

# Executive Constraints and Economic Growth

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## Abstract

Despite extensive research on the relationship between democracy and development, the features of democracy that are particularly important for this outcome remain unclear. Here, I unpack the democracy-growth link by examining the economic effects of two forms of executive constraints: horizontal constraints, the power of the parliament to control the executive, and vertical constraints, the capacity of citizens to keep rulers accountable through competitive elections. Using dynamic panel models, I demonstrate that each constraint influences growth through a specific mechanism. Horizontal constraints are strongly associated with greater private investment, whereas vertical constraints significantly improve living conditions through increasing education, health and public spending. Contrary to the conventional wisdom that horizontal constraints on rulers are the most important condition for growth, I show that vertical constraints are the driving force through which democracy improves economic development.

**Keywords:** Democracy, executive constraints, institutions, economic growth

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# Introduction

A rapidly accumulating body of evidence points towards democracy as a fundamental cause of growth ([Acemoglu et al. 2019](#); [Colagrossi, Rossignoli, and Maggioni 2020](#); [Knutson 2021](#); [Gerring, Knutsen, and Berge 2022](#)). The proponents of this argument claim that democratic institutions secure property rights, produce steady economic policies, and promote greater investment in physical and human capital ([North 1990](#); [Knutsen 2013](#)). Yet, empirical analyzes produce contradictory results on the relationship between democracy and development, ranging from negative ([Barro 1996](#)) to no significant correlation ([Przeworski et al. 2000](#); [Gerring et al. 2005](#); [Doucouliagos and Ulubaşoğlu 2008](#)). In response to these results, scholars have increasingly focused on specific features of democratic governance, including forms of government 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](#)). Although scholars now agree that democracy matters, questions remain as to which democratic institution(s) matter the most for development.

Much of the work that examines the effect of different forms of democratic institutions has focused on executive constraints. A particularly prominent line of research has posited that horizontal constraints on the executive, such as legislatures, are a sufficient condition for economic growth by increasing capital investment ([North and Weingast 1989](#)). Related work argues that another form of executive constraints, vertical constraints linked to institutions of electoral democracy, can even threaten property rights and thereby growth by generating pressures for the equitable distribution of wealth ([Przeworski and Limongi 1993](#)). Many scholars dissent from this argument, suggesting that free and fair elections shift government policy towards the preferences of the majority ([Acemoglu and Robinson 2005](#)). As a result, vertically constrained governments adopt policies that enhance the provision of public goods such as education and health, improving the living conditions of most of the population, and thus facilitating economic growth ([Besley and Kudamatsu 2006](#); [Wang, Mechkova, and Andersson 2019](#); [Gerring et al. 2021](#)).

In this article, I explicitly examine and compare the relationship between economic growth and vertical and horizontal constraints. Covering a panel of 183 countries from 1950 to 2020, my results challenge the conventional wisdom that horizontal constraints are the primary mechanism linking democracy to better economic performance. Although horizontal constraints increase capital investment - in line with theoretical expectations - my analyses reveal that horizontal constraints do not significantly increase the levels of real GDP per capita in either the short or long term, after controlling for the effects of vertical constraints. Instead, I find strong evidence that vertical constraints facilitate growth, even after controlling for horizontal constraints: vertical constraints increase real GDP per capita by roughly one percent in the short run and 31 in the long run. My analyses also test a plausible explanation for this relationship, in line with that of the literature: vertical constraints have a strong positive relationship with human capital development, increasing education levels and public spending while reducing infant mortality rates. These results hold regardless modeling choices about variables, controls, samples and dynamic panel model assumptions. Cumulatively, these findings suggest that electoral contestation - not horizontal accountability - is the primary force through which democracy improves 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's behavior by splitting the power of the government into relatively autonomous branches, and thus 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.<sup>1</sup> Both of these constraints have distinct links to development: horizontal constraints can facilitate financial development, whereas vertical constraints enhance public good provision and thereby human development.

## 1.1 Investment without electoral democracy?

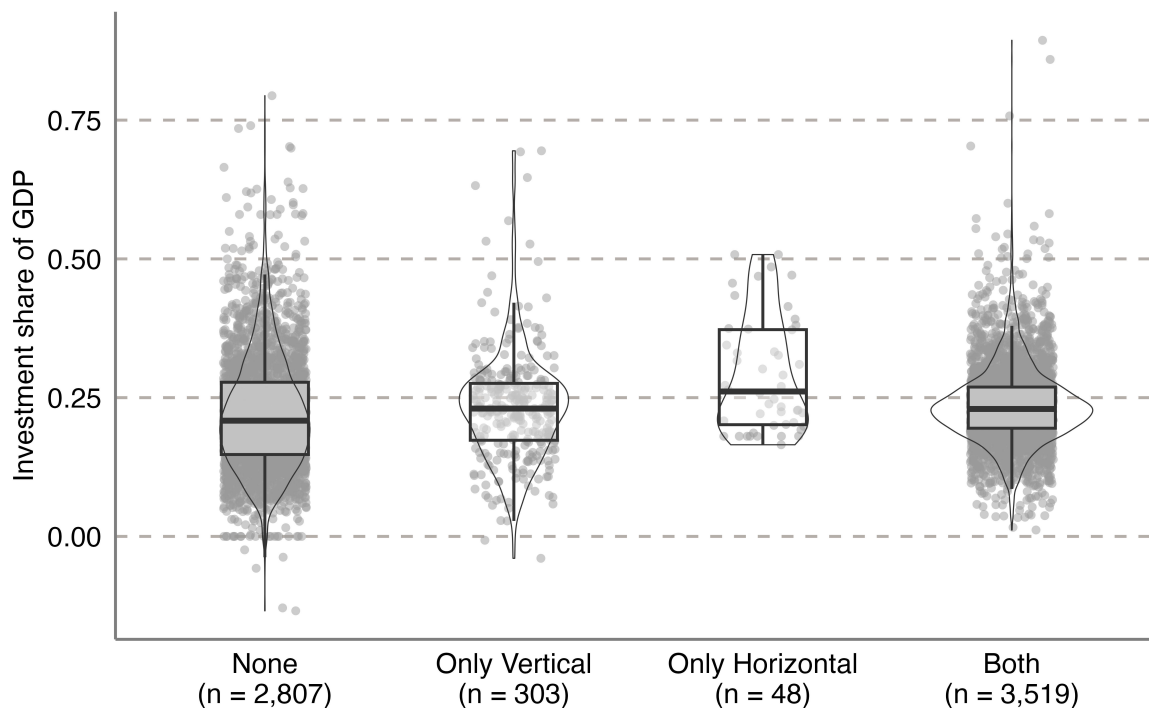
A large body of scholarship examines the role of horizontal constraints in establishing the incentives for financial development. [North and Weingast \(1989\)](#) suggest that the introduction of a Parliament with binding powers discouraged the English Crown from engaging in predatory behavior after 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

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1. [Boese et al. \(2022\)](#) argue that in addition to contestation and participation, constraints on rulers are a key dimension of democracy. My approach treats both the contestation and participation dimensions of democracy as vertical constraints because they facilitate vertical accountability. Accordingly, vertical constraints include both the right to compete for votes for public office (contestation) and the right to vote in this competition (participation).



Data: The World Bank and Polity IV

Figure 1: The relationship between executive constraints and investment

with investment. Indeed, scholars have found that the introduction of checks and balances increases private investment across countries ([Stasavage 2002](#)). However, this finding belies the fact 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](#) provides a nuanced picture of the relationship between executive constraints and investment in a sample of 169 countries between 1950 and 2018,<sup>2</sup> illustrating the isolated and combined impacts of the four possible combinations of vertical and horizontal constraints. Although country years with only horizontal constraints appear to have the highest levels of investment, this difference relies on a small number of observations. These results thus provide only weak support for the commitment literature. Interestingly, they also show a modest but statistically significant difference in the levels of investment be-

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 provide a full description of these variables at the Data and Methods section.

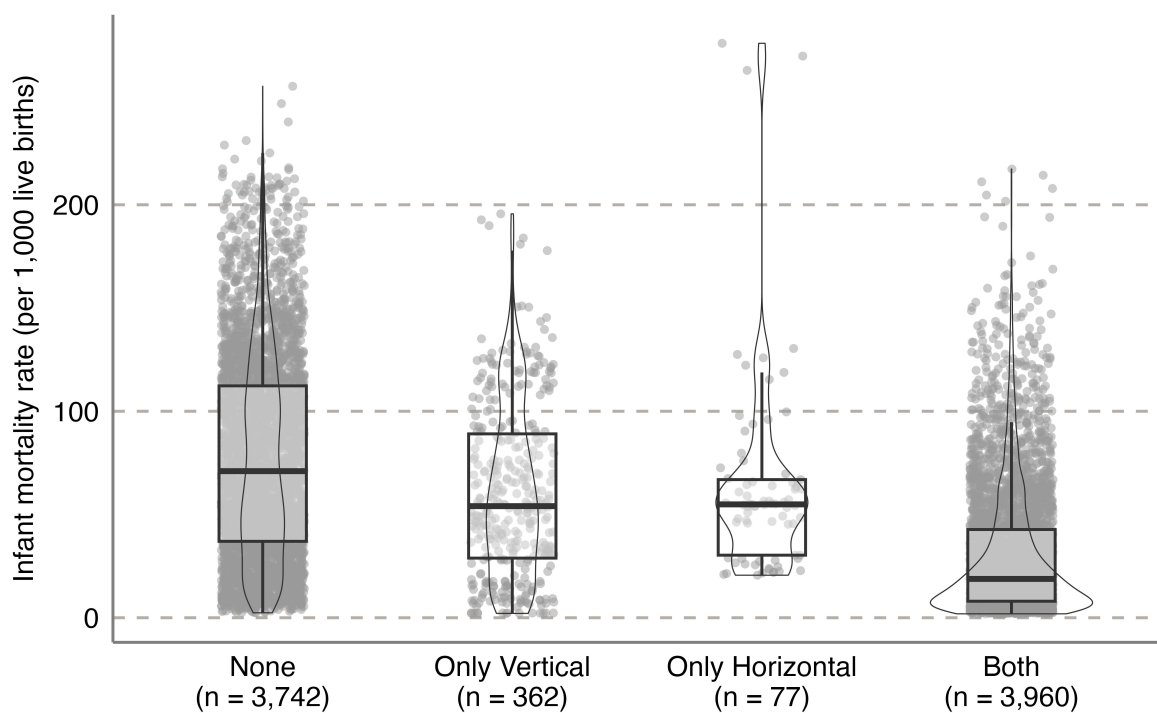
tween polities with only vertical and both constraints and polities with none of these institutions, suggesting that vertical constraints are not detrimental for investment.

## 1.2 Electoral institutions in action

While the relationship between democracy and private investment remains contested, there is less disagreement 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. Finally, Miller (2015) stresses that contested elections, both in autocracies and democracies, promote human development through health, education, gender equality, and civil liberties.

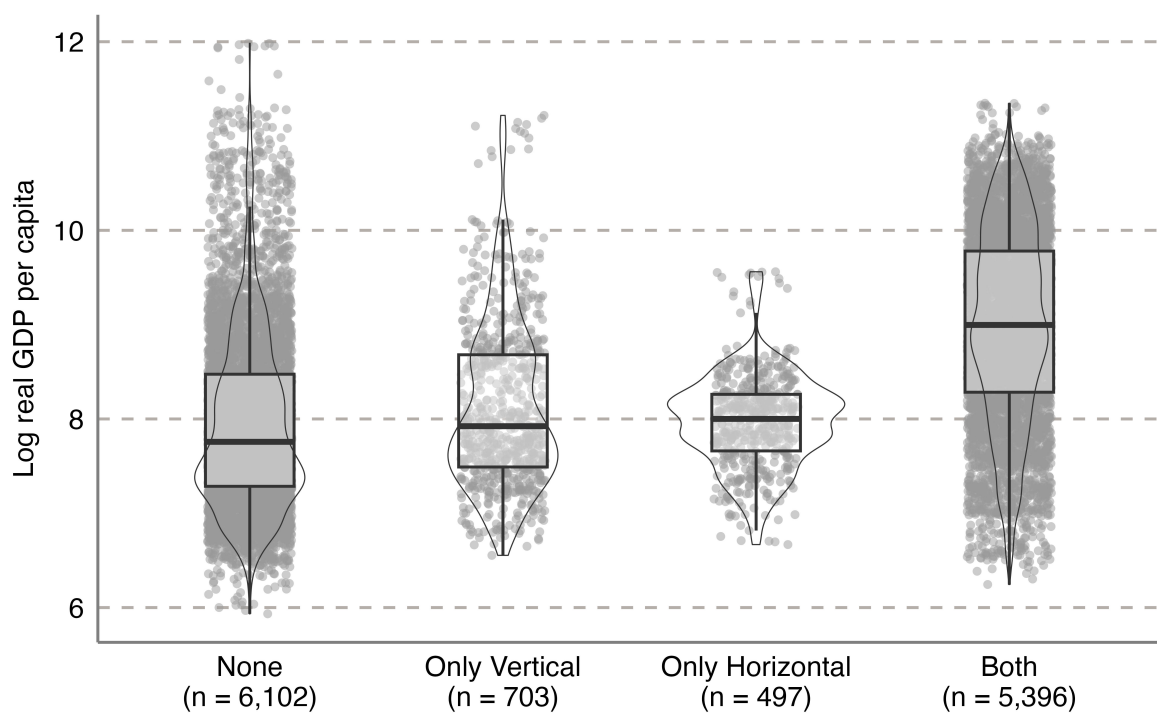
Pinto and Timmons (2005) illustrate how vertical constraints influence human capital by reducing entry barriers to power and allowing citizens to register their preferences and select their leader. Electoral contestation shifts government policy towards the preferences of the median voter. Under inclusive institutions, the preferences of the median voter is aligned with a broader segment of the population, who would be more likely to demand goods with positive externalities, such as schools and health care. Therefore, leaders in such contested configurations must provide sufficient public goods or face electoral defeat. Voting can also be an accountability mechanism when politicians fail to meet citizens' welfare thresholds (Ferejohn 1986; 1999); they may align rulers' interests with those of their constituents (Barro 1973) or reduce potential predatory behavior (Benhabib and Przeworski 2010). Finally, participatory institutions can produce efficient resource allocation and better provision of public goods by solving collective action problems (Besley et al. 2005, 2007; Gonçalves 2014; Touchton, Wampler, and Peixoto 2021).

Figure 2 provides no conclusive observational evidence that vertical constraints are



Data: The World Bank and Polity IV

Figure 2: The relationship between executive constraints and infant mortality



Data: Maddison Project Database and Polity IV

Figure 3: Overall contribution of executive constraints to economic growth

associated with lower infant mortality rates, a common indicator to measure living conditions cross-nationally. Observations having only vertical constraints have indeed lower infant mortality rates than observations with no constraints, but there is no significant differences between country-years with only vertical or only horizontal constraints. However, configurations with both constraints are strongly associated with lower infant mortality rates than cases with only horizontal or vertical constraints, or neither form of constraints. These findings constitute evidence 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 moderate evidence that there is a correlation between both horizontal and vertical constraints and the proposed mechanisms by which they facilitate development. Concerning the direct effect of both constraints on growth, [Figure 3](#) indicates that, in isolation, horizontal constraints may not be as important as previous studies suggest (e.g. [Cox and Weingast 2018](#)). [Figure 3](#) shows the direct contribution of each institutional configuration to economic growth, measured as the level of real GDP per capita in log points. Interestingly, there are no significant differences between only vertically and only horizontally constrained observations. However, countries with both constraints appear to have better economic performance than the rest of configurations. These observations show an empirically relevant interplay between both constraints. In isolation, each constraint perform a substitutory development 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.<sup>3</sup>

## 2 Data and Methods

In this paper, I use these observational data to empirically 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

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3. Appendix [Figure A1](#) provides additional evidence for this claim. Accordingly, the interaction plot shows that there is no isolated significant correlation of horizontal constraints on growth, but there is a strong correlation of vertical constraints on such outcome.

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 183 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).<sup>4</sup> This variable is available for 169 countries and the period up to 2022.

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 IV (Marshall and Gurr 2020).

I use dichotomous indicators for both constraints to ease the interpretation of their potential effects on different economic outcomes, specially regarding their over-time effects: it is more intuitive to interpret short-term effects of having or not one kind of constraint, instead of a certain level of such institution.<sup>5</sup>

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4. 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).

5. Appendix Figure A2 shows that these variables strongly correlate with other alternative data sources for executive constraints such as V-Dem horizontal and vertical accountability indexes created by Lührmann, Marquardt, and Mechkova (2020).

## 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 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  $t$ .  $\alpha_c$  and  $\delta_t$  are country and year-fixed effects.  $\xi$  is the impact of horizontal and/or vertical constraints  $C_{ct}$  based on Polity IV indicators, and  $\gamma_j$  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.<sup>6</sup> The four lags in my model thus account for both GDP dynamics, and the economic downturns that characterize such political transitions.

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

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 though the latter is addressed by country-fixed effects, the model could have an asymptotic bias of order  $1/T$ , also called the Nickel bias (Nickell 1981). Accordingly, past levels of GDP could be correlated with the error term (violating the exogeneity assumption), leading to biased and inconsistent estimates. To address these issues, I employ the Difference and System Generalized Method of Moments (GMM) estimators developed by Arellano and Bond (1991) and Blundell and Bond (1998), respectively.<sup>7</sup> 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 modeling choices about variables, controls, samples and 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

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7. Appendix A3.2. provides a detailed discussion about sequential exogeneity. Appendix A3.3. discuss model sensitivity to different GMM assumptions.

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	-5.28	-5.35	-5.39			
p-value (reject unit root)	.00	.00	.00			
AR2 test p-value				.104	.132	.159
Observations	8,519	8,519	8,519	8,362	8,362	8,362
Countries in the sample	156	156	156	156	156	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 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 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.

four lags of log real GDP per capita. I multiply the reported coefficients by 100 to ease interpretation.<sup>8</sup> 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 long-run effects for horizontal and vertical constraints correspondingly, whereas in the third column I report this effect only for vertical constraints.<sup>9</sup>

In the model presented in Column 3 of [Table 1](#), which includes both horizontal and vertical constraints, the presence of vertical constraints is estimated to be positive and significant, with a coefficient of .787 (standard error = .382).<sup>10</sup> By contrast, horizontal constraints have weak and statistically insignificant relationship with GDP per capita. Indeed, even in models 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).<sup>11</sup> 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

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

9. 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 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.

10. 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.

11. Appendix Table A10 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 A9 and A11).

Table 1) provide an additional robustness to endogeneity concerns due to the inclusion of GDP lags. Patterns observed in the within estimator remain: vertical constraints increase growth, whereas the effect of horizontal ones is insignificant.

### 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 a 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:

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

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.

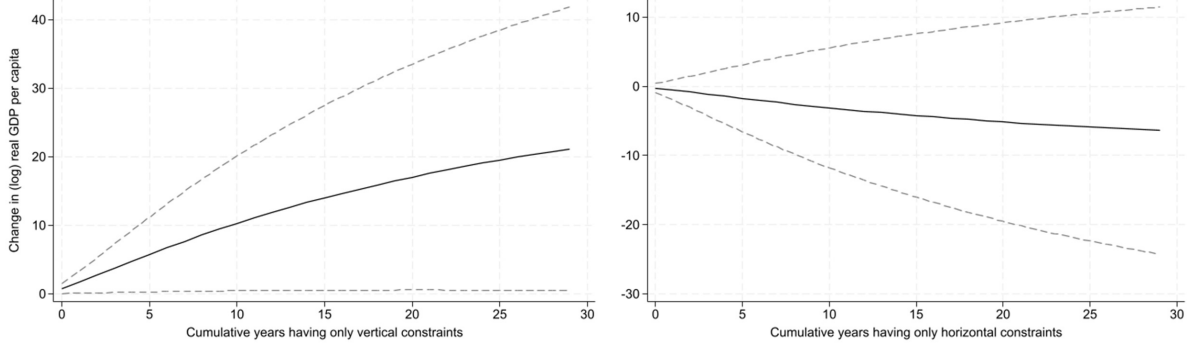


Figure 4: Dynamic panel model estimates of the over-time effects of executive constraints on log real GDP per capita

### 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 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:

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

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 Wein-](#)

gast (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 (1.04)		2.13 (1.08)	.150 (.057)		-.047 (.105)	2.24 (1.53)		-1.06 (1.99)	-.256 (.140)		.224 (.192)
Vertical constraints		1.70 (1.12)	-.008 (1.27)		.206 (.055)	.244 (.101)		3.14 (1.32)	3.93 (1.62)		-.442 (.165)	-.613 (.232)
Effect after 25 years	9.17 (4.25)	7.39 (4.70)	9.20 (4.58)	5.61 (2.12)	7.64 (2.02)	9.04 (3.72)	9.56 (6.62)	13.36 (5.59)	16.70 (6.57)	-8.09 (4.13)	-13.91 (4.44)	-19.30 (6.22)
Long-run effect	9.22 (4.26)	7.44 (4.72)	9.25 (4.61)	6.25 (2.37)	8.54 (2.28)	10.09 (4.20)	9.62 (6.67)	13.45 (5.63)	16.81 (6.62)	-15.40 (7.87)	-26.31 (8.49)	-36.54 (12.18)
Persistence of outcome variable	.770 (.019)	.772 (.019)	.770 (.019)	.976 (.003)	.976 (.003)	.976 (.003)	.767 (.039)	.766 (.039)	.766 (.039)	.983 (.003)	.983 (.003)	.983 (.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 rulers 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 around 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
Competitiveness, 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 as 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.

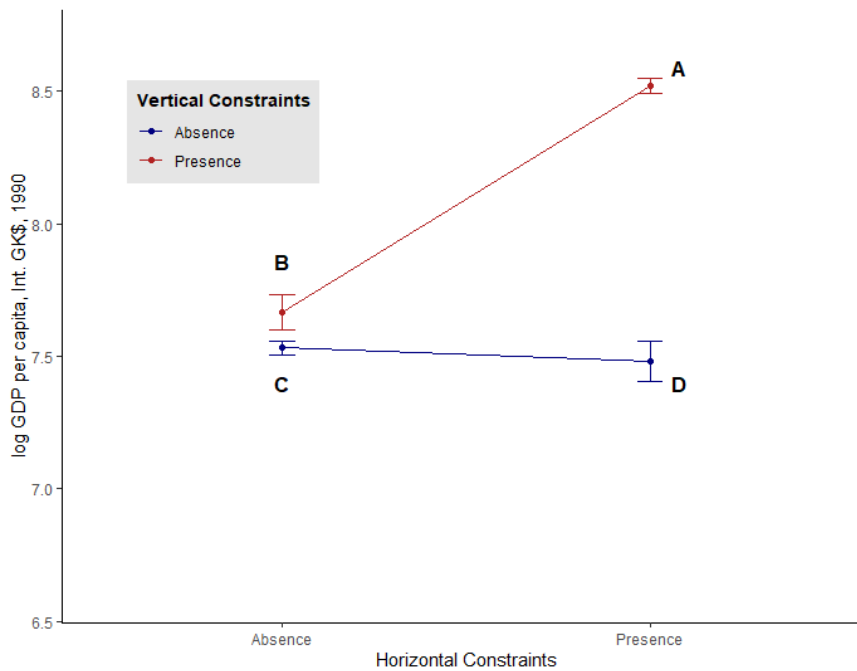
**Figure A1: Interaction Plot between Horizontal and Vertical Constraints**

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

Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage
Afghanistan	1800–2018	Chad	1960–2018	France	1958	Ivory Coast	1960–1999	Pakistan	1999–2007	Spain	1873–1875
Albania	1915–1989	Chile	1818–1850	Gabon	1960–2008	Ivory Coast	2002–2010	Panama	1903–1954	Spain	1923–1930
Albania	1991	Chile	1924–1934	Georgia	1992–1994	Japan	1800–1867	Panama	1968–1988	Spain	1939–1977
Algeria	1962–2003	Chile	1973–1988	German East	1949–1990	Japan	1945–1951	Papal States	1815–1860	Sudan	1958–1964
Angola	1975–2018	China	1800–1911	Germany	1800–1908	Jordan	1946–1955	Paraguay	1811–1936	Sudan	1969–1985
Argentina	1825–1879	China	1913–2018	Germany	1918	Jordan	1957–2018	Paraguay	1940–1988	Sudan	1989–2011
Argentina	1930–1936	Colombia	1860–1866	Germany	1933–1944	Kazakhstan	1991–2018	Parma	1815–1859	Suriname	1980–1986
Argentina	1943–1957	Colombia	1886–1899	Ghana	1964–1969	Kenya	1964–1996	Peru	1821–1827	Suriname	1990
Argentina	1966–1972	Colombia	1904–1929	Ghana	1972–1978	Kosovo	1999	Peru	1835–1885	Sweden	1800–1869
Argentina	1976–1982	Colombia	1948–1956	Ghana	1982–2000	Kuwait	1963–2018	Peru	1919–1932	Sweden	1907–1916
Armenia	1996–1997	Comoros	1975–1977	Greece	1827–1863	Kyrgyzstan	1991–2004	Peru	1948–1955	Syria	1949–1953
Austria	1919	Comoros	1982–1989	Greece	1916–1919	Kyrgyzstan	2010	Peru	1962	Syria	1958–2018
Austria	1933–1938	Comoros	1995	Greece	1922–1925	Laos	1959–2018	Peru	1968–1979	Syria	1949–1991
Austria	1945	Comoros	1999–2001	Greece	1936–1943	Latvia	1934–1939	Peru	1992–2000	Tajikistan	1991–2018
Azerbaijan	1991	Comoros	2018	Greece	1967–1974	Lebanon	1975–2004	Philippines	1941–1943	Tanzania	1961–1994
Azerbaijan	1993–2018	Costa Rica	1838–1889	Guatemala	1839–1878	Lesotho	1970–1992	Philippines	1972–1986	Thailand	1800–1968
Baden	1819–1871	Costa Rica	1917–1919	Guatemala	1896–1897	Liberia	1890–1996	Poland	1935–1938	Thailand	1971–1973
Bahrain	1971–2018	Croatia	1991–1999	Guatemala	1900–1920	Liberia	2003–2005	Poland	1944–1988	Thailand	1976–1977
Bangladesh	1975–1990	Cuba	1952–2018	Guatemala	1931–1943	Libya	1951–2018	Portugal	1800–1835	Thailand	1991
Bangladesh	2007–2008	Cyprus	1963–1967	Guatemala	1954–1965	Lithuania	1926–1939	Portugal	1842–1889	Thailand	2006–2007
Bangladesh	2018	Cyprus	1974	Guatemala	1974–1985	Luxembourg	1940–1944	Portugal	1907	Thailand	2014–2018
Bavaria	1800–1871	Czechia	1938–1945	Guinea	1958–2009	Madagascar	1972–1991	Portugal	1910	The Gambia	1994–2016
Belarus	1996–2018	Czechia	1948–1988	Guinea-Bissau	1974–1999	Malawi	1964–1993	Portugal	1926–1975	Togo	1960–2018
Belgium	1830–1846	Congo Dem.Rep.	1960–2005	Guinea-Bissau	2003–2004	Mali	1960–1991	Qatar	1971–2018	Tunisia	1956–2013
Belgium	1914	Congo Dem.Rep.	2016–2018	Guinea-Bissau	2012–2013	Mali	2012	Rep. of Vietnam	1955–1975	Turkey	1800–1908
Belgium	1940–1943	Denmark	1800–1848	Guyana	1980–1991	Mauritania	1962–2006	Rep. of Congo	1963–1991	Turkey	1918–1945
Benin	1963–1990	Denmark	1866–1914	Haiti	1820–1933	Mauritania	2008–2018	Rep. of Congo	1997–2018	Turkey	1960
Bhutan	1907–2007	Denmark	1940–1944	Haiti	1950–1956	Mexico	1822–1993	Romania	1864–1989	Turkey	2016–2018
Bolivia	1825–1872	Djibouti	1977–1998	Haiti	1961–1993	Modena	1815–1859	Russia	1800–1922	Turkmenistan	1991–2018
Bolivia	1876–1879	Dominican Rep.	1844–1977	Haiti	1999–2005	Mongolia	1924–1989	Rwanda	1961–2018	Tuscany	1815–1860
Bolivia	1936–1951	Ecuador	1830–1947	Haiti	2010–2016	Morocco	1800–1912	Saudi Arabia	1926–2018	Two Sicilies	1816–1860
Bolivia	1964–1981	Ecuador	1963–1967	Honduras	1839–1847	Morocco	1956–2018	Saxony	1806–1867	Uganda	1966–1979
Bosnia & Herz.	1992–2018	Ecuador	1972–1978	Honduras	1852–1853	Mozambique	1975–1993	Senegal	1962–1977	Uganda	1985–2018
Brazil	1824–1945	Egypt	1928–1934	Honduras	1864–1893	Nepal	1800–1958	Senegal	1981–1999	United Arab Em.	1971–2018
Brazil	1964–1973	Egypt	1952–2018	Honduras	1907	Nepal	1960–1980	Serbia	1929–1938	Uruguay	1830–1918
Bulgaria	1879–1917	El Salvador	1841–1983	Honduras	1912	Nepal	2002–2005	Serbia	1941–1991	Uruguay	1934–1951
Bulgaria	1919–1989	Equ. Guinea	1969–2018	Honduras	1919	Netherlands	1815–1847	Sierra Leone	1967	Uruguay	1971–1984
Burkina Faso	1960–1977	Eritrea	1993–2018	Honduras	1924	Netherlands	1940–1944	Sierra Leone	1971–1995	Uzbekistan	1991–2018
Burkina Faso	1980–2014	Estonia	1918	Honduras	1936–1981	Nicaragua	1838–1989	Sierra Leone	1997–2001	Venezuela	1830–1957
Burma/Myanmar	1958–1959	Estonia	1933–1939	Hungary	1867–1987	Niger	1960–1992	Singapore	1965–2004	Venezuela	2009–2012
Burma/Myanmar	1962–2015	Eswatini	1968–2018	Hungary	1989	Niger	1996–1998	Solomon Islands	2000–2003	Venezuela	2017–2018
Burundi	1962	Ethiopia	1930–1993	India	1947–1951	Niger	2009	Somalia	1969–2011	Vietnam	1954–1976
Burundi	1966–2004	Fiji	1987–1989	Indonesia	1945	Nigeria	1966–1978	South Africa	1992–1993	Württemberg	1800–1818
Burundi	2015–2018	Fiji	2000	Indonesia	1957–1998	Nigeria	1984–1998	South Korea	1948–1959	Yemen	1918–1961
Cambodia	1953–1992	Fiji	2006–2017	Iran	1800–1940	North Korea	1948–2018	South Korea	1961–1962	Yemen	1966–2011
Cambodia	1997–2012	Finland	1930	Iran	1953–1996	Norway	1814–1872	South Korea	1972–1987	Yemen	2014–2018
Cambodia	2017–2018	France	1800–1829	Iran	2004–2018	Norway	1940–1944	South Sudan	2011–2018	Zambia	1972–1990
Cameroon	1966–2018	France	1851–1868	Iraq	1924–2009	Oman	1800–2018	South Yemen	1967–1990	Zimbabwe	1987–2008
Central Afr. Rep.	1960–1992	France	1870–1876	Italy	1861–1899	Pakistan	1972	Spain	1800–1836		
Central Afr. Rep.	2003–2015	France	1940–1946	Italy	1922–1947	Pakistan	1977–1987	Spain	1845–1870	Total:	9,490 obs.

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

Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage
Albania	1990	Cambodia	1993–1996	Ghana	1960–1963	Kenya	1997–2001	Peru	1886–1918	Suriname	1987–1989
Argentina	1880–1929	Chile	1851–1887	Greece	1915	Kyrgyzstan	2005	Peru	1933–1947	Tanzania	1995–2018
Argentina	1937–1942	Chile	1935–1963	Greece	1920–1921	Kyrgyzstan	2007–2009	Philippines	1935–1940	Thailand	1969–1970
Armenia	1995	Colombia	1832–1859	Guatemala	1879–1895	Lebanon	1943–1974	Philippines	1944–1949	Thailand	1974–1975
Azerbaijan	1992	Colombia	1930–1947	Guatemala	1898–1899	Liberia	1997–2002	Philippines	1969–1971	Thailand	1978–1990
Bangladesh	1974	Cuba	1902–1951	Guatemala	1921–1930	Madagascar	1960–1971	Poland	1989–1990	Turkey	1971–1972
Bangladesh	2014–2017	Czechia	1989	Guatemala	1944–1953	Malawi	2001–2002	Rep. of Congo	1960–1962	Turkey	1980–1982
Belarus	1995	Djibouti	1999–2018	Guatemala	1966–1973	Malaysia	1969–1970	Russia	1993–1999	Turkey	2014–2015
Benin	1960–1962	Ecuador	1948–1962	Guatemala	1986–1995	Malaysia	1996–2007	Russia	2007–2018	Uganda	1980–1984
Bhutan	2008–2012	Ecuador	1970–1971	Guinea	2010–2018	Mexico	1994–1996	Senegal	1960–1961	Venezuela	2006–2008
Bolivia	1873–1875	Ecuador	2007–2018	Haiti	1935–1945	Mozambique	1994–2012	Senegal	1978–1980	Venezuela	2013–2016
Bolivia	1880–1935	Equatorial Guinea	1968	Honduras	1904–1906	Nepal	1959	Sierra Leone	1968–1970	Zambia	1964–1971
Brazil	1961–1963	France	1959–1964	Hungary	1988	Nepal	1981–1989	Singapore	2005–2018	Zimbabwe	1983–1986
Brazil	1974–1984	Gabon	2009–2018	Iran	1997–2003	Paraguay	1937–1939	South Korea	1963–1971	Zimbabwe	2009–2012
Bulgaria	1918	Georgia	1991	Iraq	2010–2013	Paraguay	1989–1991	Sri Lanka	2010–2014	Total:	795 obs.

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

Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage
Albania	1914	Comoros	2002–2005	Germany	1909–1917	Luxembourg	1867–1889	Portugal	1908–1909	Turkey	1909–1917
Albania	1996	Costa Rica	1948	Guyana	1966–1979	Madagascar	2009–2013	Romania	1859–1863	United Kingdom	1800–1836
Algeria	2004–2018	Denmark	1849–1865	Honduras	1848–1851	Mauritania	1960–1961	Serbia	1921–1928	Uruguay	1919–1933
Cambodia	2013–2016	Egypt	1922–1927	Honduras	1854–1863	Netherlands	1848–1916	Serbia	1939–1940	Württemberg	1819–1871
Cape Verde	1975–1990	Egypt	1935–1945	Indonesia	1946–1956	Niger	2010	South Korea	1800–1905	Yemen	1962–1965
Chile	1891–1923	Ethiopia	1855–1929	Iran	1941–1945	Norway	1873–1897	Spain	1837–1844	Yemen	2012–2013
China	1912	Fiji	2018	Italy	1900–1921	Poland	1926–1934	Spain	1871–1872	Zambia	1996–2000
Colombia	1900–1903	France	1830–1847	Japan	1868–1944	Portugal	1836–1841	Spain	1876–1899		
Comoros	1978–1981	France	1869	Liberia	1884–1889	Portugal	1890–1906	Sweden	1870–1906	Total:	847 obs.

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

Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage	Country	Coverage
Albania	1992–1995	Colombia	1867–1885	Greece	1926–1935	Latvia	1991–2018	Norway	1898–1939	Spain	1978–2018
Albania	1997–2018	Colombia	1957–2018	Greece	1944–1966	Lebanon	2005–2018	Norway	1945–2018	Sri Lanka	1948–2009
Argentina	1958–1965	Comoros	1990–1994	Greece	1975–2018	Lesotho	1966–1969	Pakistan	1973–1976	Sri Lanka	2015–2018
Argentina	1973–1975	Comoros	1996–1998	Guatemala	1996–2018	Lesotho	1993–2018	Pakistan	1988–1998	Sudan	1956–1957
Argentina	1983–2018	Comoros	2006–2017	Guinea-Bissau	2000–2002	Liberia	1847–1883	Pakistan	2008–2018	Sudan	1965–1968
Armenia	1991–1994	Costa Rica	1890–1916	Guinea-Bissau	2005–2011	Liberia	2006–2018	Panama	1955–1967	Sudan	1986–1988
Armenia	1998–2018	Costa Rica	1920–1947	Guinea-Bissau	2014–2018	Lithuania	1918–1925	Panama	1989–2018	Suriname	1975–1979
Australia	1901–2018	Costa Rica	1949–2018	Guyana	1992–2018	Lithuania	1991–2018	Papua New-Guinea	1975–2018	Suriname	1991–2018
Austria	1920–1932	Croatia	2000–2018	Haiti	1934	Luxembourg	1890–1939	Paraguay	1992–2018	Sweden	1917–2018
Austria	1946–2018	Cyprus	1960–1962	Haiti	1946–1949	Luxembourg	1945–2018	Peru	1828–1834	Switzerland	1848–2018
Bangladesh	1972–1973	Cyprus	1968–1973	Haiti	1957–1960	Madagascar	1992–2008	Peru	1956–1961	Syria	1944–1948
Bangladesh	1991–2006	Czechia	1918–1937	Haiti	1994–1998	Madagascar	2014–2018	Peru	1963–1967	Syria	1954–1957
Bangladesh	2009–2013	Czechia	1946–1947	Haiti	2006–2009	Malawi	1994–2000	Peru	1980–1991	Taiwan	1992–2018
Belarus	1991–1994	Czechia	1990–2018	Haiti	2017–2018	Malawi	2003–2018	Peru	2001–2018	Thailand	1992–2005
Belgium	1847–1913	Congo Dem. Rep.	2006–2015	Honduras	1894–1903	Malaysia	1957–1968	Philippines	1950–1968	Thailand	2008–2013
Belgium	1915–1939	Denmark	1915–1939	Honduras	1908–1911	Malaysia	1971–1995	Philippines	1987–2018	The Gambia	1965–1993
Belgium	1944–2018	Denmark	1945–2018	Honduras	1913–1918	Malaysia	2008–2018	Poland	1918–1925	The Gambia	2017–2018
Benin	1991–2018	Dominican Rep.	1978–2018	Honduras	1920–1923	Mali	1992–2011	Poland	1991–2018	Timor-Leste	2002–2018
Bhutan	2013–2018	Ecuador	1968–1969	Honduras	1925–1935	Mali	2013–2018	Portugal	1911–1925	Trinidad & Tobago	1962–2018
Bolivia	1952–1963	Ecuador	1979–2006	Honduras	1982–2018	Mauritania	2007	Portugal	1976–2018	Tunisia	2014–2018
Bolivia	1982–2018	Egypt	1951	Hungary	1990–2018	Mauritius	1968–2018	Rep. of Congo	1992–1996	Turkey	1946–1959
Botswana	1966–2018	El Salvador	1984–2018	India	1952–2018	Mexico	1997–2018	Romania	1990–2018	Turkey	1961–1970
Brazil	1946–1960	Estonia	1919–1932	Indonesia	1999–2018	Moldova	1991–2018	Russia	1992	Turkey	1973–1979
Brazil	1985–2018	Estonia	1991–2018	Iran	1946–1952	Mongolia	1990–2018	Russia	2000–2006	Turkey	1983–2013
Bulgaria	1990–2018	Fiji	1970–1986	Iraq	2014–2018	Montenegro	2008–2018	Senegal	2000–2018	Uganda	1962–1965
Burkina Faso	1978–1979	Fiji	1990–1999	Ireland	1921–2018	Mozambique	2013–2018	Sierra Leone	1961–1966	Ukraine	1991–2018
Burkina Faso	2015–2018	Fiji	2001–2005	Israel	1948–2018	Namibia	1990–2018	Sierra Leone	1996	United Kingdom	1837–2018
Burma/Myanmar	1948–1957	Finland	1917–1929	Italy	1948–2018	Nepal	1990–2001	Sierra Leone	2002–2018	USA	1800–2018
Burma/Myanmar	1960–1961	Finland	1931–2018	Ivory Coast	2000–2001	Nepal	2006–2018	Slovakia	1993–2018	Uruguay	1952–1970
Burma/Myanmar	2016–2018	France	1848–1850	Ivory Coast	2011–2018	Netherlands	1917–1939	Slovenia	1991–2018	Uruguay	1985–2018
Burundi	1963–1965	France	1877–1939	Jamaica	1959–2018	Netherlands	1945–2018	Solomon Islands	1978–1999	Venezuela	1958–2005
Burundi	2005–2014	France	1947–1957	Japan	1952–2018	New Zealand	1857–2018	Solomon Islands	2004–2018	Zambia	1991–1995
Cameroon	1961–1965	France	1965–2018	Jordan	1956	Nicaragua	1990–2018	Somalia	1960–1968	Zambia	2001–2018
Canada	1867–2018	Georgia	1995–2018	Kenya	1963	Niger	1993–1995	Somalia	2012–2018	Zimbabwe	1980–1982
Cape Verde	1991–2018	Germany	1919–1932	Kenya	2002–2018	Niger	1999–2008	South Africa	1910–1991	Zimbabwe	2013–2018
Central Afr. Rep.	1993–2002	Germany	1949–2018	Kosovo	2000–2006	Niger	2011–2018	South Africa	1994–2018		
Central Afr. Rep.	2016–2018	Ghana	1970–1971	Kyrgyzstan	2006	Nigeria	1960–1965	South Korea	1960		
Chile	1888–1890	Ghana	1979–1981	Kyrgyzstan	2011–2018	Nigeria	1979–1983	South Korea	1988–2018		
Chile	1964–1972	Ghana	2001–2018	Laos	1953–1958	Nigeria	1999–2018	Spain	1900–1922		
Chile	1989–2018	Greece	1864–1914	Latvia	1920–1933	North Macedonia	1991–2018	Spain	1931–1938	Total:	5,829 obs.

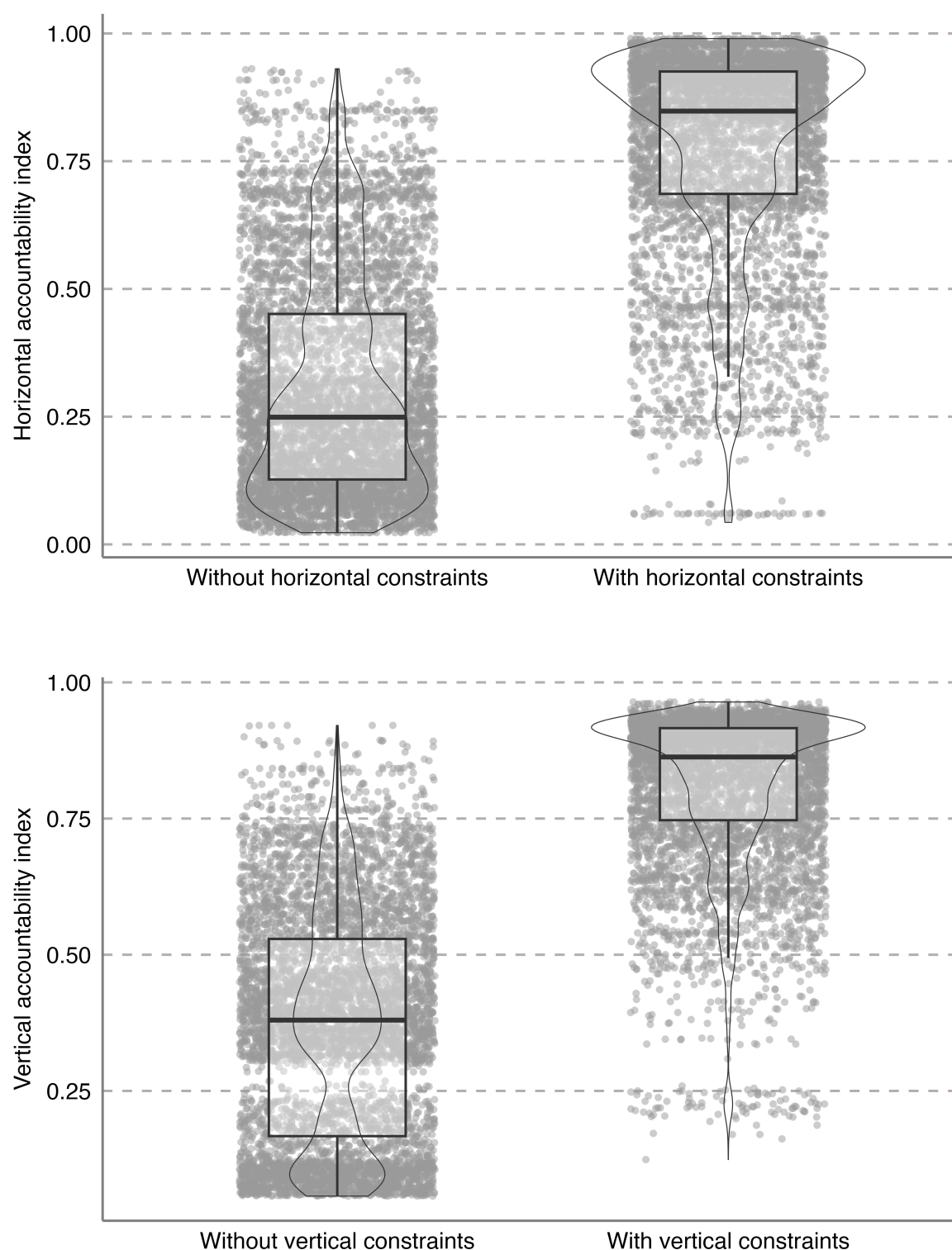
## A2.1. Comparison to Alternative Measures of Constraints

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 through 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

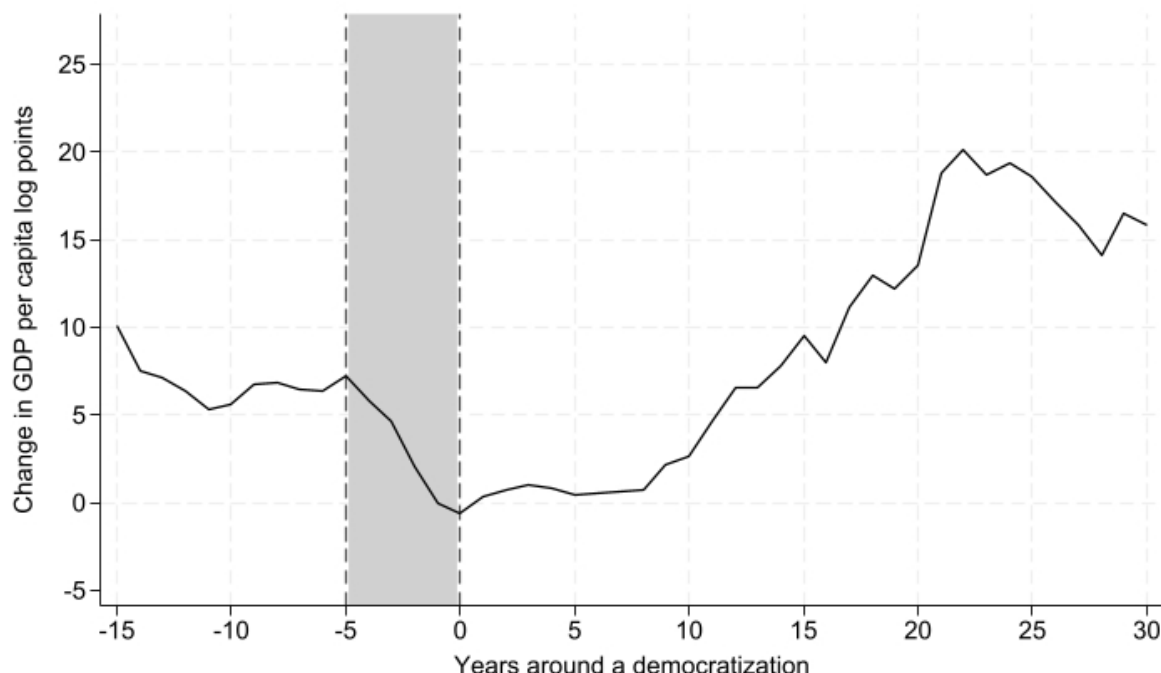
### A3. Econometric assumptions

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**



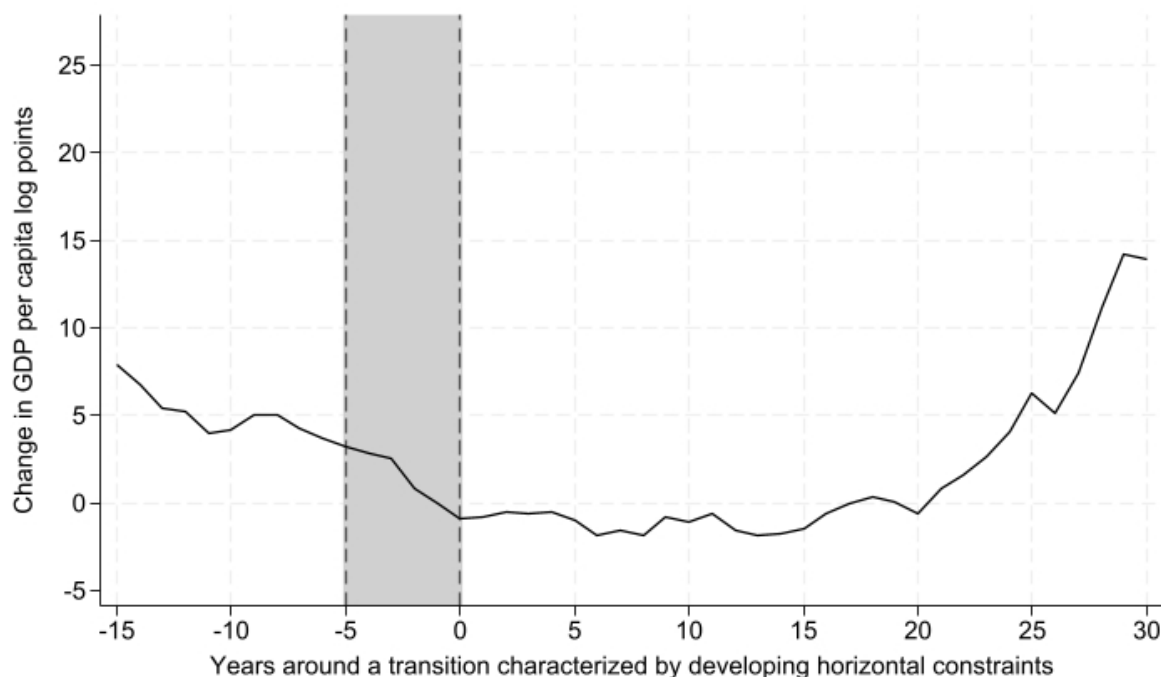
Note.— The graph illustrates GDP before and after a democratization takes place. Particularly, it plots logged real GDP per capita around a democratic transition, conditional on countries remaining non democratic in the same year. Log real GDP per capita is normalized to 0 in the year preceding the democratization. Time in years relative to the year of democratization is 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.

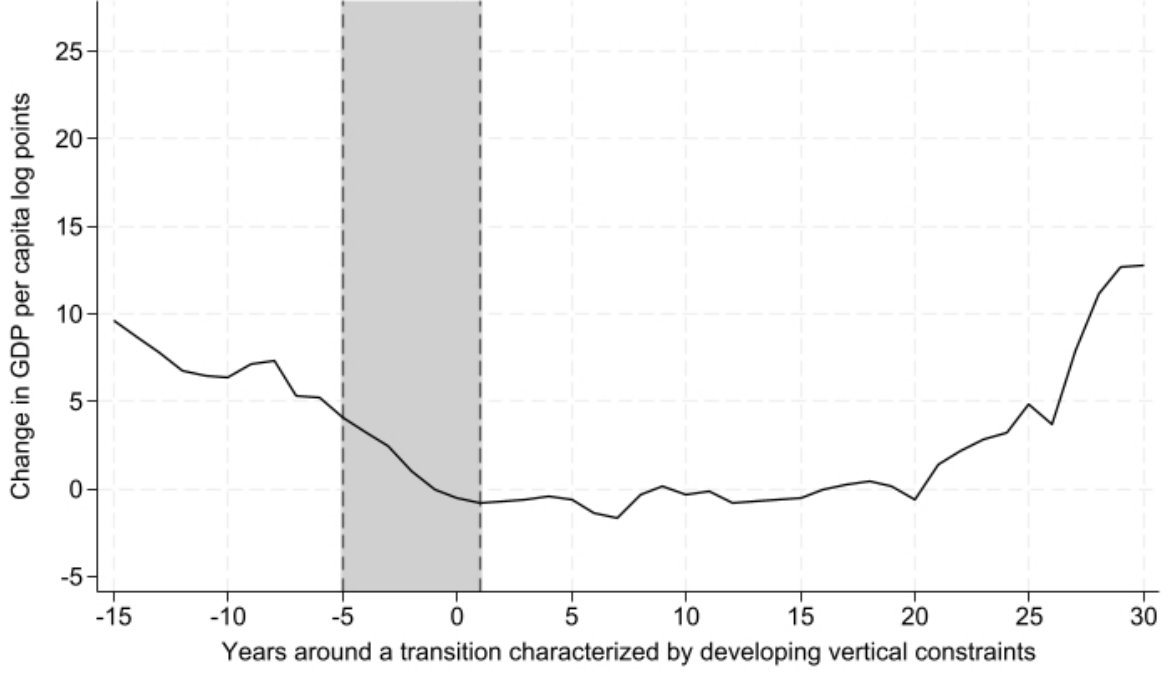
**Figure A4: The temporary dip of GDP preceding minor transformations**



### 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  $\varepsilon_{ct}$  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:

$$\mathbb{E}[\varepsilon_{ct} \mid y_{ct-1}, \dots, y_{ct_0}, C_{ct}, \dots, C_{ct_0}, \alpha_c, \delta_t] = 0 \quad (4)$$

Here, the error term  $\varepsilon_{ct}$  is uncorrelated with constraints  $C_{ct}$  for all  $c$  and  $t \geq t_0$ , given the lagged dependent variables  $y_{ct-1}, \dots, y_{ct_0}$ . 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  $\theta$  using data. The GMM does this by setting up moment conditions that relate the data with the parameters, then it finds the values of  $\theta$  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:

$$\Delta Y_{ct} = \sum_t \Delta \delta_t d_t + \xi \Delta C_{ct} + \sum_{j=1}^4 \gamma_j \Delta Y_{ct-j} + \Delta \varepsilon_{ct} \quad (5)$$

Where,  $\Delta Y_{ct}$  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  $\Delta \delta_t$ .  $\Delta C_{ct}$  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  $\Delta Y_{ct-1}$  is correlated with  $\Delta\varepsilon_{ct}$ , the GMM estimator uses lag levels of  $Y_{ct-2}, Y_{ct-3}, \dots$  as instrument for  $\Delta Y_{ct-1}$ . These earlier lags are valid instruments because they are not correlated with the current error term  $\varepsilon_{ct}$ . In other words, all endogenous variables in the first-differenced equation are instrumented by their lagged values. Hence, past values for both constraints  $C_{ct-2}, C_{ct-3}, \dots$  are also treated as instruments for  $\Delta C_{ct}$ . 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  $Y_{ct}$ :

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

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  $C_{ct}$ :

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

Meaning that the first and higher lags of both executive constraints are valid instruments for the first-differenced constraints variable. In other words, error terms are assumed to be serially uncorrelated. I took as many as possible past lags to instrument for these variables, having 5995 instruments. GDP persistence is a bit lower, but the coefficients for vertical constraints is higher and significant. Sargan test is 0.000 whereas Hansen test is 1.00.

## A4. 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

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 A9. 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 A10. 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 growth 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 183 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 A11. Estimation Results using the whole sample

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

Table A12. Full Controlled Model

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

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

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

Name	ID	CoW	Coverage	Name	ID	CoW	Coverage
Maldives	MDV	781	1900–2022	Singapore	SGP	830	1867–2022
Mali	MLI	432	1900–2022	Slovakia	SVK	317	1939–2022
Malta	MLT	338	1900–2022	Slovenia	SVN	349	1989–2022
Mauritania	MRT	435	1904–2022	Solomon Islands	SLB	940	1900–2022
Mauritius	MUS	590	1900–2022	Somalia	SOM	520	1900–2022
Mecklenburg Schwerin	MCL	280	1789–1867	South Africa	ZAF	560	1900–2022
Mexico	MEX	70	1789–2022	South Korea	KOR	730	1789–1905
Modena	MDN	332	1789–1859	South Korea	KOR	732	1906–2022
Moldova	MDA	359	1990–2022	South Sudan	SSD	626	2011–2022
Mongolia	MNG	712	1911–2022	South Yemen	YMD	680	1900–1990
Montenegro	MNE	341	1789–2022	Spain	ESP	230	1789–2022
Morocco	MAR	600	1789–2022	Sri Lanka	LKA	780	1900–2022
Mozambique	MOZ	541	1900–2022	Sudan	SDN	625	1900–2022
Namibia	NAM	565	1900–2022	Suriname	SUR	115	1900–2022
Nepal	NPL	790	1789–2022	Sweden	SWE	380	1789–2022
Netherlands	NLD	210	1789–2022	Switzerland	CHE	225	1798–2022
New Zealand	NZL	920	1841–2022	Syria	SYR	652	1918–2022
Nicaragua	NIC	93	1838–2022	Taiwan	TWN	713	1900–2022
Niger	NER	436	1922–2022	Tajikistan	TJK	702	1990–2022
Nigeria	NGA	475	1914–2022	Tanzania	TZA	510	1914–2022
North Korea	PRK	731	1945–2022	Thailand	THA	800	1789–2022
North Macedonia	MKD	343	1991–2022	The Gambia	GMB	420	1900–2022
Norway	NOR	385	1789–2022	Timor-Leste	TLS	860	1900–2022
Oman	OMN	698	1789–2022	Togo	TGO	461	1916–2022
Pakistan	PAK	770	1947–2022	Trinidad and Tobago	TTO	52	1900–2022
Panama	PAN	95	1903–2022	Tunisia	TUN	616	1789–2022
Papal States	PPS	327	1789–1860	Turkey	TUR	640	1789–2022
Papua New Guinea	PNG	910	1900–2022	Turkmenistan	TKM	701	1990–2022
Paraguay	PRY	150	1811–2022	Tuscany	TSC	337	1789–1860
Parma	PRM	335	1789–1859	Two Sicilies	TWS	329	1789–1860
Peru	PER	135	1789–2022	Uganda	UGA	500	1900–2022
Philippines	PHL	840	1900–2022	Ukraine	UKR	369	1990–2022
Poland	POL	290	1789–2022	United Arab Emirates	ARE	696	1971–2022
Portugal	PRT	235	1789–2022	United Kingdom	GBR	200	1789–2022
Qatar	QAT	694	1900–2022	United States of America	USA	2	1789–2022
Republic of Vietnam	VDR	817	1802–1975	Uruguay	URY	165	1825–2022
Republic of the Congo	COG	484	1903–2022	Uzbekistan	UZB	704	1789–2022
Romania	ROU	360	1789–2022	Vanuatu	VUT	935	1900–2022
Russia	RUS	365	1789–2022	Venezuela	VEN	101	1789–2022
Rwanda	RWA	517	1916–2022	Vietnam	VNM	816	1945–2022
Sao Tome and Principe	STP	403	1900–2022	Württemberg	WRG	271	1789–1871
Saudi Arabia	SAU	670	1789–2022	Yemen	YEM	678	1789–1989
Saxony	SXN	269	1789–1867	Yemen	YEM	679	1990–2022
Senegal	SEN	433	1904–2022	Zambia	ZMB	551	1911–2022
Serbia	SRB	345	1804–2022	Zanzibar	ZZB	511	1856–1964
Seychelles	SYC	591	1903–2022	Zimbabwe	ZWE	552	1900–2022
Sierra Leone	SLE	451	1900–2022				