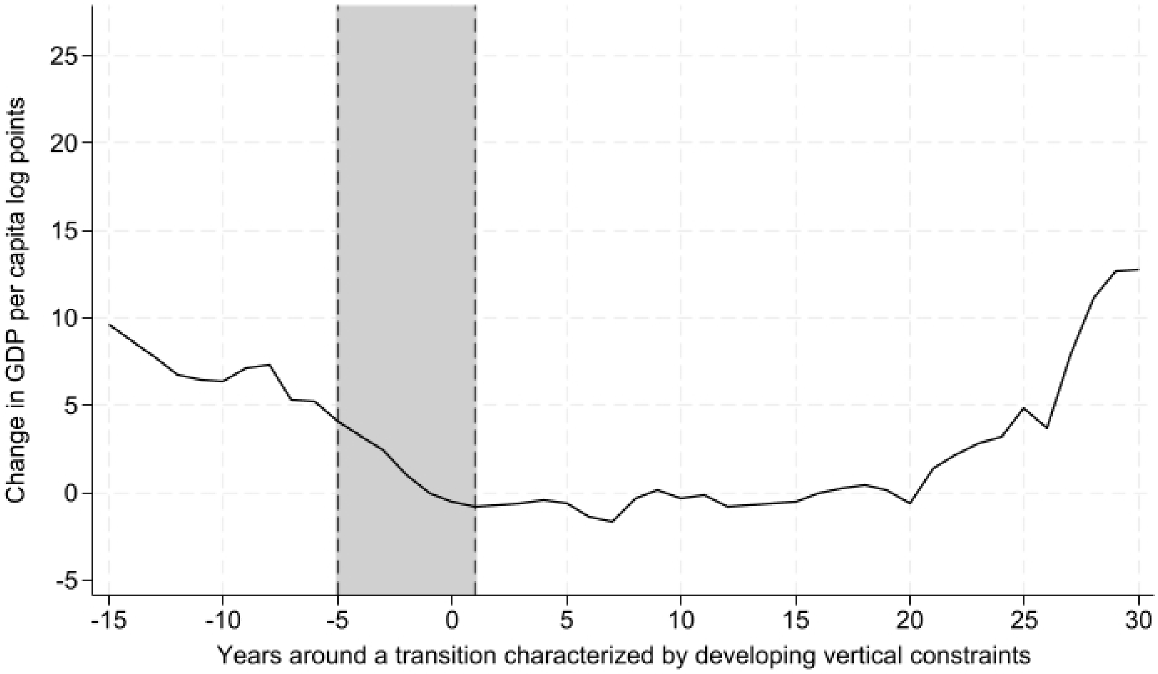
Figure A4: The temporary dip of GDP preceding minor transformations



A3.2. The need for exogeneity

The model presented in Equation 1 implies that the relationship between constraints and economic outcomes involves two dynamic properties. The first one is persistence, in

Figure A5: The temporary dip of GDP preceding minor transformations



the sense that past values of the dependent variables might affect their current values. The second one is pre-democratization recession, implying that there is a dip in GDP before political transformations. Perhaps the most important assumption in such models is the need for exogeneity, which refers to the idea that my key independent variables do not have a direct relationship with unobserved covariates in the error term that could affect the dependent variable. This assumption changes when dealing with the timing of variables in a dynamic model, specially when the error term captures all other time-varying unobservables such as the shocks to GDP per capita. For instance, the sequential exogeneity assumption imposes that the values of the predictors at a given time are independent of the future error terms, conditional on past values of the dependent variable and the predictors. In other words, in my dynamic panel data model, exogeneity implies that given past values of GDP, the error term does not have a systematic relationship either with those past values of GDP and with the current and past values of both constraints.

Assumption 1: Sequential Exogeneity

Recall Equation 1 in the following terms:

$$y_{ct} = \alpha_c + \delta_t + \xi C_{ct} + \sum_{j=1}^{4} \gamma_j y_{ct-j} + \varepsilon_{ct}$$

Where, y_{ct} is the dependent variable (log real GDP per capita) for country c and time t. C_{ct} is the presence of horizontal and vertical constraints, y_{ct-j} are lagged dependent variables, and ε_{ct} is the error term.

Letting t_0 to denote the first year available in the sample which is 1950, the sequential exogeneity assumption imposes the following:

$$\mathbb{E}\left[\varepsilon_{ct} \,|\, y_{ct-1}, ..., y_{ct_0},\, C_{ct}, ..., C_{ct_0},\, \alpha_c,\, \delta_t\right] = 0 \tag{4}$$

Here, the error term ε_{ct} is uncorrelated with constraints C_{ct} for all c and t $\geq t_0$, given the lagged dependent variables $y_{ct-1}, ..., y_{ct_0}$. This simply means that the error term is independent of past GDP per capita, current and past constraints and additional covariates. The intuition behind the assumption is the following. If we know the past values of the dependent variable and the predictors up to time t, the current error term should not be systematically influenced by those predictors. Essentially, the past values control for any potential bias introduced by omitted or unobserved covariates.

This assumption imposes that countries transitioning to or away from a political system with either constraint are not on a different GDP trend relative to others with similar levels of GDP in the past few years and similar levels of long-run development (Acemoglu et al. 2019). In Table 1 I give information for testing this assumption. The Arellano-Bond estimates use lagged values of the dependent variable and other exogenous variables as instruments for the current values of the independent variables included. In this regard, Sargan test for over-identifying restrictions is 1, which indicates that instruments are valid and thus uncorrelated with the error term. Additionally, the second-order auto correlation test AR2 is insignificant in all specifications, which means that the model is correctly specified that the exogeneity assumption holds.

A3.3. Sensitivity to GMM Assumptions

In dynamic panel data models, the Generalized Method of Moments (GMM) is particularly effective for dealing with the inherent complexity that arises when lagged dependent variables are included as regressors, which often leads to violating key assumptions. The core idea of GMM is to use moment conditions to estimate parameters in a model. Moment conditions are essentially equations derived from the model's assumption about the relationship between variables and the errors, such as the sequential exogeneity assumption presented above. These moment conditions ensure that the model remains valid under realistic assumptions about the data-generating process. Imagine for example we want to estimate some unknown parameter θ using data. The GMM does this by setting up moment conditions that relate the data with the parameters, then it finds the values of θ that make these conditions as close to zero as possible.

As discussed in Section 2.1, dynamic panel data models like the one specified in

Equation 1 have an asymptomatic bias of order 1/T, also known as the Nickell bias (Nickell 1981). Accordingly, y_{ct-j} might be correlated with country fixed effects in the error term, leading to biased estimates. However, this bias should be small in my setting since T is fairly large in the panel, each country is observed 54.6 times on average. This feature motivates the use of the within estimator.

Difference GMM Estimation

Here I provide more robustness to address potential endogeneity issues introduced by the inclusion of GDP lags in the right-hand side of Equation 1. Arellano and Bond (1991) propose the Difference GMM estimator as a tool to address the Nickell bias in panel data models. This method uses first-differencing to remove unit fixed effects and then uses lagged values of the dependent variable and the endogenous regressors as instruments in the first-differenced equations. Then, the estimation technique finds the parameters that satisfy the moment conditions, ensuring that the instruments are valid and the estimates are consistent. To illustrate how this estimator works, let use the first-difference estimator in Equation 1 as follows:

Having Equation 1 in time t:

$$Y_{ct} = \alpha_c + \delta_t + \xi C_{ct} + \sum_{j=1}^{4} \gamma_j Y_{ct-j} + \varepsilon_{ct}$$

And the same equation for time t-1:

$$Y_{ct-1} = \alpha_c + \delta_{t-1} + \xi C_{ct-1} + \sum_{j=1}^{4} \gamma_j Y_{ct-(j-1)} + \varepsilon_{ct-1}$$

I can subtract the equation for t-1 from the equation for t:

$$Y_{ct} - Y_{ct-1} = (\alpha_c - \alpha_c) + (\delta_t - \delta_{t-1}) + \xi(C_{ct} - C_{ct-1}) +$$
$$\gamma(Y_{ct-1} - Y_{ct-2}) + \gamma(Y_{ct-2} - Y_{ct-3}) + \gamma(Y_{ct-3} - Y_{ct-4}) + \gamma(Y_{ct-4} - Y_{ct-5}) + (\varepsilon_{ct} - \varepsilon_{ct-1})$$

This simplifies to the following first-differenced equation:

$$\Delta Y_{ct} = \sum_{t} \Delta\delta_t d_t + \xi \Delta C_{ct} + \sum_{j=1}^{4} \gamma_j \Delta Y_{ct-j} + \Delta\varepsilon_{ct} \tag{5}$$

Where, ΔY_{ct} is the first difference of real GDP per capita for country c between t and t-1. $\Delta\delta_t$ is the first difference between year fixed effects in time t and t-1. This is essentially a time trend in common shocks that affect all countries equally. Hence, d_t are year dummies for the changes in year effects $\Delta\delta_t$. ΔC_{ct} is the first difference of executive constraints based on Polity IV between years t and t-1, and $\Delta\varepsilon_{ct}$ is the first difference of the error term.

Since ΔY_{ct-1} is correlated with $\Delta\varepsilon_{ct}$, the GMM estimator uses lag levels of $Y_{ct-2}, Y_{ct-3}, \ldots$ as instrument for ΔY_{ct-1}. These earlier lags are valid instruments because they are not correlated with the current error term ε_{ct}. In other words, all endogenous variables in the first-differenced equation are instrumented by their lagged values. Hence, past values for both constraints $C_{ct-2}, C_{ct-3}, \ldots$ are also treated as instruments for ΔC_{ct}. In the other hand, the estimator includes instruments for a full set of year dummies (ranging from 1950 to 2020) d_t to account for time trends captured by $\Delta\delta_t$.

Finally, based on Assumption 1, the moment conditions used in the Difference GMM are the following:

For the dependent variable Y_{ct}:

$$\mathbb{E}\left[(\varepsilon_{ct} - \varepsilon_{ct-1}) \cdot Y_{cs}\right] = 0 \qquad \text{for all } s \leq \text{t} - 2$$

This means that the second and higher lags of real GDP per capita are uncorrelated with the error term in the first-differenced equation.

And for executive constraints C_{ct}:

$$\mathbb{E}\left[(\varepsilon_{ct} - \varepsilon_{ct-1}) \cdot C_{c,s+1}\right] = 0 \qquad \text{for all } s \leq \text{t} - 2$$

Both executive constraints' first and higher lags are valid instruments for the first-differenced constraints variable. In other words, error terms are assumed to be serially uncorrelated. I used Acemoglu et al. (2019) Stata replication code to estimate my model with the Difference GMM. Essentially, the formula estimates the dynamic panel data model presented in Equation 1, declaring the number of lags of the variables treated as endogenous and used in the GMM instrumentation. This baseline model takes all available lags from real GDP per capita, and the constraints measures over 70 years, the period covered in my sample. As a result, a total of 5995 instruments were used in the GMM estimation process. GDP persistence is slightly lower in these estimates, but the coefficients for vertical constraints are higher and significant. Sargan test is 0.000 whereas Hansen test is 1.00.

The problem of too many instruments

An issue widely noticeable in the GMM estimator is the high proliferation of instruments, also called the "problem of too many instruments" (Roodman 2007). Because the number of instruments grows with T and all available lags included in the estimation equation, the GMM becomes inconsistent as the number of instruments becomes too large (Mehrhoff 2009). Accordingly, too many instruments in the GMM estimation process can overfit instrumented variables, "failing to expunge their endogenous components and biasing coefficient estimates toward those from non-instrumenting estimators" (Roodman 2007, 6). They also weaken the Hansen test of over-identifying restrictions, which checks instrument validity. Even though there is no rule of thumb to select the "optimal set of instruments" for GMM estimation, Roodman (2007) suggests to reduce the instrument count by either limiting the lag depth or "collapsing" the instrument set (Mehrhoff 2009).

My baseline GMM results in Table 1 rely on 5995 instruments based on all available lags of real GDP per capita and horizontal and vertical constraints over 70 years. Due to concerns about the problem of too many instruments, I present several robustness tests about the GMM estimation using a combination between restricting the number and collapsing the lags for instrumentation. Table A9 reports the results for such tests. In the first column I report the baseline GMM estimates without any restriction. The second column describes these estimates capping the number of lags used for instrumentation to 30 years, resulting in 4411 total GMM instruments. Instead of separating the instruments per period, the third column creates only one collapsed instrument per variable. Here, I don't restrict the number of lags available for instrumentation, but the total number of GMM instruments drops significantly from 4411 with 30-years capped instrumentation to 267 instruments with the uncapped but collapsed version. The fourth column presents the results of the combination between capping and collapsing the instrumentation. As shown, this combination drastically reduces the number of GMM instruments to 153, lower than the number of cross-sectional units analyzed by the model (156 countries). As expected, capping and collapsing make the instrument count linear in T (instead of quadratic), whereas combining both makes the instrument count invariant in T (Roodman 2007). These estimates reduce substantially over-fitting and provide more efficient estimates. They also show that the effect of vertical constraints on real GDP per capita remains positive and significant, while the impact of horizontal constraints is negligible.

A4. Additional tests and checks for the dynamic panel model estimates

In this section I compare different modeling decisions besides those proposed in my main specification.

A4.1. Interaction effects

Democracy components such as horizontal and vertical constraints have important interactive properties. Accordingly, when determining growth sources both constraints perform a substitute role. Hence, horizontal constraints increase investment whereas vertical ones increase human capital. They can perform this role in the absence of the

Table A9. Restricting instruments in GMM Estimates

	Arellano-Bond estimates			
	Baseline	Capped	Collapsed	Both
Horizontal constraints	-.113 (.433)	-.054 (.514)	–.544 (.913)	-.368 (.920)
Vertical constraints	1.39 (.488)	1.38 (.610)	1.78 (1.08)	1.76 (1.06)
Log GDP, first lag	1.14 (.045)	1.11 (.045)	1.10 (.069)	1.13 (.067)
Log GDP, second lag	–.107 (.057)	–.098 (.055)	–.101 (.059)	–.110 (.058)
Log GDP, third lag	–.017 (.026)	–.015 (.025)	–.006 (.022)	–.010 (.024)
Log GDP, fourth lag	–.056 (.019)	–.048 (.019)	–.050 (.018)	–.047 (.019)
Effect after 25 years	27.75 (9.51)	22.21 (9.29)	26.06 (18.33)	33.99 (25.41)
Long-run effect	36.28 (12.58)	25.89 (10.77)	29.21 (22.10)	45.56 (44.31)
Persistence of GDP	.961 (.006)	.947 (.008)	.939 (.024)	.961 (.028)
Lags used for instruments	69-70	29-30	69-70	29-30
GMM total instruments	5995	4411	267	153
AR2 test p-value	.159	.113	.392	.427
Sargan test p-value	.00	.00	.011	.084
Hansen test p-value	1.00	1.00	1.00	.169
Observations	8,362	8,362	8,362	8,362
Countries in the sample	156	156	156	156

other constraint. However, when both constraints are present in a society, they should complement each other to promote prosperity.

Here, I present some additional evidence for such claims. I include an interaction term between both constraints into the specification described in Equation 1. Interestingly, the coefficient for the presence of vertical constraints is higher and still significant (p-value = .052), compared with the significant positive effect of the presence of both constraints. These results imply that having only vertical constraints increases growth by .873 percent in the short run (standard deviation = .426) conditional on the rest of covariates. On the other hand, the presence of both constraints increases GDP per capita by .544 percent in the short run (standard deviation = .233).

I also evaluate whether this interaction is important when accessing sources of growth previously described. Results shown in Table A9 are consistent with my findings. Accordingly, when analyzing the incentives to invest, only the combination of both constraints appears to be increasing investment by 2.11 per cent in the short run. This observation is consistent with recent literature that contends democracy as a property rights enhancing institution. Conversely, the relationship between vertical constraints and human development does not change when including the interaction term. Vertical constraints increase primary school enrollment by .189 percent, they also increase tax revenue by 3.28 percent and decrease child mortality by 6.39 percent in the short run.

These additional results imply that vertical constraints are indeed the driving force that leads to the positive effect of democracy on economic growth. While I expected that the coefficient for both constraints should capture all the potential positive effects of their components, the coefficient of vertical ones (though their significance in the within estimator) is higher in most of the cases. Additionally, these results also imply that failing to control for democracy as a whole or another institution may produce misleading results such as those observed with horizontal constraints coefficients.

A4.2. Alternative GDP measures

Here I use an alternative measure for economic growth based on point estimates from a latent variable model of GDP per capita Fariss et al. (2022). This variable is available for all countries in the sample ranging from 1789 to 2019. Without an interaction term, the results remain insensitive. Horizontal constraints do not affect growth significantly, whereas vertical constraints increase GDP per capita by .383 per cent in the short run.

Table A10. Interaction Effects

Dependent variable	Only Horizontal	Only Vertical	Both Constraints	Obs.	Countries
GDP per capita (within estimates)	.212 (.566)	.873* (.426)	.544** (.233)	8,519	156
GDP per capita (GMM with 5995 instruments)	.205 (.675)	1.46*** (.558)	1.28*** (.316)	8,362	156
Investment share of GDP	3.798 (2.93)	.242 (1.41)	2.11* (1.18)	5,797	146
Primary-school enrollment	-.534 (.379)	.189** (.088)	.203*** (.059)	5,474	103
Secondary-school enrollment	.237 (.761)	-.072 (.068)	.176*** (.057)	5,474	103
Tax revenue share of GDP	-6.21 (6.79)	3.28** (1.60)	2.92* (1.56)	4,747	120
Child mortality per 1,000 births	.089 (.233)	-.639** (.254)	-.388** (.165)	8,520	156

A4.3. Alternative functional form of GDP

Table A11. Alternative GDP Measures and Functional Form

Dependent variable	Only Horizontal	Only Vertical	Both Constraints	Obs.	Countries
GDP per capita (Farris et al. 2022)	.00004 (.247)	.383* (.209)		9,059	170
Growth rate of real GDP per capita (estimates without interaction)	-.061 (.372)	.738 (.452)		8,416	156
Growth rate of real GDP per capita (estimates with interaction)	.739 (.468)	.889* (.511)	.669** (.117)	8,416	156
Growth rate of the latent variable (estimates without interaction)	.049 (.254)	.322 (.232)		8,950	170
Growth rate of the latent variable (estimates with interaction)	-.038 (.244)	.303 (.274	.373*** (.119)	8,950	170

As described before, design choices are crucial for the relationship between democracy and economic growth (Doucouliagos and Ulubaşoğlu 2008; Colagrossi, Rossignoli, and Maggioni 2020; Gerring, Knutsen, and Berge 2022; Cruz, Gerring and Knutsen 2024). Specially, design choices regarding the dependent variable are perhaps the most crucial in determining the effects of democracy among social scientists. In particular, level measures of GDP per capita are frequently used in economic research (e.g. Acemoglu et al. 2019). Although widely unnoticed, this decision may explain why economists tend to be more optimistic on the relationship between democracy and growth than political scientists (Cruz, Gerring and Knutsen 2024).

Here, I change the functional form of economic growth from a level specification to a first difference specification. Since this decision appears to be crucial in modeling the effects of democracy on growth, I also include an interaction term to access the combined effects of both constraints. Interestingly, the presence of both constraints increases significantly the real GDP per capita growth rate by .669 in the short run. Horizontal constraints do not affect grwoth significantly, but vertical constraints increase the growth rate by roughly .89 percent in the short run (standard deviation = .511; p-value = .084).

A4.4. Sample selection and additional covariates

Recall that the baseline model presented in Equation 1 is based on a sample covering 182 countries from 1950 to 2020. I made this decision due to panel data modeling constraints, particularly to avoid issues concerning having more temporal units than cross-sectional ones. Here, I use an additional sample that covers 182 countries ranging from 1900 to 2020. Table A11 describes the results for the effects of executive constraints on growth and its sources. The main results remain. Horizontal constraints do not affect growth significantly, whereas the effect of vertical constraints is positive and significant. Horizontal constraints, however, do significantly and positively affect private investment. The effect of both institutions on primary and secondary education is insignificant. However, these estimates could be biased because the number of countries is lower than the years observed. Finally, vertical constraints increase tax revenue and decrease infant mortality rates as measured by the World Bank.

Table A12 shows the estimation results for the effect of executive constraints on economic growth using additional covariates as controls. These covariates are the same that Acemoglu et al. (2019) include in their research, such as the log of population, the log population below 16 years old, trade volume as a fraction of GDP and a binary measure of social unrest. The first panel shows results for my baseline specification using both measures of population and their lagged values as controls. The effect of vertical constraints is still positive and significant at the .1 level. These results suggest that vertical constraints increase GDP per capita by .944 per cent in the short run, after controlling for the effect of horizontal constraints, log population and the log of population below 16 years old. Interestingly, once controlled for population, the effect of horizontal constraints on economic growth is negative and significant at the .1 level. These estimates imply that the presence of horizontal constraints decreases GDP per capita by .853 percent in the short run, once controlled for additional covariates.

The effect of both constraints is no longer significant when trade as a share of GDP is included in the model along with both measures of population. Interestingly, none of the additional covariates included have a significant effect. A similar pattern can be seen when the dummy of social unrest is included alongside with both measures of population. Unlike the case with trade, social unrest do have a negative a significant effect on GDP

Table A12. Estimation Results using the whole sample

Dependent variable	Horizontal	Vertical	Observations	Countries	Years
GDP per capita (within estimates)	-.388 (.256)	1.037*** (.247)	10,514	156	115
GDP per capita (GMM with 5995 instruments)	.205 (.675)	1.46*** (.558)	1.28*** (.316)	8,362	156
Investment share of GDP	2.13* (1.08)	-.008 (1.27)	5,797	146	55
Primary-school enrollment	.031 (.065)	.060 (.064)	7,455	103	107
Secondary-school enrollment	.064 (.052)	-.010 (.051)	7,455	103	107
Tax revenue share of GDP	-1.06 (1.99)	3.93* (1.62)	4,747	120	42
Child mortality (V-Dem gathered)	.315 (.653)	-1.008 (.698)	10,520	156	115
Child mortality (World Bank)	.148 (.124)	-.407** (.145)	7,242	155	55

Table A13. Full Controlled Model

Dependent variable	Horizontal	Vertical	Observations	Countries	Years
GDP per capita (population as control)	-.853* (.448)	.944* (.569)	5,559	134	47
GDP per capita (Trade as control)	-.048 (.444)	.039 (.467)	4,556	130	46
GDP per capita (Social unrest as control)	-.757 (.537)	.815 (.659)	5,085	130	47
Trade as share of GDP	-.702 (1.074)	.584 (.985)	4,573	130	46
Probability of social unrest	-.138 (3.91)	-7.26 (4.48)	5,133	131	47

per capita. These results suggest that having an occurrence of unrest reduces GDP per capita by 1.14 (standard error = .275) in the short run. These results not only imply that social unrest is an important determinant of growth, but that these occurrences may be also correlated with political transformations characterized by developing horizontal and vertical constraints. Indeed, social unrest appears to absorb the overall effect of vertical constraints, suggesting a potential correlation between both variables.

Table A1. Country units and year coverage included in the dataset

Name	ID	CoW	Coverage
Afghanistan	AFG	700	1789–2022
Albania	ALB	339	1912–2022
Algeria	DZA	615	1900–2022
Angola	AGO	540	1900–2022
Argentina	ARG	160	1789–2022
Armenia	ARM	371	1990–2022
Australia	AUS	900	1789–2022
Austria	AUT	300	1789–1918
Austria	AUT	305	1919–2022
Azerbaijan	AZE	373	1990–2022
Baden	BDN	267	1789–1871
Bahrain	BHR	692	1900–2022
Bangladesh	BGD	771	1971–2022
Barbados	BRB	53	1900–2022
Bavaria	BVR	245	1789–1871
Belarus	BLR	370	1990–2022
Belgium	BEL	211	1789–2022
Benin	BEN	434	1900–2022
Bhutan	BTN	760	1900–2022
Bolivia	BOL	145	1825–2022
Bosnia and Herzegovina	BIH	346	1992–2022
Botswana	BWA	571	1900–2022
Brazil	BRA	140	1789–2022
Bulgaria	BGR	355	1878–2022
Burkina Faso	BFA	439	1919–2022
Burma/Myanmar	MMR	775	1789–2022
Burundi	BDI	516	1916–2022
Cambodia	KHM	811	1900–2022
Cameroon	CMR	471	1961–2022
Canada	CAN	20	1841–2022
Cape Verde	CPV	402	1900–2022
Central African Republic	CAF	482	1920–2022
Chad	TCD	483	1920–2022
Chile	CHL	155	1789–2022
China	CHN	710	1789–2022
Colombia	COL	100	1789–2022
Comoros	COM	581	1900–2022
Costa Rica	CRI	94	1838–2022
Croatia	HRV	344	1941–2022
Cuba	CUB	40	1789–2022
Cyprus	CYP	352	1900–2022
Czechia	CZE	315	1918–1992
Czechia	CZE	316	1993–2022
Dem. Rep. of the Congo	COD	490	1900–2022
Denmark	DNK	390	1789–2022
Djibouti	DJI	522	1900–2022
Dominican Republic	DOM	42	1789–2022
Ecuador	ECU	130	1830–2022
Egypt	EGY	651	1789–2022
El Salvador	SLV	92	1838–2022
Equatorial Guinea	GNQ	411	1900–2022
Eritrea	ERI	531	1900–2022
Estonia	EST	366	1918–2022
Eswatini	SWZ	572	1900–2022
Ethiopia	ETH	530	1789–2022
Fiji	FJI	950	1900–2022
Finland	FIN	375	1809–2022
France	FRA	220	1789–2022
Gabon	GAB	481	1910–2022
Georgia	GEO	372	1990–2022
German Dem. Rep.	DDR	265	1949–1990
Germany	DEU	255	1789–2022
Ghana	GHA	452	1902–2022
Greece	GRC	350	1822–2022
Guatemala	GTM	90	1789–2022
Guinea	GIN	438	1900–2022
Guinea-Bissau	GNB	404	1900–2022
Guyana	GUY	110	1900–2022
Haiti	HTI	41	1789–2022
Hanover	HVR	240	1789–1866
Hesse-Darmstadt	HDM	275	1789–1867
Hesse-Kassel	HKS	273	1789–1866
Honduras	HND	91	1838–2022
Hungary	HUN	310	1789–2022
Iceland	ISL	395	1900–2022
India	IND	750	1789–2022
Indonesia	IDN	850	1800–2022
Iran	IRN	630	1789–2022
Iraq	IRQ	645	1920–2022
Ireland	IRL	205	1919–2022
Israel	ISR	666	1948–2022
Italy	ITA	325	1861–2022
Ivory Coast	CIV	437	1900–2022
Jamaica	JAM	51	1900–2022
Japan	JPN	740	1789–2022
Jordan	JOR	663	1922–2022
Kazakhstan	KAZ	705	1990–2022
Kenya	KEN	501	1900–2022
Kosovo	XKX	347	1999–2022
Kuwait	KWT	690	1789–2022
Kyrgyzstan	KGZ	703	1990–2022
Laos	LAO	812	1900–2022
Latvia	LVA	367	1920–2022
Lebanon	LBN	660	1918–2022
Lesotho	LSO	570	1900–2022
Liberia	LBR	450	1821–2022
Libya	LBY	620	1789–2022
Lithuania	LTU	368	1918–2022
Luxembourg	LUX	212	1815–2022
Madagascar	MDG	580	1817–2022
Malawi	MWI	553	1900–2022
Malaysia	MYS	820	1900–2022

Table A1. Country units and year coverage included in the dataset (continued)

Name	ID	CoW	Coverage
Maldives	MDV	781	1900–2022
Mali	MLI	432	1900–2022
Malta	MLT	338	1900–2022
Mauritania	MRT	435	1904–2022
Mauritius	MUS	590	1900–2022
Mecklenburg Schwerin	MCL	280	1789–1867
Mexico	MEX	70	1789–2022
Modena	MDN	332	1789–1859
Moldova	MDA	359	1990–2022
Mongolia	MNG	712	1911–2022
Montenegro	MNE	341	1789–2022
Morocco	MAR	600	1789–2022
Mozambique	MOZ	541	1900–2022
Namibia	NAM	565	1900–2022
Nepal	NPL	790	1789–2022
Netherlands	NLD	210	1789–2022
New Zealand	NZL	920	1841–2022
Nicaragua	NIC	93	1838–2022
Niger	NER	436	1922–2022
Nigeria	NGA	475	1914–2022
North Korea	PRK	731	1945–2022
North Macedonia	MKD	343	1991–2022
Norway	NOR	385	1789–2022
Oman	OMN	698	1789–2022
Pakistan	PAK	770	1947–2022
Panama	PAN	95	1903–2022
Papal States	PPS	327	1789–1860
Papua New Guinea	PNG	910	1900–2022
Paraguay	PRY	150	1811–2022
Parma	PRM	335	1789–1859
Peru	PER	135	1789–2022
Philippines	PHL	840	1900–2022
Poland	POL	290	1789–2022
Portugal	PRT	235	1789–2022
Qatar	QAT	694	1900–2022
Republic of Vietnam	VDR	817	1802–1975
Republic of the Congo	COG	484	1903–2022
Romania	ROU	360	1789–2022
Russia	RUS	365	1789–2022
Rwanda	RWA	517	1916–2022
Sao Tome and Principe	STP	403	1900–2022
Saudi Arabia	SAU	670	1789–2022
Saxony	SXN	269	1789–1867
Senegal	SEN	433	1904–2022
Serbia	SRB	345	1804–2022
Seychelles	SYC	591	1903–2022
Sierra Leone	SLE	451	1900–2022

Name	ID	CoW	Coverage
Singapore	SGP	830	1867–2022
Slovakia	SVK	317	1939–2022
Slovenia	SVN	349	1989–2022
Solomon Islands	SLB	940	1900–2022
Somalia	SOM	520	1900–2022
South Africa	ZAF	560	1900–2022
South Korea	KOR	730	1789–1905
South Korea	KOR	732	1906–2022
South Sudan	SSD	626	2011–2022
South Yemen	YMD	680	1900–1990
Spain	ESP	230	1789–2022
Sri Lanka	LKA	780	1900–2022
Sudan	SDN	625	1900–2022
Suriname	SUR	115	1900–2022
Sweden	SWE	380	1789–2022
Switzerland	CHE	225	1798–2022
Syria	SYR	652	1918–2022
Taiwan	TWN	713	1900–2022
Tajikistan	TJK	702	1990–2022
Tanzania	TZA	510	1914–2022
Thailand	THA	800	1789–2022
The Gambia	GMB	420	1900–2022
Timor-Leste	TLS	860	1900–2022
Togo	TGO	461	1916–2022
Trinidad and Tobago	TTO	52	1900–2022
Tunisia	TUN	616	1789–2022
Turkey	TUR	640	1789–2022
Turkmenistan	TKM	701	1990–2022
Tuscany	TSC	337	1789–1860
Two Sicilies	TWS	329	1789–1860
Uganda	UGA	500	1900–2022
Ukraine	UKR	369	1990–2022
United Arab Emirates	ARE	696	1971–2022
United Kingdom	GBR	200	1789–2022
United States of America	USA	2	1789–2022
Uruguay	URY	165	1825–2022
Uzbekistan	UZB	704	1789–2022
Vanuatu	VUT	935	1900–2022
Venezuela	VEN	101	1789–2022
Vietnam	VNM	816	1945–2022
Würtemberg	WRG	271	1789–1871
Yemen	YEM	678	1789–1989
Yemen	YEM	679	1990–2022
Zambia	ZMB	551	1911–2022
Zanzibar	ZZB	511	1856–1964
Zimbabwe	ZWE	552	1900–2022