

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 are 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. Using a dynamic panel modeling approach, my results show that horizontal constraints decrease GDP per capita after controlling for the effect of democracy. Even though vertical constraints do not affect growth directly, they are strongly associated with more education and lower infant mortality. This research challenges the conventional wisdom that horizontal constraints on rulers, such as checks and balances, are necessary to stimulate investment and growth.

Keywords: Democracy, executive constraints, institutions, economic growth

1 Introduction

Despite wide agreement that democratic institutions should have positive economic effects (Papaioannou and Siourounis 2008; Acemoglu et al. 2019; Colagrossi, Rossignoli, and Maggioni 2020; Knutsen 2021; Gerring, Knutsen, and Berge 2022), empirical analyses are contradictory, ranging from negative (Barro 1996) to no significant effects (Przeworski et al. 2000; Gerring et al. 2005; Doucouliagos and Ulubaşoğlu 2008).

At least some of this disagreement is due to scholars' use of composite regime measures that neglect the varied nature of democracy. In this article, I unpack democracy into two forms of executive constraints and estimate their direct and indirect effect on economic growth. I argue that the incentives these constraints provide determine the paths through

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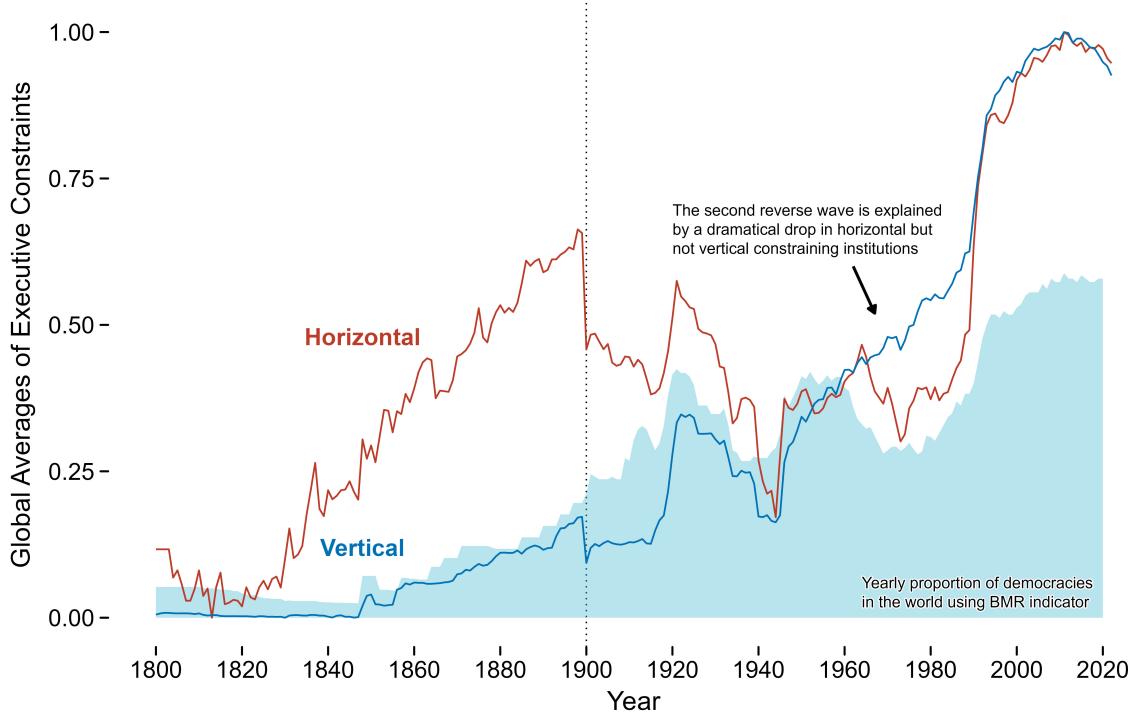
which democracy influences development. Horizontal constraints affect the incentives for capital investment, whereas vertical constraints are linked to better public goods provision, such as education and health. I use a dynamic panel modeling approach, which allows me to estimate the individual effect of these two institutions on growth while also accounting for the effect of democracy. Contrary to findings from previous work, I found that horizontal constraints decrease growth in the short and long run. These analyses also demonstrate a strong relationship between vertical constraints and human development indicators.

2 Unpacking the democracy-growth link

The relationship between democracy and economic growth has long been a pivotal issue for social scientists and one marked by contradictory empirical findings. For instance, [Doucouliagos and Ulubaşoğlu \(2008\)](#) found a positive and significant impact of democracy in only 27% of the cases surveyed, while 21% were negative and non-significant, 37% were positive but non-significant, and 15% were negative and significant. They also report that differences in specification, measurement, and estimation account for much of this variation. A common issue is that researchers use composite democracy indicators as proxies for the impact of specific regime components ([Boese et al. 2022](#)). This means that studies that have relied on such indicators cannot identify the specific institution(s) that drive the overall regime effect. Highlighting exclusively one regime component over others may explain why studies find such heterogeneous results in different outcomes.

To account for this concern, several studies have disaggregated the role of certain institutions, such as executive constraints ([Cox and Weingast 2018](#); [Fjelde, Knutsen, and Nygård 2021](#)). Scholars have also unpacked democracy features such as political accountability ([Lührmann, Marquardt, and Mechkova 2020](#)) and polyarchy dimensions ([Boese and Wilson 2023](#)). [Boese et al. \(2022\)](#) propose perhaps the most comprehensive approach, constructing a cube of democracy based on three dimensions: participation, electoral contestation, and constraints on the executive.

In this paper, I take a similar approach to [Cox and Weingast \(2018\)](#), [Fjelde, Knutsen, and Nygård \(2021\)](#) and [Boese et al. \(2022\)](#), focusing on specific democratic institutions. I center on executive constraints because the limitation of the power itself is a key dimension of democracy, and they have a theoretically and empirically strong link with economic growth. Horizontal constraints provide checks on rulers' behavior by splitting up the power of the government into relatively autonomous branches. These checks can be imposed from legislative control over executive attributions (e.g., public budget) or an independent judiciary with legal instruments to review rulers' decisions (e.g., judicial review). Vertical constraints keep leaders accountable to most of the population. These institutions bind the will of power holders with the interests of organized masses through



Data: V-Dem and Boix, Miller and Rosato (2020)

Figure 1: Global averages of vertical and horizontal constraints (1800-2020)

contested multi-party elections and extensive franchise rights (Dahl 1971). Consequently, institutions providing electoral oversight allow for vertical accountability, in which citizens can evaluate and accordingly sanction their rulers.

Crucially, these constraints are empirically quite distinct. Figure 1 depicts how their evolution has been uneven across modern history.¹ There was a great divergence between the levels of both institutions during the 19th century, driven by Western countries' early political development, characterized by the implementation of legislatures with binding powers over the executive while the rest of the countries remained highly unequal, restricting multiparty competition or imposing legal restrictions on the right to vote. During the 20th century, there was a dramatic increase in contestation and participation levels, converging within the second and third waves of democratization. The levels of both constraints differ during the Cold War period: the second reverse wave appears to be driven by a sudden drop in horizontal constraining institutions rather than vertical. This observation makes sense as most of the world has been experiencing a constant development in vertical constraints such as enfranchisement since the mid-20th century.

1. I used Fjelde, Knutsen, and Nygård (2021) approach to construct two constraint indices based on V-Dem mid-level democracy indices traced back to the 18th century (Coppedge et al. 2023).

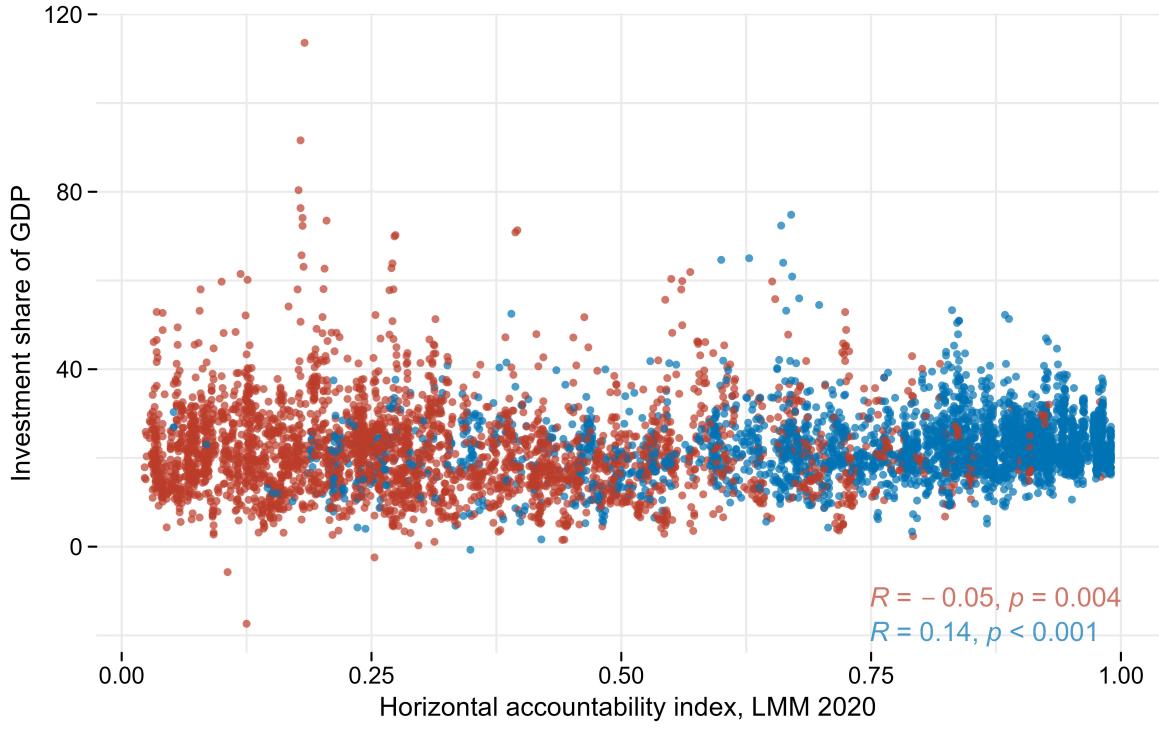
2.1 Investment without democracy?

A large body of scholarship has examined the roles of democratic institutions in establishing the incentives for economic development. [North and Weingast \(1989\)](#) suggest that horizontal constraints over the English Crown after the Glorious Revolution were commitment devices discouraging the ruler from engaging in expropriatory behavior. Many studies have tried to generalize such an 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 they positively influence private investment ([Stasavage 2002](#); [Wright 2008](#)), while others 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 must ensure certainty that they can own the benefits of their productive operations once earned. This means that as long as there is some credible commitment institution, there is no need for other democratic features to ensure prosperity. Indeed, some scholars have treated democratic institutions outside of horizontal constraints as a threat to property rights and investment. In their view, democracy generates demands for immediate public consumption, threatening the profits of capital holders, which reduces investment and retards growth ([Przeworski and Limongi 1993](#)). Facing no electoral accountability, an authoritarian government has fewer pressures to allocate public resources toward immediate consumption.

In line with such arguments, the levels of horizontal constraints should be positively correlated with the levels of investment. Indeed, the Pearson correlation coefficient between both is slightly positive and significant (see [Figure 2](#)). More rigorous statistical analyses of this phenomenon ([Stasavage 2002](#); [Cox and Weingast 2018](#)) have tended to treat such constraints as isolated regime features without accounting for the fact that they are a fundamental component of democratic politics. 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 2](#) illustrates this concern. The plot depicts the relationship between investment and horizontal constraints (measured by the horizontal accountability index proposed by [Lührmann, Marquardt, and Mechkova 2020](#)) using a sample of 184 countries from 1960 to 2010. I grouped each observation by Acemoglu et al.’s dichotomous democracy indicator (2019); blue represents democracies and red non-democracies. Although there is no strong relationship between horizontal constraints and investment in either group, contrary to the commitment literature, the relationship for non-democracies is actually negative.



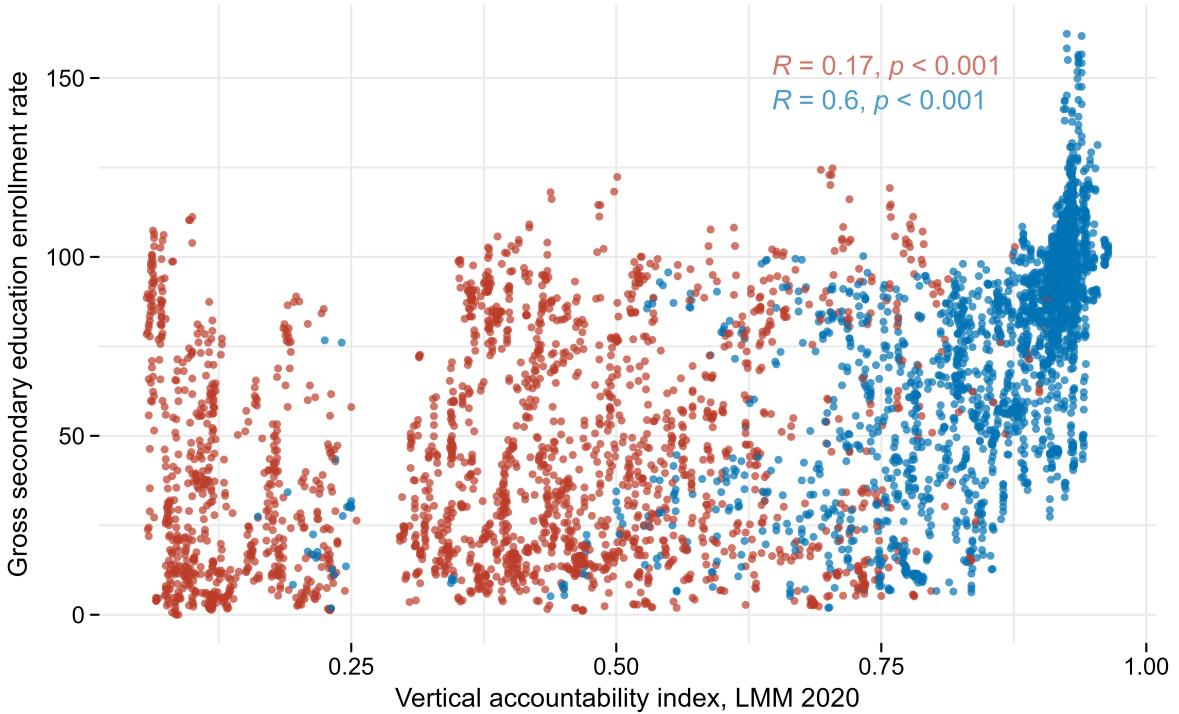
Data: V-Dem and the World Bank

Figure 2: The relationship between horizontal constraints and investment

2.2 Electoral institutions in action

While the relationship between democracy and private investment is still contested, empirical evidence widely suggests that vertical constraints influence growth by enhancing 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](#)). Most recently, [Wang, Mechkova, and Andersson \(2019\)](#) show that the quality of competitive elections has a consistently negative effect on 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 \(2005\)](#) depict how vertical constraints influence human capital by reducing entry barriers to power and allowing citizens to register their preferences and select their leader. Political competition allows voters to use the state to redistribute wealth from rich to poor. Thus, more competitive regimes broaden the median voter, who would be more likely to demand goods with positive externalities, such as schools and health care. Voting can also be an accountability mechanism when politicians fail to meet citizens' welfare thresholds ([Ferejohn 1986; 1999](#)); they may align rulers' interests with



Data: V-Dem and the World Bank

Figure 3: The relationship between vertical constraints and human capital

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 3 shows the relationship between vertical constraints and education, a common indicator to measure human development in economics. As before, I distinguish two groups of country-year observations based on whether they are democratic per Acemoglu et al. (2019). Although authoritarian regimes developing some degree of vertical constraints appear to increase secondary education slightly, democracies are those regimes strongly correlated with better educational outcomes.

3 Data and Methods

Because horizontal and vertical constraints are components of democracy, traditional approaches to modeling their effects face econometric problems. In particular, their true effect may be conflated with that of the other constraint or other democratic institutions. To address this concern, I use dynamic panel data models accounting for country and year heterogeneity and growth dynamics. Crucially, I control for democracy using Acemoglu et al. (2019) dichotomous measure. The baseline analysis is based on an unbalanced panel

of 184 countries between 1960 and 2010. The dependent variable is the natural logarithm of gross domestic product (GDP) per capita measured in 2000 U.S. dollars international prices, obtained from the World Bank Development Indicators.

To measure the levels of horizontal and vertical constraints, I use [Lührmann, Marquardt, and Mechkova \(2020\)](#) accountability indices based on V-Dem data ([Coppedge et al. 2023](#)). The horizontal accountability index refers to the extent to which state institutions hold the executive accountable. This form of accountability requires institutions such as legislatures, judiciaries, and other oversight agencies to demand information and punish improper behavior ([Lührmann, Marquardt, and Mechkova 2020](#)). The vertical accountability index reflects the ability of the population to hold its government accountable through elections and political parties. Both measures best capture the concept of executive constraints proposed in this paper as they properly reflect the accountability function that such institutions must produce once established. Conversely, available measures such as those proposed by [Cox and Weingast \(2018\)](#) rely on arbitrary cutoffs using Polity IV indicators, while some indices proposed by [Fjelde, Knutsen, and Nygård \(2021\)](#) and [Boese et al. \(2022\)](#) are constructed under ambiguous aggregation formulas.

3.1 Econometric model

To estimate the effect of executive constraints on economic growth, 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 would 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 would capture influences of global trends on growth common to all countries in the sample, such as, for example, the impacts produced by the two oil shocks that occurred in the 1970s ([Cox and Weingast 2018](#)).

As [Acemoglu et al. \(2019\)](#), I include four lagged dependent variables, controlling for GDP persistence and the temporary dip in GDP that precedes democratization (see [Figure A1](#)). This choice is particularly important as it specifies how far back in time the model needs to consider when adjusting for confounding factors ([Imai, Kim, and Wang 2023](#)). Accordingly, this dynamic panel model assumes a standard sequential exogeneity, which implies that the key independent variables and past GDP are orthogonal to contemporaneous and future shocks to GDP and that the error term is serially uncorrelated. Hence, this model requires sufficient GDP lags to be included to eliminate the residual serial correlation in the error term and to remove the influence of the dip in GDP depicted in [Figure A1](#). Lastly, GDP lags not only control for the impact of other economic factors, such as commodity prices, agricultural productivity, and technology

(Acemoglu et al. 2019), but they also assess the propensity to democratize or develop one or more constraints based on past GDP. The model stands in the following equation:

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

Where y_{ct} is the natural logarithm of gross domestic product (GDP) per capita measured in 2000 U.S. dollars for country c and time t . α_c and δ_t are country and year-fixed effects correspondingly. β is the coefficient capturing the effect of democracy D_{ct} measured by Acemoglu et al. (2019). ξ is the impact of horizontal or vertical constraints C_{ct} , and γ_j reports coefficients for up to four lags of the dependent variable y_{ct-j} .

4 Estimation results

This section reports estimation results from different specifications of Equation 1. Reported coefficients are multiplied by 100 to ease their interpretation.² Robust standard error against heteroskedasticity and serial correlation at the country level are reported in parentheses. Table 1 reports results using Lührmann, Marquardt, and Mechkova (2020) accountability indices and including four lags of GDP per capita on the right-hand side of the equation. These estimates imply that controlling for the effect of democracy, an increase in horizontal constraints decreases GDP per capita by .027 percent in the short run, whereas vertical constraints appear to not influence growth significantly.³

Table 2 provides an additional specification of Equation 1, using dichotomous measures of executive constraints based on Polity IV.⁴ With this approach, I can estimate the treatment effect of political transitions characterized by only horizontal or vertical constraints, conditional on the effect of full democratic transitions. Here, the presence of horizontal constraints is estimated to be negative and significant, with a coefficient of 1.24 (standard error = .582). These results imply that developing horizontal constraints in authoritarian political settings would decrease GDP per capita by roughly 1.2 percent in the short run. Interestingly, the presence of vertical constraints appears to absorb some of the overall effects of democratization, as its inclusion decreases the magnitude and significance of the democracy indicator.

2. 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). Thus, all reported coefficients associated with Δx are multiplied by 100 to ease their interpretation.

3. Appendix AX provides additional robustness tests changing the ANRR democracy indicator to the BMR variable and using different constraint measures. Appendix AX includes several additional covariates, such as log population, log population below 16 years old, log population above 64 years old, net financial flows and trade volume as fractions of GDP, and a dichotomous measure of social unrest.

4. Following Cox and Weingast (2018), I code a country as having horizontal constraints on the executive when there are substantial limitations for the exercise of power by the chief executive according to Polity. Similarly, 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.

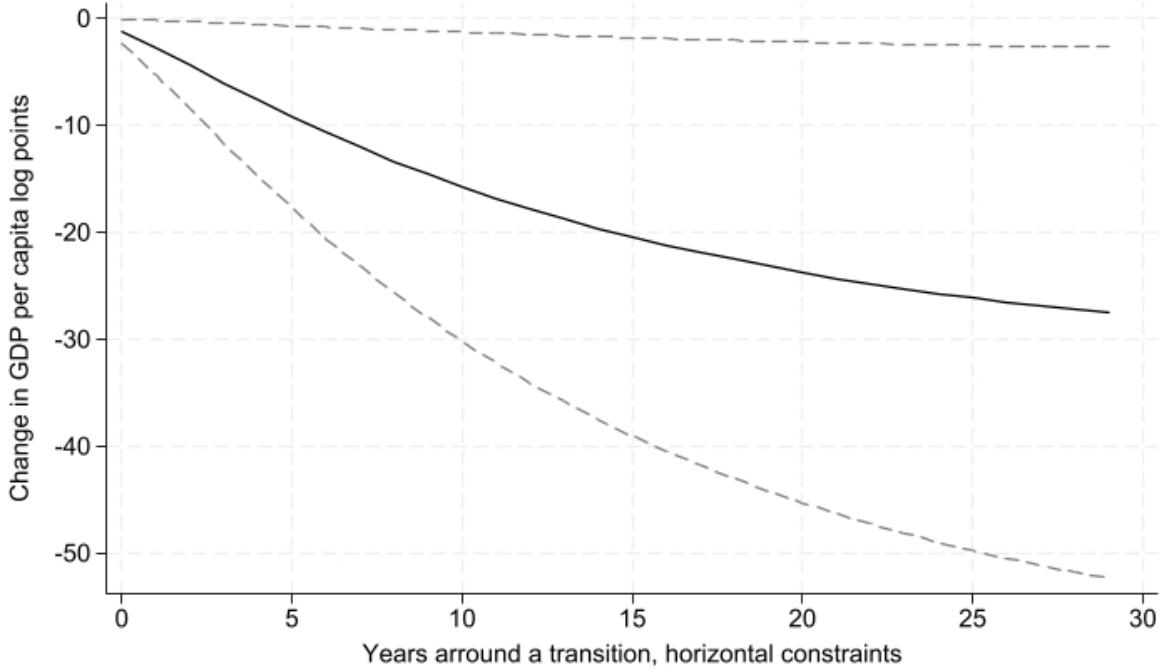


Figure 4: Dynamic panel model estimates of the over-time effects of horizontal constraints on log GDP per capita

4.1 Long-run effects

Equation 1 specifies a fixed effects panel model that includes lagged dependent variables, controlling for dynamics such as the time-persistence behavior of GDP and the economic shocks produced by democratization processes. This implies that key coefficients must be interpreted as contemporaneous effects and that GDP dynamics determine how this effect unfolds over time. Iterating the short-run estimates, the cumulative long-run effect of executive constraints on growth is given by the following formula:

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

Where $\hat{\xi}$ denotes the parameter estimates of executive constraints, and $\hat{\gamma}$ denotes the parameter estimates of the lagged dependent variables included in the model. Applying this formula to the estimates in column 1 of [Table 2](#), I find that transitions characterized by evolving only horizontal constraints decrease GDP per capita by roughly 32 percent in the long run (standard error = 14.73), conditional on the impact of full democratic transitions. Accordingly, [Table 1](#) also reports that dictatorships would decrease GDP per capita by .712 percent in the long run for every unit increase of horizontal constraints they could develop yearly. Finally, [Figure 4](#) plots the estimated log GDP per capita change caused by transitions developing only horizontal constraints. Yearly effects are obtained by forward iteration of the estimated process modeled in Equation 2. This figure

simulates the development path if a non-democratic political regime were to develop only horizontal constraints. As shown, countries following such a transition path would experience consistently declining growth over the long run.⁵

Dynamic models with fixed effects have an asymptotic bias of order $1/T$, a product of potentially violating the strict exogeneity assumption defined in [Appendix A2](#) ([Nickell 1981](#)). Accordingly, GDP lags included in the right-hand side of Equation 1 might be correlated with countries' idiosyncratic and non-stochastic characteristics. To address this concern, columns 4 to 6 in Tables 1 and 2 report estimates using the [Arellano and Bond \(1991\)](#) generalized method of moments (GMM). Patterns observed in the within estimator remain: horizontal constraints retard growth, whereas the effect of vertical ones is insignificant.

4.2 Mechanisms of growth

Lastly, this section examines whether there is a relationship between both types of constraints and several growth channels. As mentioned above, scholars suggest that horizontal constraints should enhance growth through private investment, while vertical constraints are strongly linked to human development indicators, such as education and health. Following the literature, these institutions are more likely to influence specific channels that determine growth. Thus, once again replicating [Acemoglu et al. \(2019\)](#), I 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, education as gross primary and secondary education enrollment rates, and health as the infant mortality rate (all from the World Bank Development Indicators). This model assumes the same dynamic properties of Equation 1; thus, lagged dependent variables on the right-hand side account for the persistent behavior of each outcome. Additionally, these lags control for both the dip in GDP preceding democratization and the mechanical effect of greater GDP on the intermediating variables ([Acemoglu et al. 2019](#)).

[Table 3](#) shows the estimation results using [Lührmann, Marquardt, and Mechkova \(2020\)](#) accountability indices, whereas [Table 4](#) uses Polity IV. Contrary to the literature, horizontal constraints do not influence private investment significantly. Indeed, once controlled by other democratic components such as vertical constraints, horizontally constraining institutions appear not to influence any growth source. However, higher levels of vertical

5. Figure AX plots the estimated log GDP per capita change caused by developing higher levels of horizontal constraints in non-democratic cases. The graph depicts the same consistent negative impact.

constraints increase primary education and decrease infant mortality in the short and long run. Developing more vertical constraints increases primary education enrollment by .541 percent (standard error .201) in the long run, conditioning on the negative but insignificant effect of horizontal constraints.

Estimates in [Table 4](#) provide additional evidence showing how democracy components can absorb the effects of other institutions. Here, the only presence of horizontal constraints appears to improve general living conditions regarding education and health, even though the effect of vertical constraints is always stronger in such outcomes. However, once controlled by both constraints, the effect of horizontal ones turns insignificant or negatively associated with sources such as investment and infant mortality, and only vertical ones appear to improve living conditions. Particularly, political transitions characterized by these institutions decrease child mortality rates by 27.31 percent (standard error 9.57), both in the long run and conditioned by horizontal constraints. These are conservative estimates to the extent that they rely on the assumption that the dip in GDP produced around four years before democratization is also produced before a political transition characterized by any executive constraint. Changing the dynamic processes modeled in Equation 3 (e.g., using two instead of four outcomes lags) does not change the estimates for horizontal, but it changes the significance of the effect of vertical constraints.⁶

5 Conclusion

In recent years, the case for democracy has been strengthened by the accumulation of evidence pointing to it as a fundamental cause of growth. However, no conclusive arguments exist about what aspect of democratic politics drives such an effect. This research's main contribution is to uncover how particular components of democracy influence growth separately and jointly and identify the channels through which these institutions may influence development. This research shows that horizontal constraints decrease growth in the short and long run once controlled by the effect of democracy. Vertical constraints do not directly affect growth but strongly influence education and infant mortality outcomes.

This article challenges the conventional wisdom that horizontal constraints on rulers, such as checks and balances, are necessary to stimulate investment and growth. I also show that failing to control other democratic institutions may produce misleading results about the effects of these institutions. Two arguments explain these findings. First, studies such as [Gehlbach and Keefer \(2011\)](#) show that horizontal constraints 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 nondemocracies. In sum, commitment-

6. [Appendix A4](#) shows that the dip in GDP preceding a major political transition may hold true for a country developing horizontal constraints but not for vertical ones.

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 why horizontal constraints should 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 before such an event. Furthermore, the English society was still highly unequal; barely two percent of the population could vote in the 18th century (Acemoglu and Robinson 2012, 230). Indeed, most of these historical cases were profoundly unequal societies with exclusive political systems. Dictators with any form of horizontal constraints may use them to reproduce inequalities by rewarding supporters and sustaining their privileges. Some constrained autocrats may foster growth by solving collective action problems, but it is still unclear whether horizontally constrained autocrats are better able to do so than vertically constrained ones.

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Table 1: Effects of executive constraints on (log) GDP per capita

	Within estimates			Arellano-Bond estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
Democracy	1.69 (.365)	1.30 (.380)	1.78 (.405)	1.68 (.454)	1.19 (.467)	1.62 (.445)
Horizontal accountability index, 0-100 scale	−.027 (.007)		−.024 (.008)	−.024 (.009)		−.021 (.009)
Vertical accountability index, 0-100 scale		−.016 (.008)	−.007 (.009)		−.010 (.009)	−.004 (.009)
Log GDP, first lag	1.23 (.040)	1.23 (.040)	1.23 (.040)	1.20 (.039)	1.20 (.038)	1.21 (.039)
Log GDP, second lag	−.199 (.049)	−.202 (.049)	−.200 (.049)	−.186 (.047)	−.186 (.047)	−.190 (.047)
Log GDP, third lag	−.028 (.031)	−.028 (.031)	−.028 (.031)	−.028 (.030)	−.028 (.030)	−.029 (.030)
Log GDP, fourth lag	−.041 (.019)	−.044 (.019)	−.042 (.019)	−.042 (.020)	−.041 (.020)	−.040 (.020)
Effect after 25 years	−.569 (.164)	−.340 (.160)	37.54 (9.13)	−.393 (.157)	−.167 (.148)	28.15 (7.87)
Long-run effect	−.712 (.226)	−.420 (.201)	46.89 (12.67)	−.433 (.175)	−.185 (.165)	31.61 (9.21)
Persistence of GDP	.962 (.006)	.962 (.006)	.962 (.006)	.945 (.007)	.946 (.007)	.949 (.007)
Unit root test <i>t</i> -statistics	−3.76	−3.91	−3.83			
<i>p</i> -value (reject unit root)	.00	.00	.00			
AR2 test <i>p</i> -value				.468	.389	.480
Observations	5,786	5,786	5,786	5627	5627	5627
Countries in the sample	159	159	159	159	159	159

Note.— The table presents estimates of the effect of executive constraints on log 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 committed; 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 democracy. Table AX reports additional columns changing the lag structure to depict how GDP persistence behaves across models.

Table 2: Effects of the presence of executive constraints on (log) GDP per capita

	Within estimates			Arellano-Bond estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
Democracy	1.38 (.594)	.782 (.783)	1.43 (.880)	1.69 (.845)	1.26 (.975)	1.99 (1.08)
Presence of horizontal constraints	-1.24 (.582)		-1.21 (.538)	-0.975 (.758)		-1.10 (.688)
Presence of vertical constraints		-.498 (.744)	-.097 (.719)		-.585 (.920)	-.266 (.852)
Log GDP, first lag	1.24 (.039)	1.24 (.039)	1.24 (.039)	1.18 (.042)	1.20 (.040)	1.20 (.040)
Log GDP, second lag	-.227 (.049)	-.228 (.049)	-.227 (.049)	-.205 (.048)	-.211 (.047)	-.212 (.047)
Log GDP, third lag	-.009 (.031)	-.009 (.031)	-.009 (.031)	-.003 (.030)	-.005 (.030)	-.005 (.030)
Log GDP, fourth lag	-.044 (.022)	-.044 (.022)	-.044 (.022)	-.042 (.024)	-.044 (.025)	-.042 (.025)
Effect after 25 years	-25.75 (11.87)	-10.39 (15.42)	29.84 (18.11)	-13.14 (10.00)	-8.89 (13.64)	30.60 (16.08)
Long-run effect	-31.99 (14.73)	-12.89 (18.94)	37.07 (22.30)	-13.84 (10.49)	-9.60 (14.62)	33.23 (17.32)
Persistence of GDP	.961 (.006)	.961 (.006)	.961 (.006)	.930 (.010)	.939 (.010)	.940 (.009)
Unit root test t-statistics	-3.85	-3.93	-3.81			
p-value (reject unit root)	.00	.00	.00			
AR2 test p-value				.395	.453	.444
Observations	5,421	5,421	5,421	5211	5211	5211
Countries in the sample	153	153	153	153	153	153

Note.— The table presents estimates of the effect of executive constraints on log 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 committed; 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 democracy. Table AX reports additional columns changing the lag structure to depict how GDP persistence behaves across models.

Table 3: Effects of executive constraints on potential mechanisms of growth

	Dependent variable											
	Log of investment share in GDP			Log of primary-school enrollment			Log of secondary-school enrollment			Log of child mortality		
	(1)	(2)	(3)*	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Whitin estimates												
Horizontal accountability, 0-100 index	.022 (.023)		.021 (.038)	.008 (.004)		-.010 (.007)	.007 (.010)		-.0014 (.013)	-.002 (.001)		-.002 (.002)
Vertical accountability, 0-100 index		.015 (.030)	.0015 (.044)		.020 (.006)	.027 (.009)		.011 (.010)	.012 (.012)		-.0015 (.0010)	.0001 (.0014)
Effect after 25 years	.088 (.091)	.058 (.117)	.084 (.149)	.140 (.081)	.356 (.118)	.477 (.171)	.089 (.135)	.153 (.133)	.167 (.169)	-.200 (.111)	-.132 (.090)	-.009 (.118)
Long-run effect	.089 (.092)	.058 (.117)	.085 (.150)	.160 (.095)	.405 (.142)	.541 (.201)	.093 (.140)	.160 (.139)	.174 (.177)	-.316 (.190)	-.211 (.153)	-.015 (.188)
Persistence of outcome variable	.748 (.021)	.747 (.021)	.748 (.021)	.951 (.008)	.950 (.008)	.950 (.008)	.929 (.013)	.928 (.013)	.928 (.013)	.993 (.001)	.993 (.001)	.993 (.001)
Observations	5,305	5,305	5,272	3,559	3,559	3,559	2,781	2,781	2,781	5,711	5,711	5,711
Countries in the sample	156	156	156	155	155	155	147	147	147	159	159	159

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 GDP per capita. Column 3 reports the long-run effects for horizontal constraints, whereas Columns 6, 9, and 12 report this information for vertical constraints.

Table 4: Effects of the presence of executive constraints on potential mechanisms of growth

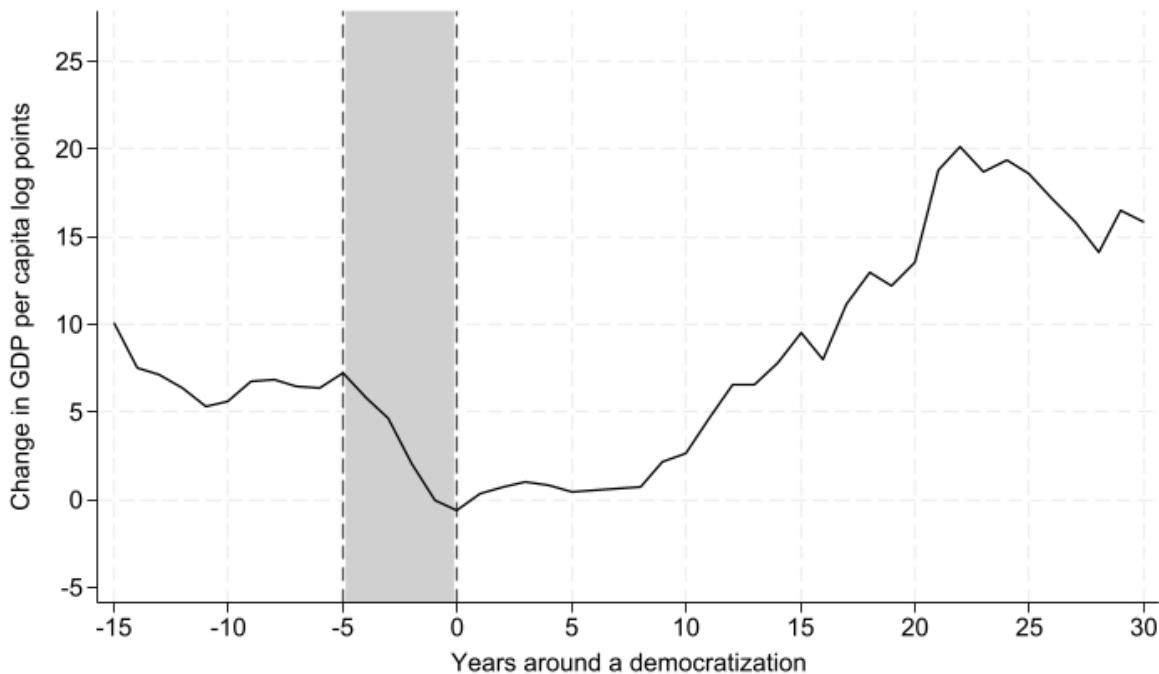
	Dependent variable											
	Log of investment share in GDP			Log of primary-school enrollment			Log of secondary-school enrollment			Log of child mortality		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Whitin estimates												
Presence of horizontal constraints	1.27 (1.20)		-.807 (1.57)	.558 (.278)		.064 (.499)	1.25 (.568)		.686 (.806)	-.150 (.053)		.013 (.059)
Presence of vertical constraints		2.13 (1.37)	2.75 (1.84)		.689 (.302)	.636 (.541)		1.32 (.589)	.719 (.827)		-.202 (.056)	-.212 (.066)
Effect after 25 years	5.17 (4.84)	8.65 (5.40)	11.12 (7.29)	10.36 (5.37)	12.77 (5.84)	11.79 (10.14)	16.87 (7.70)	17.88 (7.95)	9.73 (11.13)	-12.03 (4.03)	-16.16 (4.19)	-16.94 (5.10)
Long-run effect	5.19 (4.86)	8.68 (5.41)	11.16 (7.31)	12.11 (6.47)	14.95 (7.13)	13.80 (12.05)	17.51 (8.07)	18.59 (8.37)	10.11 (11.58)	-19.32 (7.99)	-26.06 (8.76)	-27.31 (9.57)
Persistence of outcome variable	.756 (.020)	.754 (.021)	.754 (.021)	.954 (.008)	.954 (.008)	.954 (.008)	.929 (.013)	.929 (.013)	.929 (.013)	.992 (.001)	.992 (.001)	.992 (.001)
Observations	4,982	4,982	4,982	3,325	3,325	3,325	2,605	2,605	2,605	5,253	5,253	5,253
Countries in the sample	150	150	150	146	146	146	138	138	138	151	151	151

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 GDP per capita. Columns 3, 6, 9, and 12 report this information for vertical constraints.

Appendix for “Executive Constraints and Economic Growth”

A1 Explaining the Dip in GDP preceding Democratization

Figure A1: Log GDP per capita before and after a democratization



A2 Dynamic Panel Model Assumptions

Assumption 1: Sequential Exogeneity

$$\mathbb{E} [\varepsilon_{ct} | y_{ct-1}, y_{ct-2}, \dots, y_{ct_0}, D_{ct}, D_{ct-1}, \dots, D_{ct_0}, C_{ct}, C_{ct-1}, \dots, C_{ct_0}, \alpha_c, \delta_t] = 0, \quad (4)$$

for all c and $t \geq t_0$. Implying that the error term is independent of past outcome y_{ct} , current and past D_{ct} , current and past C_{ct} , and additional covariates.

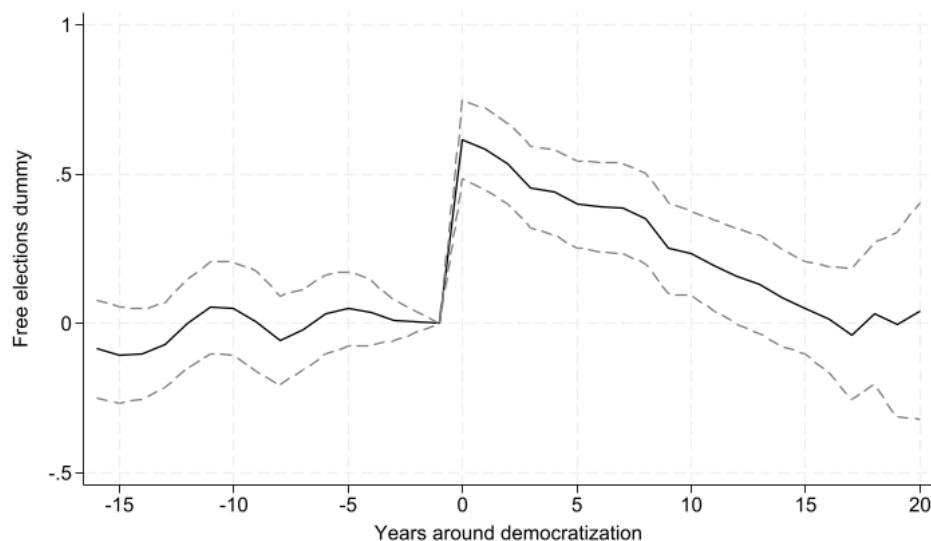
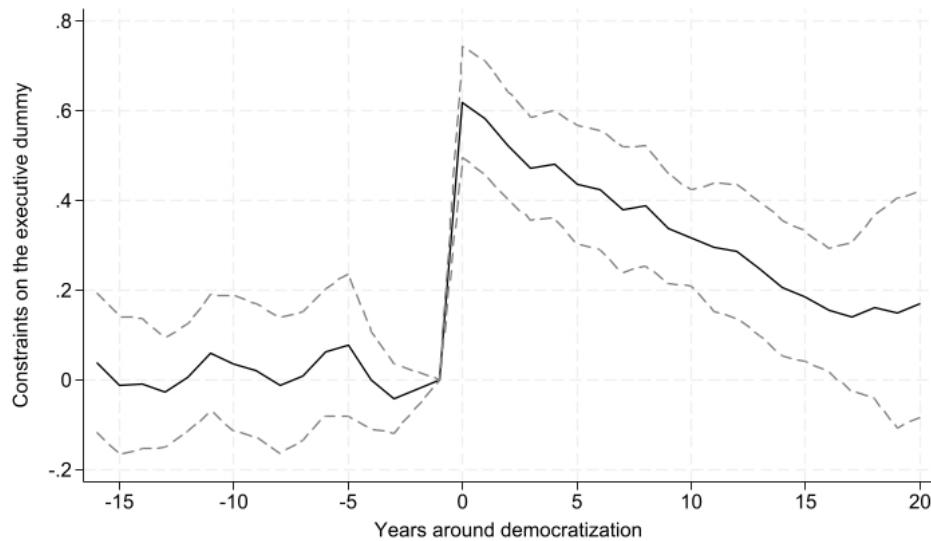
A3 Robustness Tests

Alternative measures of Democracy

Alternative measures of executive constraints

Alternative Growth measures

Alternative model specifications: interactions, lags and leads



A4 Is there a Dip in GDP preceding other types of political transitions? A question about timing

Several types of democratizers: Constraints-oriented, Participation-Oriented, Contestation-Oriented, and Combinations of the three.

