



HAL
open science

Fiscal institutions and the development of fiscal capacity: The case of fiscal rules

Ablam Estel Apeti, Jean-Louis Combes, Alexandru Minea

► **To cite this version:**

Ablam Estel Apeti, Jean-Louis Combes, Alexandru Minea. Fiscal institutions and the development of fiscal capacity: The case of fiscal rules. 2023. <hal-04472417>

HAL Id: hal-04472417

<https://hal.science/hal-04472417v1>

Preprint submitted on 22 Feb 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Fiscal institutions and the development of fiscal capacity: The case of fiscal rules

Ablam Estel Apeti^{*1,2}, Jean-Louis Combes¹, and Alexandru Minea^{1,3,4}

¹Université Clermont Auvergne, Université d'Orléans, LEO, 45067, Orléans, France

²University of Göttingen, Göttingen, Germany

³Research Institute of the University of Bucharest, University of Bucharest, Romania

⁴Department of Economics, Carleton University, Canada

Abstract

The development of fiscal capacity is widely acknowledged as an important pillar for strong state-building. However, the level of fiscal capacity remains structurally low mostly in developing countries due to a number of factors, including the lack of institutions driving governments to channel public resources to public interests or the substitution of domestic resources with external financing. Fiscal rules that limit the opportunistic use of public finances and reduce governments' appetite for debt could be a valuable tool. Therefore, in this paper, we analyze the effect of fiscal rules on fiscal capacity. Two main theoretical arguments are presented to support the possible connection between fiscal rules and the development of fiscal capacity, namely the mitigation of the extraversion theory and the development of trust between citizens and governments. Based on entropy balancing and using a sample of 71 developing countries over the period 1985-2019, we show that countries that adopt fiscal rules experience an increase in their fiscal capacity. This result, which passes a series of robustness tests, reveals some heterogeneity, notably with respect to the types of fiscal rules, the effectiveness of fiscal rules, time spent under fiscal rules, and some structural factors.

JEL Classification: D6,E62,H10,H41,H23,H26,H41,H61,H62,O23.

Keywords: Fiscal capacity, fiscal rules, development financing, entropy balancing

1 Introduction

Economic development requires a state capable of mobilizing public revenues for the provision of public goods. The literature documents several advantages of fiscal capacity, including the ability to mitigate the volatility/instability of external financing ([Apeti](#)

*Corresponding author: ablam_estel.apeti@uca.fr.

and Edoh, 2023), ensure the quality of public spending, support counter-cyclical policies to deal with negative shocks (Resilience, 2011; Aizenman and Jinjarak, 2010; Apeti et al., 2021), provide opportunities to build a strong state (Besley and Mueller, 2021), support social policies (Murshed et al., 2020; Hall et al., 2021), sustain growth and economic performance (Olson, 1993; Besley and Persson, 2008; Dincecco and Prado, 2012; Dincecco, 2015; Dincecco and Katz, 2016); improve institutional quality (Baskaran and Bigsten, 2013, Li et al., 2022), reduce the cyclical volatility of government financing (Mascagni et al., 2014; Okunogbe and Santoro, 2022; Apeti and Edoh, 2023). Unfortunately, developing countries are characterized by structurally low levels of tax revenue mobilization, indicating low or poor fiscal capacity and highlighting the need for instruments to strengthen these countries' fiscal capacity (Albers et al., 2023; Apeti and Edoh, 2023).¹

Fiscal capacity—essentially captured in the literature in three ways: *i- tax effort*,² *ii- total tax revenue to GDP ratio*, and *iii- share of direct taxes in total tax revenue*³ (see for instance Baskaran and Bigsten, 2013 for more discussion)—is defined as the amount of tax any government could potentially raise given its available tax system structure and enforcement power or country's ability to raise ("efficiently") tax revenue (Acemoglu et al., 2011; Besley and Persson, 2011; Dincecco and Prado, 2012; Besley and Persson, 2013; Johnson and Koyama, 2017; Ricciuti et al., 2018; Cantoni et al., 2019). Historically, building strong states has been associated with high fiscal capacity, and this fiscal capacity is essentially motivated by war. Indeed, according to the literature, a powerful or strong state is defined as having a monopoly on legitimate violence within a particular geographic dimension. However, maintaining this monopoly involves financing war, which pushes states to collect resources from their population (Schumpeter and Swedberg, 1918; Weber, 1919; Bean, 1973; Tilly, 1975; Levi, 1989; Brewer, 2002; Queralt, 2019). In addition, some authors have identified the role of institutions in building fiscal capacity. For example, Ricciuti et al. (2019) show that institutional quality remains

1. In other words, as developing countries experience structurally low levels of taxation—where increasing tax revenue remains a major challenge IMF (2013a)—it appears urgent to explore instruments for assisting them in raising necessary domestic resources to finance their development.

2. This variable is our baseline indicator of fiscal capacity.

3. The share of direct taxes in total tax revenue deserves some attention, as it may be understood as a simple measure of tax revenue composition. As Besley and Persson, 2009 and Dincecco and Prado, 2012 pointed out, direct taxes are a good indicator of the capacity of tax administration, because they are difficult to administer. As a result, a large share of direct tax may reflect a high capacity of the tax administration, a high tax effort, and a good fiscal capacity.

a cornerstone of fiscal capacity formation. For [Besley and Persson \(2009\)](#); [Karaman and Pamuk \(2013\)](#); [Ko et al. \(2018\)](#); [Cantoni et al. \(2019\)](#) and [Elenev et al. \(2021\)](#) public goods of common interest, such as fighting external wars, as well as political stability, military investment, urbanization, fiscal centralization are conducive to building fiscal capacity. Finally, for [Xu \(2019\)](#) and [Cogneau et al. \(2021\)](#), colonization also played an important role in fiscal capacity. In addition to these determinants, the literature also reveals that fiscal capacity is fairly predicted by some salient characteristics such as economic structure, level of development, political factors (for instance weak institutions, fragmented polities, and a lack of transparency due to weak news media), sociological and cultural factors (for instance a weak sense of national identity and a poor norm for compliance),⁴ and tax administration quality.

Since the late 1980s, an institution for managing fiscal policy has increasingly gained ground, namely fiscal rules. As shown in [Figure 1](#), and based on the countries in our sample, we observe that after a timid evolution until the late 1990s, the number of countries using fiscal rules continues to grow. In addition, a quick look at this figure shows that fiscal capacity started to grow or have an upward slope around these years after a relatively long period of fluctuation and stagnation. Fiscal rules are generally intended to correct biased incentives and contain pressures for excessive or opportunistic spending, particularly, in order to ensure fiscal responsibility and debt sustainability. Designed to mitigate persistent deficit accumulation, i.e., deficit bias, fiscal rules that can be numerical or procedural allow for sound fiscal policy by reducing three major problems in public finance management: the "common pool" problem which arises when the various decision-makers involved in the budgetary process compete for public resources and fail to internalize the current and future costs of their choices ([Weingast et al., 1981](#); [Von Hagen and Harden, 1995](#); [Velasco et al., 1999](#); [Krogstrup and Wyplosz, 2010](#)); the agency problem that arises from asymmetric information and incentive conflicts between government and voters and within the government hierarchy that usually results in manipulation of fiscal policy for electoral purposes ([Nordhaus, 1975](#); [Buchanan and Wagner, 1977](#); [Cukierman and Meltzer, 1986](#); [Dixit, 1998](#)); the dynamic incoherence problem that drives governments to strategically use budget deficits to tie the hands of their successors in the presence of electoral uncertainty ([Alesina and](#)

4. See for instance [Besley and Persson \(2014\)](#).

Tabellini, 1988; Alt and Lassen, 2006). Therefore, by creating responsible fiscal behavior and limiting the use of fiscal policy for opportunistic interests (Gootjes et al., 2021; Apeti et al., 2023b), fiscal rules can act as a cohesive institution that promotes the use of public resources for social benefit and ultimately the ability of the population to comply with taxes. Moreover, fiscal institutions, namely fiscal rules implemented to limit governments' debt capacity, appear to be a useful instrument (Bergman et al., 2016; Combes et al., 2017a; Caselli and Reynaud, 2020; Caselli and Wingender, 2021; Gootjes et al., 2021; Davoodi et al., 2022; Gomez-Gonzalez et al., 2022). Recall that fiscal rule is a long-term constraint on fiscal policy through numerical limits on budget aggregates or the management of budgetary procedures.

Despite the large body of existing literature on fiscal rules and fiscal capacity, little is said to the best of our knowledge on the link between fiscal rules and fiscal capacity. Accordingly, in this paper, we seek to examine whether fiscal rules can help developing countries improve their fiscal capacity, i.e. their ability to mobilize fiscal resources efficiently. In addition to the effect on fiscal capacity, this paper also seeks to test the skepticism about fiscal rules as an efficient tool for conducting fiscal policy.⁵

To identify the effect of fiscal rules (FR) adoption on fiscal capacity, we rely on entropy balancing developed by Hainmueller (2012). This method allows us to control the endogeneity problem associated with fiscal rules, especially selection bias. The study conducted from 1985-2019⁶ on 71 developing countries shows that adopting FR increases fiscal capacity in fiscal rules countries (FRers) relative to non-fiscal rules countries (non-FRers). This result, which passes a series of robustness tests including alternative specifications and alternative methods including panel fixed effects (OLS), two-stage least-squares, and system GMM, reveals some heterogeneity, notably with respect to the types of fiscal rules, the effectiveness of fiscal rules captured by fiscal rule strength, fiscal transparency and the existence of fiscal councils, time spent under fiscal rules, and some structural factors, including monetary coordination, particularly inflation targeting, the level of development, political competition, and freedom of speech.

The paper is organized as follows: sections 2-8 present respectively the theoretical arguments, the methodology, the data, the descriptive statistics, the benchmark results,

5. This skepticism that began when rules were introduced increased with the Covid-19 crisis. Several voices (Jonung et al., 2006; Blanchard et al., 2021) rise to propose some alternative to fiscal rules considered as essentially injurious for the automatic stabilizer.

6. It is important to note that this is the broadest period for which data is available.

the robustness, and the heterogeneity, and section 9 concludes.

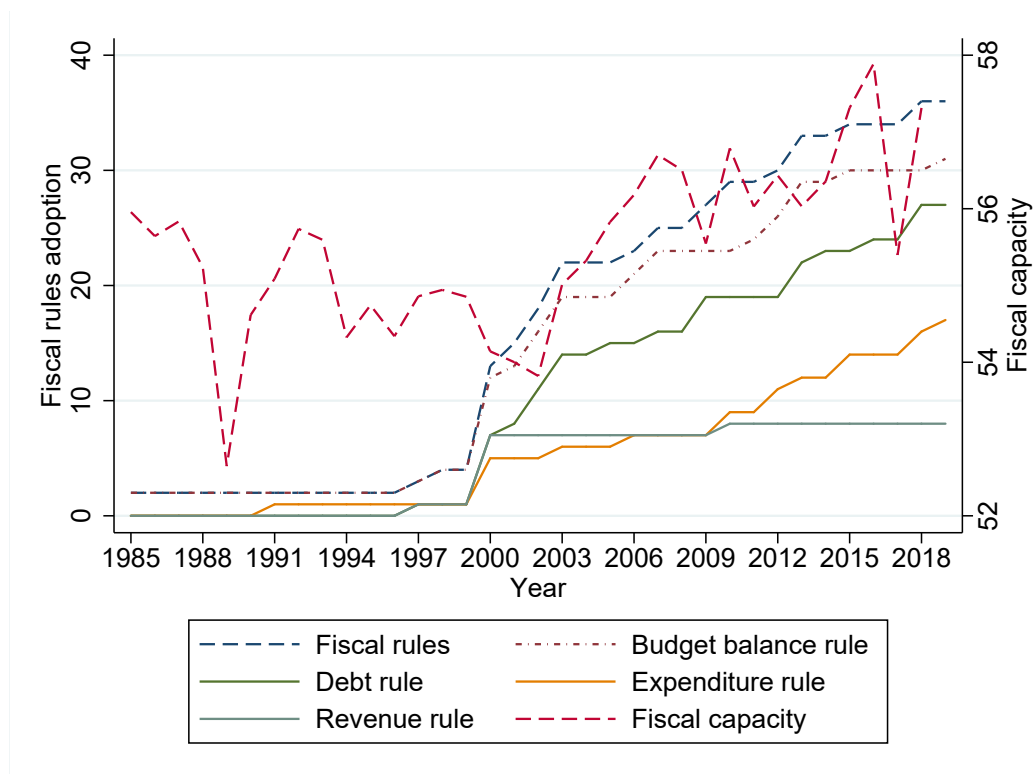


Figure 1 – Fiscal rules adoption over time
Sources: Authors’ calculations

2 Fiscal capacity and fiscal rules: the arguments

A number of arguments can be provided to support the effect of fiscal rules on fiscal capacity. Specifically, we mobilize two theories to support the relationship between fiscal rules and fiscal capacity, namely the extraversion theory (first paragraph) and the development of trust between citizens and governments (the last two paragraphs).

The first argument is based on the theory of extraversion developed by [Albers et al. \(2023\)](#). The authors apply [Bayart and Ellis \(2000\)](#)’s concept of extraversion to developing countries, particularly in Africa, arguing that governments in Africa use the opportunity of access to the international financial market and, therefore, the ability to incur debt to reduce their effort in developing fiscal capacity by leveraging the external environment or relationship. For example, close relations with (former) colonial powers can provide grants or subsidies or multinational private and public loans, or standardized credit contracts. In this way, governments may not resort to domestic revenues, but control and exploit the increasingly close ties with the outside world to incur debt. Fiscal rules

put in place to reduce the country's capacity to incur debt (Asatryan et al., 2018; Davoodi et al., 2022) can therefore allow the latter to invest in the development of its domestic resources, thus increasing its fiscal capacity. Several studies analyzed the effect of fiscal rules on the fiscal behavior of the government. For example, Asatryan et al. (2018) note that the adoption of fiscal rules promotes fiscal discipline by reducing the debt-to-GDP ratio. In a survey, Von Hagen (2002) underlines that fiscal institutions are associated with a promotion of fiscal discipline. This link between fiscal rules and fiscal discipline is supported by various authors in the literature, including Grembi et al. (2016); Badinger and Reuter (2017a); Fatás et al. (2019); Barbier-Gauchard et al. (2021); Caselli and Wingender (2021); Apeti et al. (2023b).⁷ Accordingly, by limiting the ability of debt financing, fiscal rules can curb the extraversion argument by making governments more likely to make efforts in terms of tax revenue mobilization in order to respect the rules imperatives or to limit the decline of public spending.⁸ In other words, by restricting debt-financing capacity or by setting debt at a reasonably low level, fiscal rules can help to improve countries' fiscal capacity.⁹ A corollary of this channel is the decline in inflationary pressures via the reduction in the risk of debt monetization, thus mitigating the Keynes-Oliveira-Tanzi effect (Tanzi, 1992a) and boosting tax revenue. A second corollary is the expansion of the tax base since the literature shows that excessive debt

7. See also Drazen, 2004; Primo, 2006; Hallerberg et al., 2007; Krogstrup and Wälti, 2008; Schaltegger and Feld, 2009; Gollwitzer, 2011; Argimón and Cos, 2012; Tapsoba, 2012; Benito et al., 2013; Dahan and Strawczynski, 2013; Luechinger and Schaltegger, 2013; Neyapti, 2013; Tapp, 2013; Foremny, 2014; Reuter, 2015; Bergman et al., 2016; Combes et al., 2017a; Burret and Feld, 2018; Caselli and Reynaud, 2020; Dovic and Kirpalani, 2020; Salvi et al., 2020; Gootjes et al., 2021; Gomez-Gonzalez et al., 2022.

8. This is particularly important since public spending is an effective weapon to limit civil conflicts or citizens' frustration that threaten the government's authority (Azam, 1995; Bratton and Van de Walle, 1997; Acemoglu et al., 2004; Fjelde and De Soysa, 2009; Taydas and Peksen, 2012; Justino and Martorano, 2018; Farzanegan and Gholipour, 2023).

9. An important clarification must be made regarding debt argument. Indeed, one may think that fiscal rules might simply be used by governments to replace external relations with domestic fiscal institutions in order to continue to incur debt and thus continue the extraversion behavior, since the literature shows that fiscal rules increase the credibility of governments, reduce the borrowing costs, and thus promote access to financial markets (Heinemann et al., 2014; Afonso and Jalles, 2019; Gomez-Gonzalez et al., 2022). Although this argument is plausible, we assume that it is "inconsistent" with the principle of fiscal rules and/or the relationship between fiscal rules and financial markets. Indeed, the literature shows that financial markets instead act as a watchdog or enforcement mechanism of fiscal rules (Halac and Yared, 2022) insofar as financial markets directly punish (fiscal rules) governments once loose fiscal behavior is detected (Kelemen and Teo, 2014; Kalan et al., 2018; Gootjes and de Haan, 2022). However, the desire to preserve credibility may provide an additional incentive for countries that adopt fiscal rules to develop a strong fiscal capacity to finance the economy in times of stress. Indeed, fiscal rules pose a dilemma in times of crisis: macroeconomic stabilization and sustainability. In times of crisis when the economy is in serious turmoil, macroeconomic stabilization generally outweighs public financial sustainability, breaking the limits of the rules, as shown by the Covid-19 crisis where the 60% debt limit was suspended in Europe. However, violating the rules is not cost-free, as discussed by Kalan et al. (2018).

levels negatively affect growth and output ([Panizza and Presbitero, 2014](#); [Panizza and Presbitero, 2013](#); [Jalles and Medas, 2022](#)).¹⁰ A final implication of the argument for fiscal discipline through debt reduction arises from improved taxpayer compliance and government motivation to invest in tax revenue collection since, as the literature argues, substantial public debt disincentives the debtor to invest (or taxpayer compliance) and seek to raise more revenues as any benefits would directly accrue to creditors as debt repayments ([Krugman, 1988](#); [Sachs, 1989](#); [Ferry, 2019](#)).¹¹

Next, the literature on fiscal capacity argues that the presence of institutions that place constraints on the executive's spending choices—cohesive institutions—increases fiscal capacity. Indeed, as [Albers et al. \(2023\)](#) discussed, a government that faces institutional constraints on its spending decisions is likely to use tax revenues raised exclusively for the public interest,¹² thereby promoting a spending strategy that benefits the entire population. As a result, the presence of such institutions drives the public to conclude that investments in fiscal capacity are expenditures for a future common good that benefits both the government and the population, thus facilitating public support for reforms aimed at increasing fiscal capacity or increasing tax compliance by citizens that now have an interest in the future of the country or a clear vision of government policy directions. Such constraints or institutions can be provided by fiscal rules that generally limit opportunistic behavior in the use of fiscal policy. For example, [Gootjes et al. \(2021\)](#) point out that the implementation of fiscal rules reduces the political budget cycle, i.e. the ability of the government to use public resources to secure its (re)election. The conclusion of reduced opportunistic use of fiscal policy by governments under fiscal rules is shared by, for instance, [Fatás and Mihov \(2003\)](#), [Von Hagen and Wolff \(2006\)](#), [Brzozowski and Siwińska-Gorzela \(2010\)](#). Finally, [Apeti et al. \(2023a\)](#) stress that fiscal rules increase public expenditure efficiency—and thus promote growth ([Herrera and Pang, 2005](#); [Castro, 2011](#); [Afonso and Jalles, 2013](#))—or make an efficient allocation of public resources to meet the government's main public utility functions. In this respect, fiscal rules that promote transparency in public finances,¹³ sound management of fiscal

10. The level of output is used as a proxy for tax base in many studies including [Apeti and Edoh \(2023\)](#).

11. See also [Ostry et al. \(2010\)](#) for a discussion on the negative relationship between debt and tax performance.

12. This idea reflects the principle of accountability that is an important driver of willingness to pay taxes (see for instance [McGuirk, 2013](#)).

13. Fiscal transparency informs citizens about how government and tax revenues are spent and constitutes an important element of effective public financial management, accountability, and oversight of

policy and transparency about future directions or orientation of fiscal policy decisions can promote resource allocation in the collective interest, and constitute a cohesive institution that can foster tax compliance.

Finally, the effect of fiscal rules on fiscal capacity can be justified using an insurance policy framework. For that, consider a game of two players consisting of the government and the population. The government is the insurer and the population is the insured. In this context, the trust that the insured may place in the insurer will depend on its performance, i.e. how well it managed economic policies or crises since the literature emphasizes that crises reduce citizens' trust in the governing authorities. For example, in the European context, [Polavieja et al., 2013](#) reported that economic vulnerability and crises reduce trust in politicians and satisfaction with democracy. These conclusions are supported by many other studies including [Giustozzi and Gangl, 2021](#); [Kroknes et al., 2015](#); [Hooghe and Okolikj, 2020](#). In addition, based on a survey in the Netherlands [van der Crujssen et al. \(2023\)](#) find that inflation, due to its eroding effect on people's purchasing power, is associated with a decline in trust in policymakers, including the European Central Bank, the Dutch Central Bank, and Dutch politics. Lack of trust can have a negative effect on tax revenues by reducing (voluntary) tax compliance ([Batrancea et al., 2019](#); [van der Crujssen et al., 2023](#)). As [Batrancea et al. \(2019\)](#) noted, this voluntary compliance with tax obligations by citizens can bring many long-term benefits to tax systems, including taxpayers' registration with tax authorities and compliance with tax filing deadlines returns and paying taxes, and accurate disclosure of tax obligations. As a result, the administrative costs of monitoring compliance and auditing honest taxpayers are significantly reduced ([Batrancea et al., 2019](#)). Finally, as [Afonso et al. \(2022b\)](#) highlight, taxpayers value better performance and efficiency in public expenditure and therefore efficient spending since poor allocation or efficiency of public expenditure is negatively correlated with trust in government and taxpayers' perceptions of its competence ([Pharr and Putnam, 2000](#); [Garen and Clark, 2015](#); [Besley et al., 2010](#); [Intawan and Nicholson, 2018](#); [Afonso et al., 2022b](#); [Afonso et al., 2021](#); [Rodrigues, 2021](#)). On the other hand, fiscal rules allow better management of (fiscal) policy as well as monetary policy by controlling inflationary pressure ([Combes et al., 2017b](#)). Moreover, fiscal rules promote the countercyclicality of fiscal policy ([Combes et al., 2017b](#); [Guerguil](#)

government actions.

et al., 2017; Apeti et al., 2023b), which facilitates a rapid reaction by the government in times of crisis to smooth shocks experienced by the population and also fosters public expenditure efficiency (Apeti et al., 2023a) that is important for building trust between the government and its population. In this way, fiscal rules can send a signal of government credibility/competence to the population that would increase its willingness to pay a risk premium, i.e., taxes, to receive the benefits of public (fiscal) policy in times of crisis or to keep inflation under control.

In light of all these arguments, we expect fiscal rules to be an incentive for countries to invest in their fiscal capacity to build a (fiscally) strong state.

3 Methodology

The aim of this paper is to explore the effect of fiscal rules on fiscal capacity development. In this respect, we rely on the following baseline model:

$$Y_{it} = \alpha_i + \lambda_t + \beta rule_{it} + \gamma X_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is the fiscal capacity, $rule_{it}$ is a dummy variable taking 1 if a country i at time t adopts fiscal rules and 0 otherwise. X_{it} is a vector of time-varying control variables including executive constraints, rule of law, inflation, property rights, and regime support groups. α_i and λ_t are respectively country and time-fixed effects to account for unobservable characteristics that may affect both the development of fiscal capacity or the incentives to create fiscal capacity and the adoption of fiscal rules. Specifically, country-fixed effects are useful to control initial conditions, i.e., economic, demographic, political, and country characteristics fixed over time, such as geography, culture, and history, while time-fixed effects control global shocks. ε_{it} is the error term.

The selection of control variables describing the determinants of our baseline model, including executive constraints, rule of law, inflation, property rights, and regime support groups is based on the literature. The inclusion of executive constraints is consistent with the idea of Besley et al. (2013), Besley and Persson (2014), Andersson (2022) and Albers et al. (2023) that executive constraints or institutions that set constraints on the executive would positively determine fiscal capacity. Rule of law and property rights are expected to positively influence fiscal capacity (Besley and Persson, 2014, Grier et al., 2022) as they create institutions that can support and sustain markets with

the resulting benefits to citizens leading to higher tax incentives. We include inflation as inflation history can affect fiscal capacity. Indeed, low inflation rates mitigate the negative Oliveira-Keynes-Tanzi effect, as the erosion of the real value of taxes between the date of taxation and the date of collection will decrease, thereby enhancing tax revenue collection and thus fiscal capacity (Tanzi, 1978; Tanzi, 1992b; Minea and Tapsoba, 2014; Apeti and Edoh, 2023).¹⁴ Finally, we include regime support groups to capture the effect of intra-elite competition on the development of fiscal capacity. The elite competition theory can be described as a two-player game between rural and industrial elites (Beramendi et al., 2019). In this game, when rural elites dominate the match, they can use their political influence to shift taxes to industrial elites or to push governments to protect their activities from foreign competition arising from international trade. Such a game can have positive (Beramendi et al., 2019) or negative (Andersson, 2022) effects on fiscal capacity.

The equation presented above may suffer from an identification problem despite the use of a model that controls for the determinants of fiscal capacity and unobserved heterogeneity through fixed effects. Indeed, the adoption of fiscal rules is not a random decision as it may be determined by several factors, including economic performance, fiscal conditions, monetary policy, institutional framework, and the preference for fiscal prudence (Grembi et al., 2016; Heinemann et al., 2018). These factors—which may also affect fiscal capacity—make fiscal rules adoption endogenous (not random) through the problem of selection bias. Since the use of instruments (Ertefaie et al., 2016; Canan et al., 2017) under the problem of selection bias can produce biased results, we draw on the literature by combining equation 1 with a matching approach, namely entropy balancing developed by Hainmueller (2012).

A scan of the literature shows that this approach is applied widely by many authors to contain the endogeneity problem. For example, Caselli and Wingender (2021) used this approach to access the effect of fiscal rules, Neuenkirch and Neumeier (2016) to evaluate the impact of U.S. sanctions on poverty, Balima (2020) to study the effect of coups on the cost of debt, Apeti et al. (2023a) to analyze the effect of fiscal rules on public

14. To mitigate the influence of high inflation periods, we follow Cukierman (1992), Dreher et al. (2008), Dreher et al. (2009), Dreher et al. (2010), Samarina and Sturm (2014) and use the subsequent transformation for the inflation variable: $\pi/(1 + \pi)$. As a result, extremely high inflation rates are unlikely to dominate the variation of this variable reducing the probability that our results are influenced by a few extreme observations.

expenditure efficiency, [Apeti \(2023b\)](#) to analyze the effect of sovereign debt defaults, [Ogrokhina and Rodriguez \(2019\)](#) to evaluate the effect of inflation targeting.¹⁵

The matching approach of our method requires the identification of determinants of fiscal rules. Based on the literature we select the following variables: inflation, financial openness, government fractionalization, political system, democracy, member of currency union, public debt, GDP growth, fiscal balance. First, since best macroeconomic fundamentals are a cornerstone for the adoption of credible reforms ([Kumar et al., 2009](#); [Guerguil et al., 2017](#); [Barbier-Gauchard et al., 2021](#)), we expect a positive (negative) correlation between GDP growth (inflation) and the probability of adopting fiscal rules. However, good macroeconomic performance can already signal the existence of credible reforms, which can limit the motivation to adopt additional reforms, making the sign of the two previous variables ambiguous, i.e. positive or negative ([Balima et al., 2017](#)). Second, we expect a positive effect of financial openness on the probability of adopting fiscal rules. Indeed, better financial openness may foster a more efficient allocation of capital, thereby boosting productivity ([Kose et al., 2009](#)) and, in turn, growth, thus promoting the adoption of fiscal rules. Third, the association between fiscal rules and fiscal stance, captured by fiscal balance and public debt, is ambiguous. On the one hand, a sound fiscal position, i.e., low public debt and a high fiscal balance, may favor a credible fiscal rules adoption. On the other hand, improved fiscal positions reflect sounder fiscal policies that may reduce the need for fiscal institutions to promote fiscal discipline ([Kopits, 2001](#); [Bohn, 2008](#); [Calderón and Schmidt-Hebbel, 2008](#)).

Fourth, we add politico-institutional variables that could influence the likelihood of adopting fiscal institutions such as fiscal rules. Regarding political variables, we include level of democracy. The sign of democracy is ambiguous i.e. positive or negative for two reasons: *i*- good institutional quality can promote sound fiscal behavior, thereby weakening countries' incentives to "tie their own hands" with constraints such as fiscal rules, *ii*- better institutions can create strong environment for fiscal rule adoption through high compliance with the rule's targets. For institutional variables, we include government fractionalization index, political system defined as the presence of a parliamentary regime, and currency union affiliation. Government fractionalization may encourage the adoption of fiscal rules in order to contain the pressures of the tragedy of

15. See also [Baccini et al. \(2019\)](#); [Gutmann et al. \(2021\)](#); [Apeti \(2023a\)](#); [Apeti and Edoh \(2023\)](#); [Apeti et al. \(2023c\)](#) among many others for the application of this method.

the commons (Perotti and Kontopoulos, 2002; Schlager, 2004; Ostrom, 2008; Badinger and Reuter 2017b), whereas we expect a positive effect of currency union affiliation on the adoption of these fiscal institutions. Finally, there is ambiguity in the correlation between the political system and fiscal rules. Indeed, coalition governments that may emerge from parliamentary-type systems experience trouble in cutting expenditures in difficult budgetary conditions, particularly due to the veto power of each member, but also heterogeneous partisan considerations and ideology that create deficit bias (Eslava, 2006; Blais et al., 2010; Caselles and Jurado, 2014; Crivelli et al., 2016). As a result: *i*- these governments may prefer fiscal rules as an incentive for good fiscal governance, *ii*- since fiscal rules are more likely to be introduced in countries with better fiscal health, weak fiscal conditions in this political system, may hinder credible rules, i.e., rules with announced fiscal targets respected by the government.

The analysis of our data indicates other threats to the identification of the effect of fiscal rules. The first threat to the inference that we experience is the large difference in observed covariates between units exposed to fiscal rules and those not exposed to fiscal rules. Indeed, our preliminary examination presented in Table 1 shows that observations subject to fiscal rules are different in terms of inflation, financial openness, government fractionalization, political system, democracy, member of currency union, public debt, GDP growth, fiscal balance. Indeed, columns [1], [2], and [3] present respectively, the sample means for the treatment group (with fiscal rules) and the control country (without fiscal rules) and the difference between the two first. The results reveal a difference between fiscal rules and non-fiscal rules countries/units. In particular, the fiscal rules countries are characterized by high inflation,¹⁶ low public debt, low fiscal deficit i.e. high fiscal balance, high financial openness, high government fractionalization, high political system i.e. parliamentary-type systems, high democracy, high membership of currency union i.e. high propensity to be a member of a currency union, high GDP growth.¹⁷ In econometric terms, the observations are unbalanced with respect to the fiscal rules dummy variable. This threatens our conclusions if these observed differences are also correlated with differences in fiscal capacity (Allcott, 2015;

16. However, the difference is not statistically significant.

17. These findings are consistent with the expected relationship between the probability of fiscal rules adoption and the various control variables discussed above. These differences across fiscal rules and non-fiscal rules countries demonstrate the importance of selecting an appropriate control group when computing the treatment effect of fiscal rules to avoid incorrectly estimated treatment effects.

Baccini et al., 2019), or if they proxy for unobserved differences that might drive the correlation between the fiscal rules and fiscal capacity. Using entropy balancing, therefore, allows us to control the selection bias by imitating a randomized experiment as well as by limiting these problems associated with our data. To do so, the method reweighs the observations with respect to the treatment, i.e., fiscal rules, to ensure that all relevant covariates are balanced, i.e., they have the same mean. In econometric terms, entropy balancing reweighs the observations to statistically generate a common support region where the countries/units of fiscal rules and non-fiscal rules are similar with respect to our covariates. To do this, entropy balancing directly incorporates the covariate balance into the weighting function applied to the sample units and produces data in which the two groups of units can be compared.

Table 2 presents the results of entropy balancing after weighting. A closer look at this table shows that the difference in means observed in Table 1 between the fiscal rules and non-fiscal rules countries is reduced and never statistically different from zero. Consequently, entropy balancing allows us to construct a perfect control group that is closely similar to the fiscal rules units on the basis of all covariates. Armed with this result we then run the equation 1 using the weights obtained by entropy balancing. As discussed by Ogrokhina and Rodriguez (2019) this method ensures that once the weights are generated, the treatment and control groups follow the same trend in the pre-treatment period. Furthermore, this approach is equivalent to the difference-in-difference matching technique proposed by Heckman et al. (1997) and differs only with respect to the weight construction (Marcus, 2013; Ogrokhina and Rodriguez, 2019).¹⁸

18. This method offers some advantages over competing impact analysis methods such as propensity score matching (PSM) or "simple" regression methods such as Ordinary Least Squares or difference-in-differences. First, it allows for a high degree of balance between the treatment and control units by creating a synthetic group that is as close as possible to the treatment group. Second, unlike other methods such as propensity score matching, OLS, or difference-in-differences, this method does not require the construction of an empirical model for fiscal rules, thus limiting specification and multicollinearity problems. Third, unlike traditional matching methods, entropy balancing uses a more flexible reweighting method by keeping the weights closer to the base weights to avoid information loss. The fourth advantage is that, unlike classical matching which is based on the assumption of conditional independence, entropy balancing allows us to exploit the panel aspect of our data and control for time and country-fixed effects in our regression. Next, combining matching with a fixed-effects model has the advantage of eliminating unobserved and time-invariant differences in the outcome variable between fiscal rule and non-rule countries, which standard matching estimators are unable to achieve. Basically, this methodology compares the before and after of the outcome variable (fiscal capacity) for countries with fiscal rules and countries without fiscal rules, in order to take into account imbalances in the distribution of covariates between fiscal rule and non-fiscal rule countries and eliminate time-invariant effects. Put differently, by combining a reweighting scheme with a fixed effects analysis, we reduce the bias due to the differences in both observable and unobservable characteristics (Marcus, 2013; Ogrokhina and Rodriguez, 2018; Ogrokhina

Table 1 – Descriptive statistics before weighting.

	[1]	[2]	[3]=[2]-[1]
	Fiscal rules	Non-fiscal rules	Diff
Inflation	0.8735	0.8399	-0.0336
Financial openness	0.3343	-0.0498	-0.3841***
Government fractionalization	0.2235	0.1724	-0.0511***
Political system	0.1855	0.1423	-0.0432***
Democracy	3.979	3.614	-0.365***
Member of currency union	0.3172	0.05386	-0.26334***
Public debt (lag)	57.75	63.45	5.7***
GDP growth	4.32	4.067	-0.253**
Fiscal balance (lag)	-1.014	-2.078	-1.064**
Obs	372	984	

*** p<0.01, ** p<0.05, * p<0.1.

Table 2 – Descriptive statistics after weighting

	[1]	[2]	[3]=[2]-[1]
	Fiscal rules	Control	Diff
Inflation	0.8735	0.8735	0.001
Financial openness	0.3343	0.3343	0
Government fractionalization	0.2235	0.2235	0
Political system	0.1855	0.1855	0
Democracy	3.979	3.979	0
Member of currency union	0.3172	0.3172	0
Public debt (lag)	57.75	57.75	0
GDP growth	4.32	4.32	0
Fiscal balance (lag)	-1.014	-1.014	0
Obs	372	984	
Total of weights	372	372	

*** p<0.01, ** p<0.05, * p<0.1.

4 Data

4.1 Treatment variable

We evaluate the effect of fiscal rules on fiscal capacity using an annual panel of 71 developing countries, including 37 FRers and 34 non-FRers. The period covered by the study, 1985-2019, is essentially determined by the extent of the data on fiscal rules and fiscal capacity, and the choice of countries is based on the availability of fiscal data. The treatment variable, fiscal rules, is a dummy variable that takes 1 in the presence of fiscal rules and 0 otherwise. It comes from IMF Fiscal Rules Dataset. In [Appendix](#), we compile full definitions of every variable used in this paper and their source.

4.2 Computing fiscal capacity

4.2.1 Method selection: Stochastic Frontier Analysis (SFA)

The heavy task is to select the best indicator of fiscal capacity. As previously stated, fiscal capacity is measured in three main ways in the literature: *tax effort*, *total tax revenue to GDP ratio*, and *share of direct taxes in total tax revenue* ([Besley and Persson, 2009](#); [Mkandawire, 2010](#); [Dincecco and Prado, 2012](#); [Baskaran and Bigsten, 2013](#)). Total tax revenue to GDP and share of direct taxes in total tax revenue are relatively low in developing countries. For example, the average total tax revenue as a percentage of GDP for our sample countries is 13.36%, far from the 15% required for the Sustainable Development Goals, while the share of direct taxes represents 15.53% in the countries in our sample, compared to 17.21% on average in developed countries.¹⁹ Consequently, an increase in total taxes and in the share of direct taxes would signal an improvement in fiscal capacity ([Baskaran and Bigsten, 2013](#)). However, these measures of fiscal capacity, compared to tax effort, have some limitations since they fail to take rigorously into account countries' structural characteristics (which contribute significantly to tax administration's performance).²⁰ As a result, we select tax effort as the primary measure of fiscal capacity. The total tax revenue to GDP ratio and share of direct taxes in total tax revenue are used to test the robustness of our results.

To compute tax effort we rely on Stochastic Frontier Analysis (SFA) method,²¹ [devel-](#)
[and Rodriguez, 2019](#)).

19. The difference is statistically significant ($t=-4.875$, $p\text{-value}=0.000$).

20. See for instance [Gupta, 2007](#).

21. [Aigner et al., 1977](#); [Pessino and Fenochietto, 2010](#); [Fenochietto and Pessino, 2013](#); [IMF, 2013a](#);

oped in the context of firm performance analysis. This approach identifies tax effort as a ratio of actual revenue collected to tax revenue frontier. Tax frontier is defined as maximum tax revenues that can be collected, taking into account institutional, demographic, and economic characteristics. The SFA model contains in particular a non-parametric and parametric method. The non-parametric method contains Data Envelopment Analysis (DEA) and the Free Disposal Hull (FHL) and is based on an optimization approach to plot the convex curve that characterizes the efficiency frontier. While it is less restrictive on the assumptions, it remains sensitive to random variations in the data and measurement errors. In other words, this method considers all variations between countries as inefficiency (Kumbhakar and Lovell, 2000). Thus, estimating tax effort with this method exposes us to within-sample sensitivities, cross-country heterogeneity, and outliers. Therefore, this restriction leads us to choose the parametric SFA version of Kumbhakar et al. (2015) to estimate tax effort. In contrast to existing methods,²² this method divides the error term into 4 components allowing to clearly define a long-term and a short-term efficiency. The long-term variant is called persistent tax effort and the short-term variant is called time-varying tax effort. Persistent tax effort is formed by structural factors such as geography, colonial history, culture, and other long-term factors that may affect tax effort while time-varying tax effort is determined by cyclical factors such as economic (tax) policy, commodity price fluctuations, tax administration performance, the discovery of natural resources.

4.2.2 Model presentation and fiscal capacity estimation

We estimate our main measure of fiscal capacity (tax effort) based on Kumbhakar et al. (2015) using the following model:

$$Y_{it} = \alpha + f(X_{it}; \beta) + \theta_i + v_{it} - \eta_i - \lambda_{it} \quad (2)$$

where Y_{it} is the logarithm of tax revenue (%GDP) of country i in year t , X_{it} is the vector of tax effort determinants, θ_i is country random effects, v_{it} is the country's latent heterogeneity, η_i is the persistent inefficiency, and λ_{it} is the time-varying inefficiency.

Equation 2 is estimated in three stages. For this, we rewrite it as follows:

Langford and Ohlenburg, 2015; Mawejje and Sebudde, 2019; Mudiyansele et al., 2020.

22. Stotsky and WoldeMariam, 1997; Battese and Coelli, 1992; Kumbhakar, 1991; Lee and Schmidt, 1993; Greene, 2005; Kumbhakar and Wang, 2005; Davoodi and Grigorian, 2007; Khwaja and Iyer, 2014.

$$Y_{it} = \alpha^* + f(X_{it}; \beta) + \omega_i + \epsilon_{it} \quad (3)$$

$$\alpha^* = \alpha - E(\eta_i) - E(\lambda_{it}) \quad (4)$$

$$\omega_i = \theta_i - \eta_i + E(\eta_i) \quad (5)$$

$$\epsilon_{it} = \nu_{it} - \lambda_{it} + E(\lambda_{it}) \quad (6)$$

where ω_i and ϵ_{it} have constant variance and zero mean.

Stage 1: β is estimated by the standard random effects estimator to obtain the predicted values from ϵ_{it} ($\widehat{\epsilon}_{it}$) and ω_i ($\widehat{\omega}_i$).

Stage 2: We first make the following assumptions: there is no difference between ϵ_{it} ($\widehat{\epsilon}_{it}$). $\lambda_{it} \sim N(0, \sigma^2)$ and $\nu_{it} \sim N(0, \sigma_\nu^2)$ so $E(\lambda_{it}) = \sqrt{2/\pi} \sigma$. Using standard stochastic frontier technique, we estimate the time-varying tax inefficiency λ_{it} denoted $\widehat{\lambda}_{it}$ with the predicted value of [equation 6](#).

Stage 3: Following the same approach as the previous stage, we estimate the persistent tax effort η_i denoted $\widehat{\eta}_i$ using [equation 5](#) under the following assumptions: $\eta_i \sim N(0, \sigma_\eta^2)$, $E(\eta_i) = \sqrt{2/\pi} \sigma_\eta$ and $\theta_i \sim N(0, \sigma_\theta^2)$.

By using the $\widehat{\lambda}_{it}$ and $\widehat{\eta}_i$ estimators of [Jondrow et al. \(1982\)](#), we compute the time-varying tax effort and the persistent tax effort, respectively, as follows: *time-varying tax effort* = $\exp(-\widehat{\lambda}_{it})$ and *persistent tax effort* = $\exp(-\widehat{\eta}_i)$. The *(overall) tax effort* is the product between the *time-varying tax effort* and the *persistent tax effort* i.e., *tax effort* = *time-varying tax effort* * *persistent tax effort*.

The estimation of tax effort requires the use of the determinants (input X_{it}) of public revenue mobilization (output Y_{it}). This allows us to determine tax effort according to economic, institutional, and demographic characteristics of each country. Following existing literature on tax effort estimation, we consider the following variables: GDP per capita (log), trade openness, financial development, institutional quality, agriculture-added value (% of GDP), total natural resources rents (% of GDP), and population density. Log GDP per capita, trade openness, financial development, institutional quality

are expected to have a positive effect on public revenue collection²³, while agriculture added value (% of GDP), total natural resources rents (% of GDP), and population density, would have a negative effect on tax revenue mobilization.²⁴ Finally, it is important to note that fiscal capacity will be used to denote tax effort in the remainder of the paper.

4.3 Control variables

As discussed earlier, we use the following variables to construct the balancing entropy weight: inflation, financial openness, government fractionalization, political system, democracy, currency union membership, public debt, GDP growth, and fiscal balance. GDP growth is from World Development Indicators (WDI). Government fractionalization and political system are from the Database of Political Institutions. Financial openness, democracy, member of currency union, public debt, and fiscal balance, inflation come respectively from Chinn and Ito (2006), International Country Risk Guide (ICRG), IMF Fiscal Rules Dataset, Ali Abbas et al. (2011), Kose et al. (2017), IMF World Economic Outlook (IMF-WEO)

For the determinants of fiscal capacity in our baseline model we rely on the literature, using the following determinants of fiscal capacity: executive constraints, rule of law, inflation, property rights, and regime support groups. Except for inflation, which is drawn from IMF-WEO, all these control variables are from the V-DEM (Varieties of Democracy) database.

To test the robustness of our results, we supplement our baseline model with a set of additional determinants of fiscal capacity that we arrange into 4 main groups including: *i- institutional variables* (war, government stability, clientelism, chief executive eligible for reelection), *ii- social policy variables* (inequality, ethnic fractionalization, political polarization, social policy legislation, access to public services), *iii- globalisation* (Official Development Assistance (ODA), KOF globalisation index, trade openness, real resource prices, remittances), *iv- structural and tax policy variables* (informal sector, urban population, education, financial development, tax expenditure, real GDP per capita,

23. Lotz and Morss, 1967; Chelliah et al., 1975; Tanzi, 1992a; Piancastelli, 2001; Dreher, 2006a; Gordon and Li, 2009; Le et al., 2012; Fenochietto and Pessino, 2013; Crivelli and Gupta, 2014; Gngangnon and Brun, 2017; Cheng and Pitterle, 2018; Dalamagas et al., 2019; Gngangnon and Brun, 2019.

24. Bahl, 1971; Engerman and Sokoloff, 1994; Piancastelli, 2001; Sachs and Warner, 2001; Bird et al., 2006; Bornhorst et al., 2009; McGuirk, 2013; Vahabi, 2018; Masi et al., 2020; Savoia and Sen, 2020.

climat vulnerability). Note that the justification for these variables can be found in the penultimate section of the [Appendix](#).

The full definitions of each variable used in this paper and their sources are compiled in the [Appendix](#).

5 Descriptive statistics

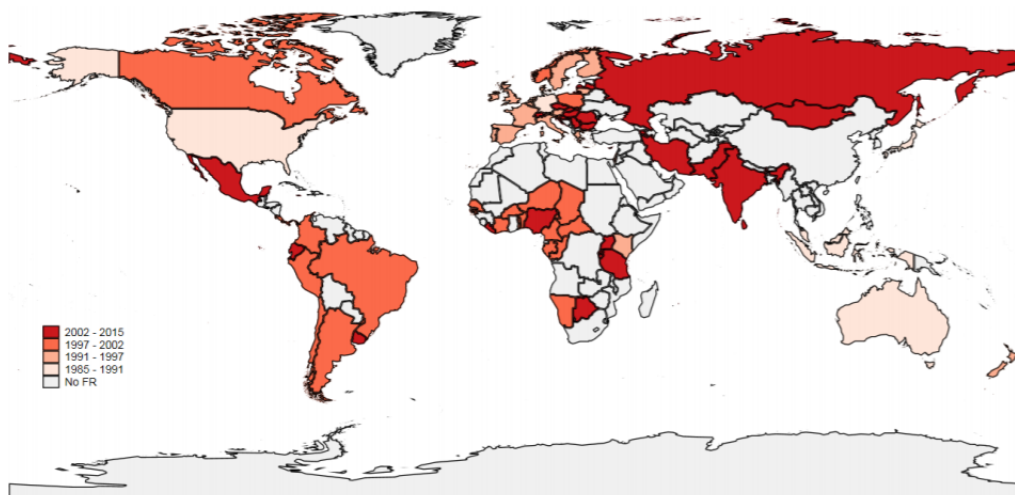
[Figure 2](#) provides a graphical representation of fiscal rules adoption over time and across countries, exhibiting a gradual diffusion of rules adoption in the early 1990s in Europe, followed by South America and Africa in the later 1990s, and Eastern Europe and Central Asia in the 2000s. [Figure 3](#) computes the average fiscal capacity in fiscal rules countries (FRers) and non-fiscal rules countries (non-FRers) over the period 1985-2019. The results highlight that fiscal capacity is larger in FRers. Indeed, we observe that fiscal capacity in FRers is 57.98% compared to 54.83% in non-FRers, i.e. a difference of 3.15% statistically significant at 1%.²⁵

[Figure 4](#) presents the evolution of fiscal capacity between FRers and non-FRers. Looking at this figure, we can see that both groups of countries follow the same downward trend in fiscal capacity until the early 1990s. Since the 1990s, with the adoption of fiscal rules, we observe a continuous increase in fiscal capacity of FRers when non-FRers experience a downward trend over nearly 18 years before experiencing a surge. The 2007-2008 crisis that paralyzed the world economy further affected the fiscal situation of non-FRers, given the drop in fiscal capacity observed during this period. On the contrary, the impact seems to be absorbed in the FRers. In sum, since the rise of fiscal capacity in the FRers after a similar evolution in the two groups of countries before this date, we observe that the FRers exhibit a higher evolution of fiscal capacity over the rest of the study period.²⁶ However, after a period of decline, we observe that around 2003, non-FRers experience an improvement in their fiscal capacity. Although this remains below that of the FRers and occurs later in our study period, it may suggest the existence of potential secular trends that we should monitor. As a result, the descriptive evidence

25. Finally, one should note that fiscal capacity in both groups of countries is relatively low, even if it amounts to at least 50%. Based on the sample average of 55.53%, we can say that countries in our sample use "only" half of their tax potential. In other words, the average fiscal capacity of 55.53% represents "only" 13.36 percent of GDP of tax performance out of a potential of 24.06 percent of GDP.

26. In addition, we can observe that, over the whole study period, non-FRers experience higher instability of their fiscal capacity than FRers.

discussed here, while not causal, provides an indication of the treatment effect of fiscal rules adoption and how to identify it. Indeed, due to potential secular trends, it would be misleading to estimate the effect of fiscal rules on fiscal capacity simply by comparing fiscal capacity before and after the adoption of fiscal rules in fiscal rules countries. To avoid overestimating the effect of the policy, we use, as discussed above, the non-fiscal rule countries as a control group to estimate the counterfactual outcome. In this way, we can control for secular trends and separate the treatment effect (see [Lagarde, 2012](#); [Ogrokhina and Rodriguez, 2018](#); [Apeti, 2023a](#)).



Note: This figure contains countries not retained in our sample

Figure 2 – Diffusion of fiscal rules adoption across countries and time
Sources: [Eyraud et al. \(2018\)](#)

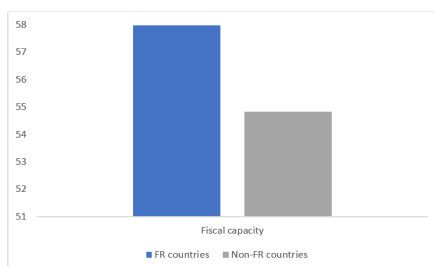


Figure 3 – Fiscal capacity and fiscal rules
Sources: Authors' calculations

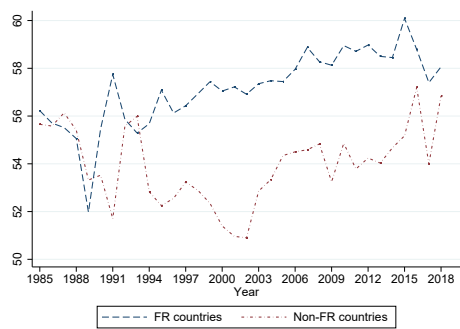


Figure 4 – Fiscal capacity in FR and non-FR countries over the period 1985-2019
Sources: Authors’ calculations

6 Benchmark results

Table 3 presents the results of the effect of fiscal rules on fiscal capacity. Column [1] presents the results of the naive regression that evaluates the effect of fiscal rules without controlling for the determinants of fiscal capacity discussed in the baseline model and without the fixed effects. In column [2] we deviate from the previous specification by including only country-fixed effects in the model while in column [3] we include both country and time-fixed effects. Finally, the complete model is in column [4] where we include the baseline model control variables and the fixed effects.

Independent of the specification, the adoption of fiscal rules significantly increases fiscal capacity in our sample countries. This result ranges from 1.02 percentage points (column [3]) to 3.47 percentage points (column [1]), with an average effect of almost 2 percentage points. In other words, fiscal rules adoption increases, on average, fiscal capacity by 2 percentage points in countries using fiscal rules compared to non-fiscal rules countries. This coefficient is economically meaningful as it represents 11% of the standard deviation of fiscal capacity and more than half, i.e. 63%, of the average difference observed between FRers and non-FRers. When looking at our control variables, we note that two of them, namely rule of law and regime support groups, significantly determine fiscal capacity and exhibit signs consistent with the above discussions.

Table 3 – Fiscal capacity and fiscal rules

Fiscal capacity	[1]	[2]	[3]	[4]
Fiscal rules	3.470** (1.4773)	2.032*** (0.3374)	1.019*** (0.2916)	1.110*** (0.2935)
Executive constraints				-2.663 (2.0676)
Rule of law				6.135*** (1.9716)
Inflation				-0.031 (0.0209)
Property rights				-0.685 (2.1132)
Regime support groups				-7.568*** (1.6245)
Country fixed effects	No	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes
Observations	1300	1300	1300	1275

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

7 Robustness

The baseline result indicates that the adoption of fiscal rules promotes fiscal capacity in developing countries. In this section, we test the robustness of this result.

7.1 Alternative specifications

We begin this exercise by altering our sample by excluding some countries or periods. First, we drop the Cold War years and those immediately following the end of the Cold War, i.e., 1985-1995, due to institutional and economic upheaval that characterizes this period. Second, we exclude time periods ranging from the Global Financial Crisis (GFC) years to post-crisis ones, i.e., 2007-2019, to control for changes in fiscal rules and potential economic or institutional change that can influence our results. Third, we test whether our results are robust to the exclusion of the Addis Ababa Financing for Development Conference of 2015, which put tax revenue mobilization at the center of development financing priorities. To do so, we exclude the period 2015-2019. Four, we test whether our results remain valid after excluding hyperinflation periods defined as times characterized by inflation above 40%, and by excluding fragile countries identified as countries trapped in cycles of low administrative capacity, political instability, conflict, and weak economic performance (IMF, 2015; Akanbi et al., 2021; Apeti, 2023b). Five, we exclude countries that are qualified as tax havens for counterfactual concerns (see Apeti and Edoh, 2023 for a similar exercise). Six, we drop non-fiscal rules countries from our sample since the treated (fiscal rules) countries may be different from non-treated (non-fiscal rules) ones beyond the characteristics we control for in our model (Neuenkirch and Neumeier, 2015). Moreover, since we remove the non-fiscal countries, that essentially constitute our control groups, it is possible that the effect captured is merely a secular trend and not necessarily due to fiscal rules adoption since by excluding these countries, our analysis is equivalent to comparing fiscal capacity before and after the treatment of treated countries, i.e. fiscal rule countries. To circumvent this problem, we add a time trend in our model. Seven, we analyze the role of outliers. To do so, we apply a trimming procedure that consists in discarding values located in the tails of the distribution, i.e. fiscal capacity below the bottom (top) 10% of the distribu-

tion in our analysis.²⁷ Eight, fiscal rules are often susceptible to major changes that could influence their performance.²⁸ For example, [Guerguil et al. \(2017\)](#) find that major changes in fiscal rules improve their efficiency by specifically enhancing their effect on fiscal policy quality or countercyclicality of fiscal policy. Accordingly, we assume that these changes in fiscal rules may bias our results if they affect our outcome variable, i.e. fiscal capacity. To test this hypothesis, we exclude from our sample the periods of fiscal rules that have experienced major changes.²⁹ Finally, we test the sensitivity of our results to sample extension by including developed countries in our sample. The results of these different tests presented in [Table A1](#) (columns [1]-[13]) in the [Appendix](#) show conclusions consistent with our baseline findings: fiscal rules improve fiscal capacity.

Next, we analyze the influence of some particular confounding factors that may pollute our effects. First, we include the time trend in the model. The idea behind this specification follows [Saka et al. \(2022\)](#) or [Apeti and Edoh \(2023\)](#), which states that controlling for time trends removes distinctive trends in fiscal capacity in individual countries that might otherwise bias our estimates if they accidentally coincide with other changes in fiscal rules. Moreover, time trends may capture potential linear changes that may exist in our outcome variable, i.e. fiscal capacity. Indeed, in recent years in developing countries, reforms are being implemented to fill the financing gap due to difficulties in accessing the international financial market and the instability of financial flows such as aid. Consequently, we assume that these reforms can cause a linear evolution or secular trends that time-fixed effects cannot perfectly capture. The results presented in column [14] of [Table A1](#) in the [Appendix](#) present similar conclusions to our baseline results.³⁰ Second, we suspect that our effects may be polluted and therefore difficult to attribute to fiscal rules if we do not take into account some confounding factors that favor tax revenue mobilization and therefore fiscal capacity building, namely inflation targeting and

27. Results not reported in this paper but available on request remain similar when applying winsorizing.

28. In the European Union, for example, the Covid-19 crisis led to the suspension of fiscal rules. Debt accumulation due to the crisis, which already exceeds 100% of GDP in some countries of the Union, urges some researchers and politicians to recommend the abolition of the rules or to implement their modification. In parallel, it is important to mention that in the Union, compliance with the fiscal rules criteria has been repeatedly violated by countries such as France and Germany since early 2000. Moreover, in many countries of the Union, unlike the 3% of GDP deficit criteria, compliance with the 60% of GDP debt rule had been challenging before the crisis. In more recent history, the Global Financial Crisis pushed many countries to introduce changes in their fiscal rules, for example by introducing flexibility clauses.

29. Data on major changes are from IMF Fiscal Rules Dataset.

30. Note that the time-fixed effects are excluded from this model as the coefficient of the time trend is omitted if we include them in the specification.

IMF programs (Minea and Villieu, 2009; Lucotte, 2012; Crivelli and Gupta, 2016). To do this, we create two fiscal rules dummy variables that exclude periods characterized by both fiscal rules adoption and inflation targeting on the one hand and fiscal rules and IMF program adoptions on the other. The results presented in columns [1]-[2] of Table A2 in the Appendix present similar findings to those of the baseline model: adopting fiscal rules increases fiscal capacity. Moreover, we examine how fiscal capacity behaves before the treatment. The idea is to check whether the positive difference identified between treated and non-treated countries is due to the treatment's adoption. To do so, we perform a dynamic entropy balancing design on the trends of our variable of interest, i.e., fiscal rules in the five years prior to the introduction (see Asatryan et al., 2018; Ogrokhina and Rodriguez, 2018; Papagni et al., 2023; Zhang et al., 2023; Apeti and Edoh, 2023 for a similar approach). Thus the non-statistically significant results (columns [3]-[7] of Table A2 in the Appendix) stress that the two groups of countries are similar before the treatment and the observed difference is due to the treatment, i.e. fiscal rules adoption. Finally, we use a placebo test on random years of fiscal rules to test whether our results are influenced by unobserved heterogeneity or "pure" chance (see for instance Tian and Xu, 2022; Apeti et al., 2023d). The results for the effect of fiscal rules on fiscal capacity reported in column [8] are non-statistically significant, suggesting that our results are related to the adoption of fiscal rules.

Third, we tested the validity of our results with the additional set of control variables justified above in particular: *i- institutional variables* (war, government stability, clientelism, chief executive eligible for reelection), *ii- social policy variables* (inequality, ethnic fractionalization, political polarization, social policy legislation, access to public services), *iii- globalisation* (ODA, KOF globalisation index, trade openness, real resource prices, remittances), *iv- structural and tax policy variables* (informal sector, urban population, education, financial development, tax expenditure, real GDP per capita). Columns [1]-[4] of Table A3 in the Appendix include these different groups one at a time, while column [5] includes all groups and thus variables simultaneously. The results are consistent with our baseline specification: fiscal rules improve fiscal capacity. A look at the control variables shows that government stability, access to public services, remittances, and education (clientelism) positively (negatively) determine fiscal capacity. The ability of the chief executive to be re-elected and inequality negatively in-

fluence fiscal capacity but only in the specifications of columns [1] and [2], respectively. Political polarization influences fiscal capacity but only in the model [5]. ODA, globalization (trade openness) affect negatively (positively) fiscal capacity but only in column [3]. Real GDP per capita and financial development (natural resources) increase (reduces) the development of fiscal capacity but only in column [5].

In column [6], we include lag in fiscal capacity to account for the recent history/level of fiscal capacity development or the potential inertia that may characterize fiscal variables such as taxes (see for instance [Beramendi et al., 2019](#); [Andersson, 2022](#) for a similar approach). The results remain consistent with our baseline findings. In addition, lagged fiscal capacity significantly determines the development of contemporary fiscal capacity. Government stability, access to public services, migrant remittances, and education reveal positive and statistically significant coefficients reflecting a favorable effect of these variables on fiscal capacity. The literature notes that including the variables used to compute the entropy balancing weights in [equation 1](#) as control variables may increase the efficiency of our results ([Neuenkirch and Neumeier, 2016](#); [Apeti and Edoh, 2023](#)). Based on this observation, we include these control variables³¹—while dropping all other variables used previously including the baseline model variables—in column [7] and add the lag of fiscal capacity to these variables in column [8]. The results remain consistent with our baseline findings.

Finally, column [9] simultaneously adds the variables of the previous four groups together with the entropy balancing variables in our baseline model while specification [10] adds the lag of the dependent variable i.e. fiscal capacity to the variables of column [9]. Our conclusions remain unchanged: fiscal rules increase fiscal capacity. For the control variables, we find that government stability, access to public services, education, and tax expenditure determine fiscal capacity in these last two specifications. Clientelism, political polarization, natural resources, and financial development determine fiscal capacity but only in specification [9]. In addition, we note that the lagged fiscal capacity is positive and statistically significant, which highlights that the country's most recent level of fiscal development positively influences fiscal capacity. Altogether, these results show that the addition of a series of control variables does not alter our baseline conclusion: fiscal rules increase fiscal capacity. However, a closer look at the control

31. These variables are: inflation, financial openness, government fractionalization, political system, democracy, currency union membership, public debt, GDP growth, and fiscal balance.

variables highlights that government stability, access to public services, and education are robust determinants of fiscal capacity since they remain statistically significant in all our specifications.³²

Our baseline model uses tax effort as a measure of fiscal capacity. In this section, we thirdly test whether changing fiscal capacity estimation model modifies the effect of the fiscal rules. First, we account for business cycle by adding output gap to the baseline model. Second, we extend tax effort estimation model by adding the following variables that determine tax revenue: ODA, lagged public debt, business cycle (measured by output gap), GDP per capita squared, urbanization, and country characteristics such as colonial past, wars, and tax havens. Third, we lag our baseline model variables in estimating fiscal capacity to account for possible endogeneity, especially the reverse causality bias. Finally, given that institutional quality may be endogenous to tax revenue (Baskaran and Bigsten, 2013; Garfias, 2019; Ricciuti et al., 2019), we remove this variable in our baseline model. The results in Table A4 in the Appendix (column [1]-[4]) use each of these new tax effort variables as a dependent variable to measure fiscal capacity. Conclusions show that the effect of fiscal rules holds despite changes in tax effort model, i.e. fiscal capacity.

Fourth, we analyze the sensitivity of our results to alternative definitions of fiscal capacity, notably tax revenue as a percentage of GDP and direct tax to total revenue ratio.³³ In addition to these two alternative definitions commonly used in the literature (see for example Besley and Persson, 2009; Baskaran and Bigsten, 2013; Besley et al., 2013; Dincecco and Prado, 2012; Ricciuti et al., 2019; Grier et al., 2021), we add two other alternative measures. First, in contrast to tax effort, which is the ratio of each country's tax revenue over its tax potential, we specify another tax effort, defined as the ratio of each country's tax revenue to the average tax revenue of developed countries. Finally, we complete our alternative definitions with an index of tax revenue dissimilarity between developing countries and developed countries, i.e. dissimilarity index between a given developing country's tax structure (for a given year) and the tax structure of developed countries, using the semi-parametric approach of Bray and Curtis (1957). The

32. Rule of law and regime support groups that were statistically significant in our baseline model lose their significance thereafter (results available on request).

33. The literature provides some justifications for the use of these two measures as proxies of fiscal capacity. First, tax revenue (% GDP) is used because it is considered as a "catch-all" measure of fiscal capacity. Second, as previously stated, direct tax share is used as it provides information on the capacity of tax administration given that direct taxes are difficult to collect.

results presented in columns [5]-[8] of [Table A4](#) in the [Appendix](#) show that changing the definition of fiscal capacity does not alter our findings: fiscal rules increase the total level of tax revenue (% GDP), the share of direct taxes in total taxes, tax revenue as a percentage of the average revenue of developed countries, and favors convergence of tax revenue structure of developing countries that is less diversified and tends to focus on some particular taxes to more robust structure like that of developed countries, i.e., favors tax reform.³⁴ In sum, fiscal rules promote fiscal capacity. In light of these results, we can conclude that fiscal rules' effect on fiscal capacity does not seem to be driven by how the latter is measured.

Finally, our baseline results are based on equal means of observable characteristics between fiscal and non-fiscal rules countries. We test whether our results hold if we rely on higher-order moments for covariate balance, namely variance, and skewness. The results of this test are reported in columns [9]-[10] of [Table A4](#) in the [Appendix](#). The conclusion reveals that changing the moments in matching treatment and control groups for weight construction does not alter our conclusion: fiscal rules improve fiscal capacity in developing countries.³⁵

7.2 Alternative estimation method

In this section, we test the robustness of our results using several alternative methods to check if our conclusions are specific to entropy balancing.

First, we test the sensitivity of our results using a panel fixed effects (country and

34. Results remain similar using tax revenue diversification index. Indeed, results not reported in this paper but available on request show that fiscal rules improve tax revenue diversification in developing countries.

35. We add a series of additional robustness. First, we lag all our institutional variables (see for instance [Beramendi et al., 2019](#), [Andersson, 2022](#)). The idea is that time t outcomes of fiscal capacity would be the consequence of past institutional dynamics or past government efforts. Moreover, one can suspect that reforms such as fiscal rules may take time before producing an effect on the conduct of fiscal policy due to, for example, the question of credibility that is built up over time. Therefore, we follow [Ogrokhina and Rodriguez \(2018\)](#) and also lag our interest variable, namely fiscal rules. Our control variables could be what [Beramendi et al. \(2019\)](#) called bad controls since they could also be influenced by fiscal capacity ([Dincecco et al., 2011](#); [Dincecco and Prado, 2012](#); [Baskaran and Bigsten, 2013](#); [Dincecco and Katz, 2016](#)). Although we present results without the control variables to show that our results are not vulnerable to this potential problem we define a model in which we lag all our control variables based on [Neuenkirch and Neumeier, 2016](#), [Beramendi et al., 2019](#), [Andersson, 2022](#) or [Apeti and Edoh, 2023](#). The results of these modifications remain consistent with our baseline findings. Finally, we analyze the effect of fiscal rules on data arranged in a 5 sub-period average. The aim is to eliminate short-term noise and to examine whether our effects can be described as long or medium-term effects ([De Haan and Sturm, 2017](#); [Combes et al., 2017a](#)). The results stay consistent: fiscal rules enhance fiscal capacity. These tests are not reported in the paper and are available on request.

time) model i.e. Ordinary Least Squares (OLS). To do so, we adopt the same approach as in [Table 3](#), starting with a naive regression that includes only fiscal rules. The results in column [1] of [Table A5](#) in the [Appendix](#) show a positive association between fiscal rules and fiscal capacity. Column [2] adds country-fixed effects to the model in column [1] and column [3] completes the results in column [2] by adding time-fixed effects. The conclusions are consistent with those of column [1]. Finally, we develop a more complete model with the same control variables as in column [4] of [Table 3](#). The results remain unchanged. These different conclusions reinforce the robustness of the previously developed conclusions supporting that our results are not driven by the chosen method, i.e. the approach based on entropy balancing.

Finally, we test the robustness of our results to alternative identification strategies using instrumental variable methods with, respectively, external and internal instruments. Indeed, to mitigate the possible endogeneity problem associated with fiscal rules, we adopt an instrumental variable (IV) approach where the number of fiscal rules in place in neighboring countries is used as an instrument (see [Caselli and Reynaud, 2020](#) for a detailed discussion on this instrument).³⁶ Next, we assess the effect of fiscal rules on fiscal capacity using the GMM system ([Blundell and Bond, 1998](#))³⁷ to control potential endogeneity biases arising mainly from reverse causality and the high persistence of fiscal variables like fiscal capacity. Results of these different methods are compiled in columns [6]-[7] of [Table A5](#) in the [Appendix](#). Conclusions indicate that using alternative methods does not qualitatively change our results derived from entropy balancing. Indeed, results from OLS-IV and GMM system support the positive effect of fiscal rules on fiscal capacity. In conclusion, our results are not specific to our estimation method:

36. The instrument variable captures, for a given country/year, the number of fiscal rules in place in countries with common borders with respect to the national economy (see for instance [Caselli and Reynaud \(2020\)](#) and [Ardanaz et al. \(2021\)](#) for a similar approach). In other words, this geographic or contiguity instrument captures the geographic diffusion of fiscal rules. The results of the first stage equation presented in column [5] of [Table A5](#) in the [Appendix](#) show a strong correlation between the instrument and the probability of adopting fiscal rules. Put differently, the adoption of fiscal rules in neighboring countries increases the probability of adoption of such rules in our target countries, indicating the relevance of our instrumental variable strategy. In addition, standard tests of instrumental variable estimation strategy using a two-stage least squares (2SLS) approach supports the strength of our instrument and do not reject the weak instrument hypothesis.

37. This method combines equations in levels and first differences in a system and estimated them with an extended system-GMM estimator that allows the use of lagged differences and levels of explanatory variables as instruments. Compared to the different GMM estimators, the system-GMM estimator allows introducing more instruments by adding a second equation, which should improve estimation efficiency. To tackle the problem of instrument proliferation raised by the above method ([Roodman, 2009](#)), the instrument matrix is collapsed.

adopting fiscal rules improves fiscal capacity in developing countries. In addition, it is important to note the strong persistency of fiscal capacity, essentially signaled by the positive and significant coefficient of 0.79 of the lag of this variable.

8 Heterogeneity

Our result suggests that fiscal rules reinforce (fiscally) strong state-building in developing countries. In this section, we examine how sensitive these results are to the rules' composition and to various factors.

8.1 The composition effect of fiscal rules

So far, our analysis is based on the overall fiscal rules. As we suspect that fiscal rules may behave differently depending on fiscal aggregate they target, we conduct a more granular analysis by assessing the effect of different types of fiscal rules on fiscal capacity, namely expenditure rule (ER), debt rule (DR), budget balance rule (BBR) and revenue rule (RR). For example, in advanced countries, revenue rules are often set in the form of a ceiling on the revenue to GDP ratio to avoid further tax increases, while in low-income countries, rules are often set in the form of a floor to encourage revenue mobilization. Expenditure rules, on the other hand, although not directly targeting revenue, can encourage tax revenue collection and thus fiscal capacity through its positive effect on economic activity (Wierds, 2007; Debrun et al., 2008; Holm-Hadulla et al., 2012; Wierds 2012; Bova et al., 2014; Davoodi et al., 2022). Indeed, by restricting the pro-cyclicality of fiscal policy and aggressive fiscal behavior in case of higher fiscal revenues, this rule can promote pro-growth policies that can strengthen fiscal capacity of developing countries. The results of these tests are presented in Table 5. They reveal that all fiscal rules have positive and statistically significant effects on fiscal capacity (columns [1]-[4] of Table 5). However, we observe some relative variations in the coefficients according to the type of fiscal rules, corroborating our intuition.

8.2 The role of rules effectiveness

In this section we analyze the sensitivity of our results to three elements that can support the effectiveness of fiscal rules, namely fiscal transparency, fiscal rule strength, and the existence of independent fiscal councils.

Table 4 – Fiscal capacity and fiscal rules: effect by type of rules

	[1]	[2]	[3]	[4]
Expenditure rule	1.833*** (0.5364)			
Debt rule		1.087*** (0.4087)		
Budget balance rule			1.411*** (0.3158)	
Revenue rule				3.961*** (0.7399)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	1275	1275	1275	1275

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All specifications include the covariates defined in the baseline model.

First, we analyze the influence of fiscal transparency on the efficiency of fiscal rules. Fiscal transparency matters for fiscal rules' effectiveness (Milesi-Ferretti, 2004). Indeed, higher transparency increases the costs of rule violation while lower fiscal transparency involves more creative accounting and less fiscal discipline (Gootjes and de Haan, 2022). To do so, we introduce in the baseline model fiscal transparency and the interaction between this variable and fiscal rules. To simplify the reading of the results, we present the findings in graphs. The first graph in Figure 5 shows the result of the conditional effect of the fiscal rules. The conclusions underline a higher efficiency of fiscal rules when accompanied by sound fiscal transparency.

Second, using binary variables in a cross-country analysis raises a major problem, which is the lack of capturing fiscal rules strength/intensity (Ogrokhina and Rodriguez, 2018; Apeti, 2023a; Apeti and Edoh, 2023). Following the literature, we assess the importance of the intensity of fiscal rule adoption based on fiscal rule index that is computed based on eleven characteristics subdivided into five: statutory basis, coverage, enforcement mechanisms, supporting procedures, and flexibility measure. In line with Schaechter et al. (2012), we give equal weight to each characteristic³⁸ and normalize the index between 0 and 1. Then, we introduce in the baseline model fiscal rules' strength and the interaction between this variable and fiscal rules (see . Results are presented in the second graph of Figure 5. Conclusions underline a larger effect of fiscal rules when the rules are "strong" suggesting the importance of supplementing fiscal rules with some features such as supporting procedures or monitoring or enforcement mechanisms.³⁹

Third, we analyze the influence of fiscal councils or independent fiscal institutions on the efficiency of fiscal rules. Fiscal councils—nonpartisan public entities with a statutory or executive mandate (IMF, 2013b)—represent another pillar of the rules-based fiscal framework by, for example, fostering fiscal sustainability through assessment of fiscal plans and performance, evaluation of macroeconomic and budgetary forecasts, monitoring of the implementation of fiscal rules, and evaluation of the cost of government measures (IMF, 2013b; Wyplosz, 2018; Davoodi et al., 2022). In addition, fiscal councils can institutionalize fiscal transparency by monitoring information about the state of

38. The following authors also followed this approach: Badinger et al., 2017; Ardanaz et al., 2021; Gootjes et al., 2021; Afonso et al., 2022a; Davoodi et al., 2022; Gootjes and de Haan, 2022.

39. As the variable can be classified as a continuous treatment variable, we employ an alternative strategy by using entropy balancing for continuous variables developed by Tübbicke (2022). The findings show a larger coefficient compared to the dummy variable, reinforcing the interaction-based conclusion. Results are available on request.

public finances (Alt and Dreyer Lassen, 2018). In line with these arguments, we assume the effects of fiscal rules to be larger when fiscal rules are supported by fiscal councils.⁴⁰ The results in column [1] of Table 6 show that fiscal rules increase fiscal capacity irrespective of the existence of fiscal councils. However, we observe a stronger effect when fiscal rules are supported by these councils.

8.3 The role of structural factors

Despite sharing some common characteristics, developing countries present various structural differences that may influence the effect of fiscal rules on fiscal capacity. Accordingly, we analyze the role of some differences on the effect of fiscal rules. Finally, time may matter in the effect of fiscal rules because of the time reforms may take to generate results.

First, we analyze the efficiency of fiscal rules in the context of political competition. Indeed, political competition can magnify the effect of fiscal rules. Specifically, when domestic political competition is strong, governments are more likely to comply with fiscal rules, as the opposition can use rules violations as a "weapon" against the government (Alt et al., 2006; Hansen, 2020; Gootjes and de Haan, 2022). However, this political competition may have an unintended effect, namely the development of clientelistic or partisan behavior that would encourage the use of public finances to serve the voters of the governing party, potentially resulting in the violation of fiscal rules. We test these two points by introducing in the baseline model the political competition—captured as the total vote share of all opposition parties (Gootjes and de Haan, 2022)—and the interaction between this variable and fiscal rules. The results presented in the third graph of Figure 5 support the first hypothesis: political competition amplifies the effect of fiscal rules.

Second, we analyze whether free speech/freedom of expression (or free media) influences the efficiency of fiscal rules.⁴¹ Indeed, the presence of free speech could increase

40. As this variable is a dummy, the graph approach does not seem appropriate. Therefore, we adopt an approach that consists of running two regressions on two sub-samples, thus opposing countries that have set up fiscal councils to countries without fiscal councils (see Gootjes and de Haan, 2022 Apeti and Edoh, 2023 for a similar approach).

41. We capture free speech as freedom of academic exchange and dissemination. Free academic exchange includes uncensored access to research material, unhindered participation in national or international academic conferences, and the uncensored publication of academic material. Free dissemination refers to the unrestricted possibility for scholars to share and explain research findings in their field of expertise to non-academic audiences through media engagement or public lectures.

the ability of relevant public opinion actors to monitor and criticize fiscal policy actions or change attitudes toward the popularity of the fiscal policies pursued, thereby increasing the cost of violating fiscal rules and thus the effectiveness of compliance with the requirements the rules (Shi and Svensson, 2006; Veiga et al., 2017; Barnes and Hicks, 2018; Gootjes and de Haan, 2022). The fourth graph in Figure 5 presents the results using the same approach as the first point. The conclusions highlight that fiscal rules are more effective when fiscal authorities have challengers who can freely criticize their choices.

Third, we analyze the influence of inflation targeting (IT) on fiscal rules. Indeed fiscal rules can have a policy mix effect if it is combined with inflation targeting (Combes et al., 2017a). In particular, the additional institutional constraint on public financial management allowed by IT by reducing the opportunity for seigniorage (Minea and Villieu, 2009; Lucotte, 2012; Galvis-Ciro and Ferreira de Mendonça, 2016; Apeti et al., 2023d) can provide an additional incentive to invest in fiscal capacity. We test this hypothesis by following the approach used earlier to test the role of fiscal councils by running two regressions according to IT adoption. The results in column [2] of Table 6 show that fiscal rules increase fiscal capacity irrespective of the existence of IT. However, we observe a stronger effect when fiscal rules are combined with IT.

Fourth, relative to emerging market economies, low-income countries are characterized by fragile fiscal positions with low tax burdens and compliance. Therefore, the discipline and credibility provided by fiscal rules may have a greater effect in these countries. We test this hypothesis based on the World Bank country classifications by setting a dummy variable that takes 1 if the country is a developing or low-income country and 0 emerging economy.⁴² The results of this test (columns [3]) show that fiscal rules improve fiscal capacity regardless of the level of economic development, but as expected the impact seems larger in low-income countries.

Finally, we analyze the role of the length of time for which the fiscal rules have been implemented. To do so, we introduce the variable "time" and the interaction between this variable and the fiscal rules in the model. The results presented in the last graph of Figure 5 show that the effect appears as soon as the fiscal rules are introduced and increases with time.⁴³

42. We use the same approach as the case of the fiscal council and IT dummy variables.

43. The duration or time spent under the fiscal rules is the difference between a year t and the first year

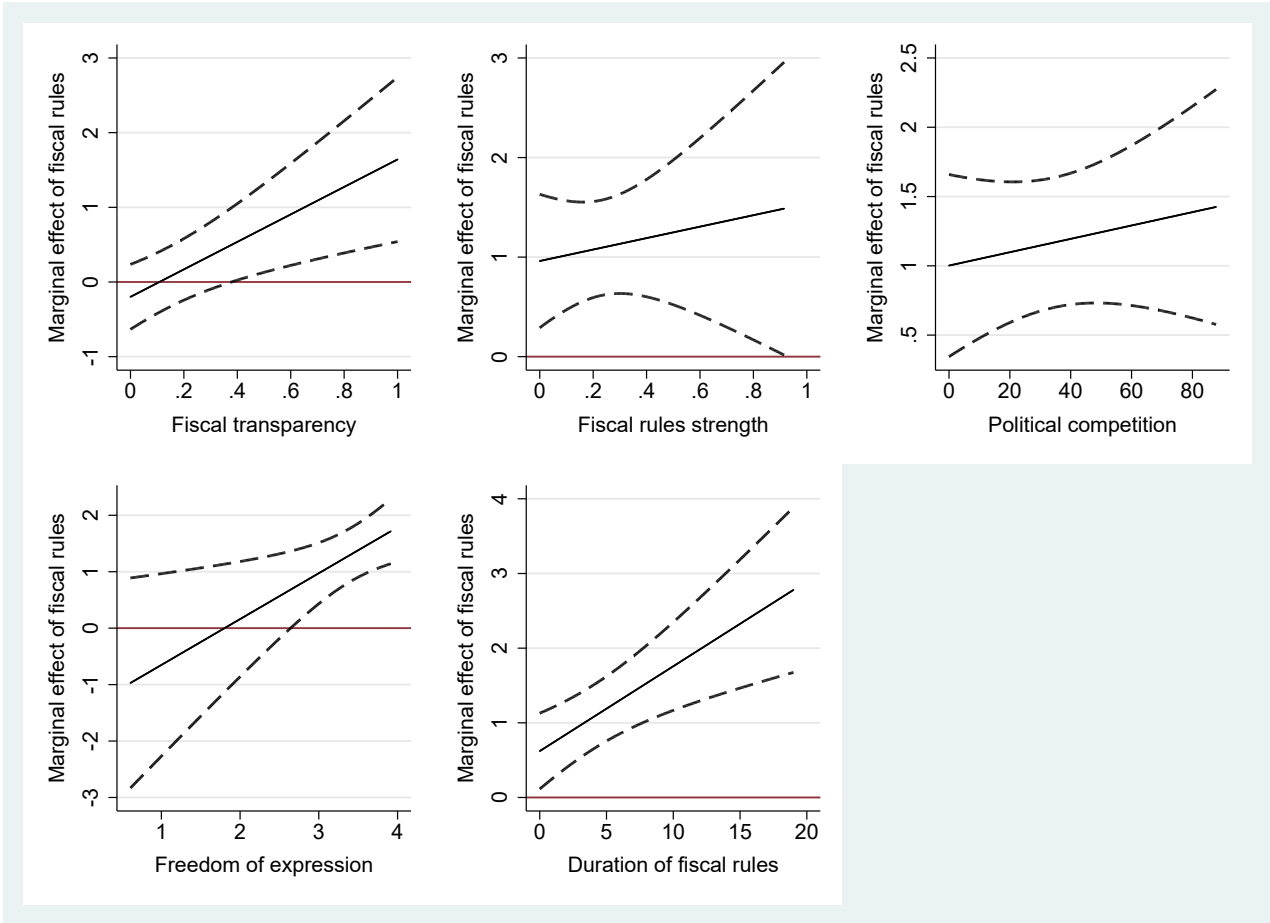


Figure 5 – Fiscal capacity and fiscal rules: heterogeneity test

Table 5 – Fiscal capacity and fiscal rules: rules effectiveness and structural factors

	[1]	[2]	[3]
Without fiscal council	1.108*** (0.3098)		
With fiscal council	1.487*** (0.5200)		
Without IT		0.969*** (0.3213)	
With IT		1.913*** (0.4701)	
Developing countries			1.236*** (0.4640)
Emerging markets			0.750** (0.3075)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	1275	1275	1275

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All specifications include the covariates defined in the baseline model.

9 Conclusion

The focus of this paper is to analyze whether adopting fiscal rules improves developing countries' fiscal capacity. Based on entropy balancing and using a sample of 71 developing countries over the period 1985-2019, we show that adopting FR reinforces the construction of a fiscally strong state. Specifically, we find that adopting fiscal rules increases fiscal capacity by 2 percentage points on average. This coefficient is economically meaningful as it represents 11% of the standard deviation of fiscal capacity. Our result, which passes a series of robustness tests, reveals some heterogeneity, notably with respect to the types of fiscal rules, the effectiveness of fiscal rules captured by fiscal rule strength, fiscal transparency and the existence of fiscal councils, time spent under fiscal rules, and some structural factors, including monetary coordination, particularly inflation targeting, the level of development, political competition, and freedom of speech.

This paper shows the importance of institutions (fiscal governance) in the construction of a strong state capable of mobilizing domestic resources to address its development issues. Two messages are thus delivered: *i*- restraining the capacity to borrow can help developing countries to raise their level of tax performance, *ii*- although highly criticized in the academic and political world, fiscal rules appear to be an effective instrument in fiscal governance.

Living in a relatively peaceful world where inter-state wars⁴⁴ are scarce, developing countries can adopt fiscal rules to increase their fiscal capacity in order to respond consistently to modern challenges such as inequality, poverty, epidemics, pandemics, climate shocks, volatility of international financial flows, problems of access to credit on the international market, volatility of commodity prices, other security issues, and ensure public goods needed for the "*big push*". Finally, fiscal rules can support developing countries in achieving the Sustainable Development Goals, since the 2015 United Nations Conference in Addis Ababa identified tax revenues as an important means of achieving these goals.

of fiscal rule adoption for fiscal rule countries. The duration of adoption for non-fiscal rule countries is 0.

44. The literature shows a favorable effect of wars, especially between states, on the constitution of fiscal capacity.

References

- Aboagye, P. Y. and Hillbom, E. (2020). Tax bargaining, fiscal contracts, and fiscal capacity in Ghana: A long-term perspective. *African Affairs*, 119(475):177–202.
- Acemoglu, D., Ticchi, D., and Vindigni, A. (2011). Emergence and persistence of inefficient states. *Journal of the European Economic Association*, 9(2):177–208.
- Acemoglu, D., Verdier, T., and Robinson, J. A. (2004). Kleptocracy and divide-and-rule: A model of personal rule. *Journal of the European Economic Association*, 2(2-3):162–192.
- Afonso, A., Huart, F., Jalles, J. T., and Stanek, P. (2022a). Twin deficits revisited: a role for fiscal institutions? *Journal of International Money and Finance*, 121:102506.
- Afonso, A. and Jalles, J. T. (2013). Do fiscal rules matter for growth? *Applied Economics Letters*, 20(1):34–40.
- Afonso, A. and Jalles, J. T. (2019). Fiscal rules and government financing costs. *Fiscal Studies*, 40(1):71–90.
- Afonso, A., Jalles, J. T., and Venâncio, A. (2021). Structural tax reforms and public spending efficiency. *Open Economies Review*, pages 1–45.
- Afonso, A., Jalles, J. T., and Venâncio, A. (2022b). *A Tale of Government Spending Efficiency and Trust in the State*. CESifo Working Paper No. 10075, Available at SSRN: <https://ssrn.com/abstract=4279164> or <http://dx.doi.org/10.2139/ssrn.4279164>.
- Agénor, P.-R. and da Silva, L. A. P. (2019). *Integrated Inflation Targeting: Another Perspective from the Developing World*.
- Aigner, D., Lovell, C. K., and Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6(1):21–37.
- Aizenman, J. and Jinjara, Y. (2010). De facto fiscal space and fiscal stimulus: Definition and assessment. *NBER Working Paper 16539*, National Bureau of Economic Research, Cambridge, MA.

- Akanbi, O. A., Gueorguiev, N., Honda, J., Mehta, P., Moriyama, K., Primus, K., and Sy, M. (2021). *Avoid a Fall or Fly Again: Turning Points of State Fragility*. IMF Working Paper No. 21/133.
- Albers, T. N., Jerven, M., and Suesse, M. (2023). The fiscal state in africa: Evidence from a century of growth. *International Organization*, 77(1):65–101.
- Alesina, A. F. and Tabellini, G. (1988). *Voting on the budget deficit*. NBER Working Paper No. 2759.
- Ali Abbas, S., Belhocine, N., El-Ganainy, A., and Horton, M. (2011). Historical patterns and dynamics of public debt—evidence from a new database. *IMF Economic Review*, 59(4):717–742.
- Allcott, H. (2015). Site selection bias in program evaluation. *The Quarterly Journal of Economics*, 130(3):1117–1165.
- Alt, J. E. and Dreyer Lassen, D. (2018). Fiscal councils and fiscal transparency. *Independent Fiscal Councils: Watchdogs or Lapdogs*, pages 75–82.
- Alt, J. E. and Lassen, D. D. (2006). Fiscal transparency, political parties, and debt in oecd countries. *European Economic Review*, 50(6):1403–1439.
- Alt, J. E., Lassen, D. D., and Rose, S. (2006). The causes of fiscal transparency: evidence from the us states. *IMF Staff papers*, 53:30–57.
- Andersson, P. F. (2022). Fiscal capacity in non-democratic states: the origins and expansion of the income tax. *Journal of Institutional Economics*, pages 1–15.
- Apeti, A. E. (2023a). Household welfare in the digital age: Assessing the effect of mobile money on household consumption volatility in developing countries. *World Development*, 161:106110.
- Apeti, A. E. (2023b). Sovereign debt default and inequality. *Industrial and Corporate Change*.
- Apeti, A. E., Bambe, B.-W.-W., and Combes, J.-L. (2023a). *On the Macroeconomic Effects of Fiscal Reforms: Fiscal Rules and Public Expenditure Efficiency*. hal-03961062f.

- Apeti, A. E., Basdevant, O., and Salins, V. (2023b). *Do Fiscal Rules Foster Fiscal Discipline in Resource-Rich Countries?* IMF Working Paper No. 23/88.
- Apeti, A. E., Combes, J.-L., Debrun, X., and Minea, A. (2021). Did fiscal space influence covid-19's fiscal response? *Covid Economics: Vetted and Real-Time Papers*, 74:71–93.
- Apeti, A. E., Combes, J.-L., and Edoh, E. D. (2023c). *Entrepreneurship in developing countries: can mobile money play a role?* hal-04081304f.
- Apeti, A. E., Combes, J.-L., and Minea, A. (2023d). Inflation targeting and the composition of public expenditure: Evidence from developing countries. *Journal of Macroeconomics*, page 103523.
- Apeti, A. E. and Edoh, E. D. (2023). Tax revenue and mobile money in developing countries. *Journal of Development Economics*, 161:103014.
- Ardanaz, M., Cavallo, E., Izquierdo, A., and Puig, J. (2021). Growth-friendly fiscal rules? safeguarding public investment from budget cuts through fiscal rule design. *Journal of International Money and Finance*, 111:102319.
- Argimón, I. and Cos, P. H. d. (2012). Fiscal rules and federalism as determinants of budget performance: An empirical investigation for the spanish case. *Public Finance Review*, 40(1):30–65.
- Asatryan, Z., Castellón, C., and Stratmann, T. (2018). Balanced budget rules and fiscal outcomes: Evidence from historical constitutions. *Journal of Public Economics*, 167:105–119.
- Azam, J.-P. (1995). How to pay for the peace? a theoretical framework with references to african countries. *Public choice*, 83(1-2):173–184.
- Baccini, L., Impullitti, G., and Malesky, E. J. (2019). Globalization and state capitalism: Assessing vietnam's accession to the wto. *Journal of International Economics*, 119:75–92.
- Badinger, H., Fichet de Clairfontaine, A., and Reuter, W. H. (2017). Fiscal rules and twin deficits: The link between fiscal and external balances. *The World Economy*, 40(1):21–35.

- Badinger, H. and Reuter, W. H. (2017a). The case for fiscal rules. *Economic Modelling*, 60:334–343.
- Badinger, H. and Reuter, W. H. (2017b). Determinants of fiscal rules. *Applied Economics Letters*, 24(3):154–158.
- Bahl, R. W. (1971). A regression approach to tax effort and tax ratio analysis. *Staff Papers*, 18(3):570–612.
- Balima, H. W. (2020). Coups d'état and the cost of debt. *Journal of Comparative Economics*, 48(3):509–528.
- Balima, W. H., Combes, J.-L., and Minea, A. (2017). Sovereign debt risk in emerging market economies: Does inflation targeting adoption make any difference? *Journal of International Money and Finance*, 70:360–377.
- Barbier-Gauchard, A., Baret, K., and Minea, A. (2021). National fiscal rules and fiscal discipline in the european union. *Applied Economics*, pages 1–23.
- Barnes, L. and Hicks, T. (2018). Making austerity popular: The media and mass attitudes toward fiscal policy. *American Journal of Political Science*, 62(2):340–354.
- Baskaran, T. and Bigsten, A. (2013). Fiscal capacity and the quality of government in sub-saharan africa. *World Development*, 45:92–107.
- Batrancea, L., Nichita, A., Olsen, J., Kogler, C., Kirchler, E., Hoelzl, E., Weiss, A., Torgler, B., Fooker, J., Fuller, J., et al. (2019). Trust and power as determinants of tax compliance across 44 nations. *Journal of Economic Psychology*, 74:102191.
- Battese, G. E. and Coelli, T. J. (1992). Frontier production functions, technical efficiency and panel data: with application to paddy farmers in india. *Journal of productivity analysis*, 3(1-2):153–169.
- Bayart, J.-F. and Ellis, S. (2000). Africa in the world: A history of extraversion. *African affairs*, 99(395):217–267.
- Bean, R. (1973). War and the birth of the nation state. *The Journal of Economic History*, 33(1):203–221.

- Benito, B., Bastida, F., and Vicente, C. (2013). Creating room for manoeuvre: a strategy to generate political budget cycles under fiscal rules. *Kyklos*, 66(4):467–496.
- Beramendi, P., Dincecco, M., and Rogers, M. (2019). Intra-elite competition and long-run fiscal development. *The Journal of Politics*, 81(1):49–65.
- Berg, A., Ostry, J. D., Tsangarides, C. G., and Yakhshilikov, Y. (2018). Redistribution, inequality, and growth: new evidence. *Journal of Economic Growth*, 23(3):259–305.
- Bergman, U. M., Hutchison, M. M., and Jensen, S. E. H. (2016). Promoting sustainable public finances in the european union: The role of fiscal rules and government efficiency. *European Journal of Political Economy*, 44:1–19.
- Besley, T., Ilzetzki, E., and Persson, T. (2013). Weak states and steady states: The dynamics of fiscal capacity. *American Economic Journal: Macroeconomics*, 5(4):205–35.
- Besley, T. and Mueller, H. (2021). *Fiscal capacity and state fragility*. Oxford University Press Oxford.
- Besley, T. and Persson, T. (2008). Wars and state capacity. *Journal of the European Economic Association*, 6(2-3):522–530.
- Besley, T. and Persson, T. (2009). The origins of state capacity: Property rights, taxation, and politics. *American economic review*, 99(4):1218–44.
- Besley, T. and Persson, T. (2011). *Pillars of prosperity: The political economics of development clusters*. Princeton University Press.
- Besley, T. and Persson, T. (2013). Taxation and development. In *Handbook of public economics*, volume 5, pages 51–110. Elsevier.
- Besley, T. and Persson, T. (2014). Why do developing countries tax so little? *Journal of economic perspectives*, 28(4):99–120.
- Besley, T., Persson, T., and Sturm, D. M. (2010). Political competition, policy and growth: theory and evidence from the us. *The Review of Economic Studies*, 77(4):1329–1352.
- Bird, R. M., Martinez-Vazquez, J., and Torgler, B. (2006). Societal institutions and tax effort in developing countries. *The challenges of tax reform in a global economy*, 283.

- Blais, A., Kim, J., and Foucault, M. (2010). Public spending, public deficits and government coalitions. doi: 10.1111/j.1467-9248.2010.00842.x.
- Blanchard, O., Leandro, A., and Zettelmeyer, J. (2021). Redesigning eu fiscal rules: From rules to standards. *Economic Policy*, 36(106):195–236.
- Blundell, R. and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1):115–143.
- Bohn, H. (2008). The sustainability of fiscal policy in the united states. *Sustainability of public debt*, pages 15–49.
- Bornhorst, F., Gupta, S., and Thornton, J. (2009). Natural resource endowments and the domestic revenue effort. *European Journal of Political Economy*, 25(4):439–446.
- Bova, M. E., Carcenac, N., and Guerguil, M. M. (2014). *Fiscal rules and the procyclicality of fiscal policy in the developing world*. IMF Working Paper No. WP/14/122.
- Bratton, M. and Van de Walle, N. (1997). *Democratic experiments in Africa: Regime transitions in comparative perspective*. Cambridge university press.
- Bray, J. R. and Curtis, J. T. (1957). An ordination of the upland forest communities of southern wisconsin. *Ecological monographs*, 27(4):326–349.
- Brewer, J. (2002). *The sinews of power: war, money and the English state 1688-1783*. Routledge.
- Brzozowski, M. and Siwińska-Gorzela, J. (2010). The impact of fiscal rules on fiscal policy volatility. *Journal of Applied Economics*, 13(2):205–231.
- Buchanan, J. M. and Wagner, R. E. (1977). Democracy in deficit: The political legacy of lord keynes.
- Buonanno, P., Plevani, G., and Puca, M. (2023). Earthquake hazard and civic capital. *European Journal of Political Economy*, page 102367.
- Burret, H. T. and Feld, L. P. (2018). (un-) intended effects of fiscal rules. *European Journal of Political Economy*, 52:166–191.

- Calderón, C. and Schmidt-Hebbel, K. (2008). The choice of fiscal regimes in the world. *Central Bank of Chile, Working Paper 487*.
- Canan, C., Lesko, C., and Lau, B. (2017). Instrumental variable analyses and selection bias. *Epidemiology (Cambridge, Mass.)*, 28(3):396.
- Cantoni, D., Mohr, C., and Weigand, M. (2019). *The rise of fiscal capacity*. Discussion Paper, No. 172, Ludwig-Maximilians-Universität München und Humboldt-Universität zu Berlin, Collaborative Research Center Transregio 190 - Rationality and Competition, München und Berlin.
- Caselles, J. A. and Jurado, I. (2014). Do coalitions lead to higher fiscal deficits? a regression discontinuity approach. In *XXI Encuentro Economía Pública*, page 29. Universitat de Girona.
- Caselli, F. and Reynaud, J. (2020). Do fiscal rules cause better fiscal balances? a new instrumental variable strategy. *European Journal of Political Economy*, 63:101873.
- Caselli, F. and Wingender, P. (2021). Heterogeneous effects of fiscal rules: The maas-tricht fiscal criterion and the counterfactual distribution of government deficits. *European Economic Review*, 136:103748.
- Castro, G. Á. and Camarillo, D. B. R. (2014). Determinants of tax revenue in oecd countries over the period 2001–2011. *Contaduría y administración*, 59(3):35–59.
- Castro, V. (2011). The impact of the european union fiscal rules on economic growth. *Journal of Macroeconomics*, 33(2):313–326.
- Chelliah, R. J., Baas, H. J., and Kelly, M. R. (1975). Tax ratios and tax effort in developing countries, 1969-71. *Staff papers*, 22(1):187–205.
- Cheng, H. W. J. and Pitterle, I. (2018). *Towards a more comprehensive assessment of fiscal space*. Working Papers No. 153, United Nations, Department of Economics and Social Affairs.
- Chinn, M. D. and Ito, H. (2006). What matters for financial development? capital controls, institutions, and interactions. *Journal of development economics*, 81(1):163–192.

- Christensen, D. and Garfias, F. (2021). The politics of property taxation: Fiscal infrastructure and electoral incentives in Brazil. *The Journal of Politics*, 83(4):1399–1416.
- Clist, P. and Morrissey, O. (2011). Aid and tax revenue: signs of a positive effect since the 1980s. *Journal of International Development*, 23(2):165–180.
- Cogneau, D., Dupraz, Y., and Mesplé-Somps, S. (2021). Fiscal capacity and dualism in colonial states: the French empire 1830–1962. *The Journal of Economic History*, 81(2):441–480.
- Combes, J.-L., Debrun, X., Minea, A., and Tapsoba, R. (2017a). Inflation targeting, fiscal rules and the policy mix: Cross-effects and interactions. *The Economic Journal*, 128(615):2755–2784.
- Combes, J.-L., Minea, A., and Sow, M. (2017b). Is fiscal policy always counter-(pro-)cyclical? the role of public debt and fiscal rules. *Economic Modelling*, 65:138–146.
- Crivelli, E., Gupta, M. S., Mulas-Granados, M. C., and Correa-Caro, C. (2016). *Fragmented politics and public debt*. IMF Working Paper No. 16/190.
- Crivelli, E. and Gupta, S. (2014). Resource blessing, revenue curse? domestic revenue effort in resource-rich countries. *European Journal of Political Economy*, 35:88–101.
- Crivelli, E. and Gupta, S. (2016). Does conditionality in IMF-supported programs promote revenue reform? *International Tax and Public Finance*, 23(3):550–579.
- Cukierman, A. (1992). Central bank strategy, credibility, and independence: Theory and evidence. *Journal des Économistes et des Études Humaines*, 3(4):581–590.
- Cukierman, A. and Meltzer, A. H. (1986). A positive theory of discretionary policy, the cost of democratic government and the benefits of a constitution. *Economic Inquiry*, 24(3):367–388.
- Dabla-Norris, E. and Lima, F. (2023). Macroeconomic effects of tax rate and base changes: Evidence from fiscal consolidations. *European Economic Review*, 153:104399.

- Dahan, M. and Strawczynski, M. (2013). Fiscal rules and the composition of government expenditures in oecd countries. *Journal of Policy Analysis and Management*, 32(3):484–504.
- Dalamagas, B., Palaios, P., and Tantos, S. (2019). A new approach to measuring tax effort. *Economies*, 7(3):77.
- Davoodi, H. R., Elger, P., Fotiou, A., Garcia-Macia, D., Han, X., Lagerborg, A., Lam, W. R., and Medas, P. A. (2022). *Fiscal Rules and Fiscal Councils: Recent Trends and Performance during the COVID-19 Pandemic*. IMF Working Paper No. 22/11.
- Davoodi, H. R. and Grigorian, D. (2007). Tax potential vs. tax effort: a cross-country analysis of armenia’s stubbornly low tax collection. *Working Paper No. 07 / 106*.
- De Haan, J. and Sturm, J.-E. (2017). Finance and income inequality: A review and new evidence. *European Journal of Political Economy*, 50:171–195.
- Debrun, X., Moulin, L., Turrini, A., Ayuso-i Casals, J., and Kumar, M. S. (2008). Tied to the mast? national fiscal rules in the european union. *Economic Policy*, 23(54):298–362.
- Deng, M. (2019). Inequality, taxation, and sovereign default risk. *Available at SSRN 3545501*.
- Dincecco, M. (2015). The rise of effective states in europe. *The Journal of Economic History*, 75(3):901–918.
- Dincecco, M., Federico, G., and Vindigni, A. (2011). Warfare, taxation, and political change: Evidence from the italian risorgimento. *The Journal of Economic History*, 71(4):887–914.
- Dincecco, M. and Katz, G. (2016). State capacity and long-run economic performance. *The Economic Journal*, 126(590):189–218.
- Dincecco, M. and Prado, M. (2012). Warfare, fiscal capacity, and performance. *Journal of Economic Growth*, 17(3):171–203.
- Dixit, A. K. (1998). *The making of economic policy: A transaction-cost politics perspective*. MIT press.

- Dovis, A. and Kirpalani, R. (2020). Fiscal rules, bailouts, and reputation in federal governments. *American Economic Review*, 110(3):860–88.
- Dražanová, L. (2020). Introducing the historical index of ethnic fractionalization (hief) dataset: accounting for longitudinal changes in ethnic diversity. *Journal of open humanities data*, 6.
- Drazen, A. (2004). *Fiscal rules from a political economy perspective*. Springer.
- Dreher, A. (2006a). Does globalization affect growth? evidence from a new index of globalization. *Applied economics*, 38(10):1091–1110.
- Dreher, A. (2006b). Imf and economic growth: The effects of programs, loans, and compliance with conditionality. *World Development*, 34(5):769–788.
- Dreher, A., Sturm, J.-E., and De Haan, J. (2008). Does high inflation cause central bankers to lose their job? evidence based on a new data set. *European Journal of Political Economy*, 24(4):778–787.
- Dreher, A., Sturm, J.-E., and De Haan, J. (2010). When is a central bank governor replaced? evidence based on a new data set. *Journal of Macroeconomics*, 32(3):766–781.
- Dreher, A., Sturm, J.-E., and Vreeland, J. R. (2009). Global horse trading: Imf loans for votes in the united nations security council. *European Economic Review*, 53(7):742–757.
- Easterly, W. and Levine, R. (1997). Africa’s growth tragedy: policies and ethnic divisions. *The quarterly journal of economics*, pages 1203–1250.
- Elenev, V., Landvoigt, T., Shultz, P. J., and Van Nieuwerburgh, S. (2021). Can monetary policy create fiscal capacity? Technical report, National Bureau of Economic Research.
- Elgin, C., Kose, M. A., Ohnsorge, F., and Yu, S. (2021). *Understanding informality*. CAMA Working Paper No. 76/2021, Available at SSRN: <https://ssrn.com/abstract=3916568> or <http://dx.doi.org/10.2139/ssrn.3916568>.

- Engerman, S. L. and Sokoloff, K. L. (1994). *Factor endowments: institutions, and differential paths of growth among new world economies: a view from economic historians of the United States*.
- Ertefaie, A., Small, D., Flory, J., and Hennessy, S. (2016). Selection bias when using instrumental variable methods to compare two treatments but more than two treatments are available. *The international journal of biostatistics*, 12(1):219–232.
- Eslava, M. (2006). *The political economy of fiscal policy: survey*. Inter-American Development Bank IDB Working Paper No. 583.
- Evertsson, N. (2016). Corporate tax avoidance: a crime of globalization. *Crime, law and social change*, 66:199–216.
- Eyraud, L., Debrun, M. X., Hodge, A., Lledo, V. D., and Pattillo, M. C. A. (2018). *Second-generation fiscal rules: Balancing simplicity, flexibility, and enforceability*. Staff Discussion Notes No. 18/04.
- Farzanegan, M. R. and Gholipour, H. F. (2023). Covid-19 fatalities and internal conflict: Does government economic support matter? *European Journal of Political Economy*, page 102368.
- Fatás, A., Ghosh, M. A. R., Panizza, U., and Presbitero, M. A. F. (2019). *The motives to borrow*. IMF Working Paper No. 19/101.
- Fatás, A. and Mihov, I. (2003). The case for restricting fiscal policy discretion. *The Quarterly Journal of Economics*, 118(4):1419–1447.
- Feldstein, M. (2015). Raising revenue by limiting tax expenditures. *Tax Policy and the Economy*, 29(1):1–11.
- Fenochietto, M. R. and Pessino, M. C. (2013). *Understanding countries' tax effort*. Number 13-244. IMF Working Paper No. 13/244.
- Ferry, M. (2019). The carrot and stick approach to debt relief: overcoming moral hazard. *Journal of African Economies*, 28(3):252–276.

- Fjelde, H. and De Soysa, I. (2009). Coercion, co-optation, or cooperation? state capacity and the risk of civil war, 1961—2004. *Conflict management and peace science*, 26(1):5–25.
- Foremny, D. (2014). Sub-national deficits in european countries: The impact of fiscal rules and tax autonomy. *European Journal of Political Economy*, 34:86–110.
- Galvis Ciro, J. C. and Ferreira de Mendonça, H. (2016). *Inflation targeting and tax effort: Evidence from Colombia*. MPRA Paper 90544, University Library of Munich, Germany, revised 14 Dec 2018.
- Gambaro, L., Meyer-Spasche, J., and Rahman, A. (2007). Does aid decrease tax revenue in developing countries. *London: LSE*.
- Garen, J. and Clark, J. R. (2015). Trust and the growth of government. *Cato J.*, 35:549.
- Garfias, F. (2019). Elite coalitions, limited government, and fiscal capacity development: Evidence from bourbon mexico. *The Journal of Politics*, 81(1):94–111.
- Giustozzi, C. and Gangl, M. (2021). Unemployment and political trust across 24 western democracies: Evidence on a welfare state paradox. *Acta Sociologica*, 64(3):255–273.
- Gnangnon, S. K. and Brun, J.-F. (2017). Impact of export upgrading on tax revenue in developing and high-income countries. *Oxford Development Studies*, 45(4):542–561.
- Gnangnon, S. K. and Brun, J.-F. (2019). Trade openness, tax reform and tax revenue in developing countries. *The World Economy*, 42(12):3515–3536.
- Gollwitzer, S. (2011). Budget institutions and fiscal performance in africa. *Journal of African Economies*, 20(1):111–152.
- Gomez-Gonzalez, J. E., Valencia, O. M., and Sánchez, G. A. (2022). How fiscal rules can reduce sovereign debt default risk. *Emerging Markets Review*, 50:100839.
- Gootjes, B. and de Haan, J. (2022). Do fiscal rules need budget transparency to be effective? *European Journal of Political Economy*, page 102210.
- Gootjes, B., de Haan, J., and Jong-A-Pin, R. (2021). Do fiscal rules constrain political budget cycles? *Public Choice*, 188(1):1–30.

- Gordon, R. and Li, W. (2009). Tax structures in developing countries: Many puzzles and a possible explanation. *Journal of public Economics*, 93(7-8):855–866.
- Greene, W. (2005). Reconsidering heterogeneity in panel data estimators of the stochastic frontier model. *Journal of econometrics*, 126(2):269–303.
- Grembi, V., Nannicini, T., and Troiano, U. (2016). Do fiscal rules matter? *American Economic Journal: Applied Economics*, pages 1–30.
- Grier, R., Young, A. T., and Grier, K. (2021). The causal effects of rule of law & property rights on fiscal capacity. *European Journal of Political Economy*, page 102169.
- Grier, R., Young, A. T., and Grier, K. (2022). The causal effects of rule of law & property rights on fiscal capacity. *European Journal of Political Economy*, 74:102169.
- Gruss, B. and Kebhaj, S. (2019). *Commodity terms of trade: a new database*. International Monetary Fund.
- Guerguil, M., Mandon, P., and Tapsoba, R. (2017). Flexible fiscal rules and countercyclical fiscal policy. *Journal of Macroeconomics*, 52:189–220.
- Gupta, A. S. (2007). *Determinants of tax revenue efforts in developing countries*. IMF Working Paper No. WP/07/184.
- Gutmann, J., Neuenkirch, M., and Neumeier, F. (2021). Sanctioned to death? the impact of economic sanctions on life expectancy and its gender gap. *The Journal of Development Studies*, 57(1):139–162.
- Gygli, S., Haelg, F., Potrafke, N., and Sturm, J.-E. (2018). The kof globalisation index-revisited. *CESifo Working Paper, No. 7430*.
- Hainmueller, J. (2012). Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political analysis*, pages 25–46.
- Halac, M. and Yared, P. (2022). Fiscal rules and discretion under limited enforcement. *Econometrica*, 90(5):2093–2127.

- Hall, S., Illian, J., Makuta, I., McNabb, K., Murray, S., O'Hare, B. A., Python, A., Zaidi, S. H. A., and Bar-Zeev, N. (2021). Government revenue and child and maternal mortality. *Open Economies Review*, 32(1):213–229.
- Hallerberg, M., Strauch, R., and Von Hagen, J. (2007). The design of fiscal rules and forms of governance in european union countries. *European Journal of Political Economy*, 23(2):338–359.
- Hammond, G. et al. (2012). State of the art of inflation targeting. *Handbooks*.
- Hansen, D. (2020). The effectiveness of fiscal institutions: International financial flogging or domestic constraint? *European Journal of Political Economy*, 63:101879.
- Heckman, J. J., Ichimura, H., and Todd, P. E. (1997). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *The review of economic studies*, 64(4):605–654.
- Heinemann, F., Moessinger, M.-D., and Yeter, M. (2018). Do fiscal rules constrain fiscal policy? a meta-regression-analysis. *European Journal of Political Economy*, 51:69–92.
- Heinemann, F., Osterloh, S., and Kalb, A. (2014). Sovereign risk premia: The link between fiscal rules and stability culture. *Journal of International Money and Finance*, 41:110–127.
- Herbst, J. (2014). *States and power in Africa: Comparative lessons in authority and control*, volume 149. Princeton University Press.
- Herrera, S. and Pang, G. (2005). *Efficiency of public spending in developing countries: an efficiency frontier approach*, volume 3645. World Bank Publications.
- Hintze, O. (1906). *Organization and the Organization of the State*. Reprinted in 1970 as chap. 5 in *The Historical Essays of Otto Hintze*, edited by Felix Gilbert. New York: Oxford University Press.
- Holm-Hadulla, F., Hauptmeier, S., and Rother, P. (2012). The impact of expenditure rules on budgetary discipline over the cycle. *Applied Economics*, 44(25):3287–3296.

- Hooghe, M. and Okolikj, M. (2020). The long-term effects of the economic crisis on political trust in europe: Is there a negativity bias in the relation between economic performance and political support? *Comparative European Politics*, 18:879–898.
- IMF (2013a). *Fiscal monitor: Taxing times*. International Monetary Fund Washington, DC.
- IMF (2013b). *The Functions and Impact of Fiscal Councils*. International Monetary Fund, Washington, D.C.
- IMF (2015). *IMF Engagement with Countries in Post-Conflict and Fragile Situations*. Washington, D.C.: International Monetary Fund.
- Intawan, C. and Nicholson, S. P. (2018). My trust in government is implicit: Automatic trust in government and system support. *The Journal of Politics*, 80(2):601–614.
- Jalles, J. T. and Medas, P. A. (2022). *Economic Growth After Debt Surges*. IMF Working Paper No. 22/159.
- Johnson, N. D. and Koyama, M. (2017). States and economic growth: Capacity and constraints. *Explorations in Economic History*, 64:1–20.
- Jondrow, J., Lovell, C. K., Materov, I. S., and Schmidt, P. (1982). On the estimation of technical inefficiency in the stochastic frontier production function model. *Journal of econometrics*, 19(2-3):233–238.
- Jonung, L., Larch, M., and Fischer, J. (2006). 101 proposals to reform the stability and growth pact: Why so many? a survey. *Public Finance and Management*, 8(3).
- Justino, P. and Martorano, B. (2018). Welfare spending and political conflict in latin america, 1970–2010. *World Development*, 107:98–110.
- Kalan, F. D., Popescu, M. A., and Reynaud, J. (2018). *Thou Shalt Not Breach: The Impact on Sovereign Spreads of Noncomplying with the EU Fiscal Rules*. IMF Working Paper No. WP/18/87.
- Karaman, K. K. and Pamuk, Ş. (2013). Different paths to the modern state in europe: the interaction between warfare, economic structure, and political regime. *American Political Science Review*, 107(3):603–626.

- Kelemen, R. D. and Teo, T. K. (2014). Law, focal points, and fiscal discipline in the united states and the european union. *American Political Science Review*, 108(2):355–370.
- Khwaja, M. S. and Iyer, I. (2014). *Revenue potential, tax space, and tax gap: a comparative analysis*. Policy Research Working Paper No. 6868. World Bank, Washington.
- Kleven, H. J., Kreiner, C. T., and Saez, E. (2016). Why can modern governments tax so much? an agency model of firms as fiscal intermediaries. *Economica*, 83(330):219–246.
- Ko, C. Y., Koyama, M., and Sng, T.-H. (2018). Unified china and divided europe. *International Economic Review*, 59(1):285–327.
- Kopits, G. (2001). Fiscal rules: useful policy framework or unnecessary ornament? *Available at SSRN 2094462*.
- Kose, M. A., Kurlat, S., Ohnsorge, F., and Sugawara, N. (2017). *A cross-country database of fiscal space*. The World Bank.
- Kose, M. A., Prasad, E. S., and Terrones, M. E. (2009). Does openness to international financial flows raise productivity growth? *Journal of International Money and Finance*, 28(4):554–580.
- Krogstrup, S. and Wälti, S. (2008). Do fiscal rules cause budgetary outcomes? *Public Choice*, 136(1-2):123–138.
- Krogstrup, S. and Wyplosz, C. (2010). A common pool theory of supranational deficit ceilings. *European Economic Review*, 54(2):269–278.
- Kroknes, V. F., Jakobsen, T. G., and Grønning, L.-M. (2015). Economic performance and political trust: The impact of the financial crisis on european citizens. *European Societies*, 17(5):700–723.
- Krugman, P. (1988). Financing vs. forgiving a debt overhang. *Journal of development Economics*, 29(3):253–268.
- Kumar, M., Baldacci, E., Schaechter, A., Caceres, C., Kim, D., Debrun, X., Escolano, J., Jonas, J., Karam, P., Yakadina, I., et al. (2009). Fiscal rules—anchoring expectations for sustainable public finances. *IMF staff paper, Washington DC*.

- Kumbhakar, S. and Lovell, C. (2000). Stochastic production frontier. *Cambridge University Press*. Kumbhakar, SC, & Sarkar, S.(2003). *Deregulation, ownership and productivity growth in the banking industry: Evidence from India*. *Journal of Money Credit and Banking*, 35(3):403-424.
- Kumbhakar, S. C. (1991). Estimation of technical inefficiency in panel data models with firm-and time-specific effects. *Economics Letters*, 36(1):43–48.
- Kumbhakar, S. C., Wang, H., and Horncastle, A. P. (2015). *A practitioner's guide to stochastic frontier analysis using Stata*. Cambridge University Press.
- Kumbhakar, S. C. and Wang, H.-J. (2005). Estimation of growth convergence using a stochastic production frontier approach. *Economics Letters*, 88(3):300–305.
- Lagarde, M. (2012). How to do (or not to do)... assessing the impact of a policy change with routine longitudinal data. *Health policy and planning*, 27(1):76–83.
- Langford, B. and Ohlenburg, T. (2015). *Tax revenue potential and effort*. IGC Working Paper. London: International Growth Centre, London School of Economics and Political Science.
- Le, T. M., Moreno-Dodson, B., and Bayraktar, N. (2012). *Tax capacity and tax effort: Extended cross-country analysis from 1994 to 2009*. Policy Research Working Paper No. 6252. World Bank, Washington.
- Lee, Y. H. and Schmidt, P. (1993). A production frontier model with flexible temporal variation in technical efficiency. *The measurement of productive efficiency: Techniques and applications*, pages 237–255.
- Levi, M. (1989). Of rule and revenue. In *Of Rule and Revenue*. University of California Press.
- Li, W., Roland, G., and Xie, Y. (2022). Erosion of state power, corruption control and fiscal capacity. *The Economic Journal*, 132(644):1542–1565.
- Lindberg, S. I., Bue, M. C. L., and Sen, K. (2022). Clientelism, corruption and the rule of law. *World Development*, 158:105989.

- Lotz, J. R. and Morss, E. R. (1967). Measuring “tax effort” in developing countries. *Staff Papers*, 14(3):478–499.
- Lucotte, Y. (2012). Adoption of inflation targeting and tax revenue performance in emerging market economies: An empirical investigation. *Economic Systems*, 36(4):609–628.
- Luechinger, S. and Schaltegger, C. A. (2013). Fiscal rules, budget deficits and budget projections. *International Tax and Public Finance*, 20(5):785–807.
- Marcus, J. (2013). The effect of unemployment on the mental health of spouses—evidence from plant closures in germany. *Journal of health economics*, 32(3):546–558.
- Mascagni, G., Moore, M., and McCluskey, R. (2014). *Tax Revenue Mobilisation In Developing Countries: Issues and Challenges*. European Union (Belgium).
- Mascagni, G. and Santoro, F. (2023). The tax side of the pandemic: Shifts in compliance attitudes and perceptions in rwanda. *The Journal of Development Studies*, pages 1–22.
- Masi, T., Savoia, A., Sen, K., et al. (2020). *Is there a fiscal resource curse? Resource rents, fiscal capacity, and political institutions in developing economies*. WIDER Working Paper 2020/10.
- Mawejje, J. and Sebudde, R. K. (2019). Tax revenue potential and effort: Worldwide estimates using a new dataset. *Economic Analysis and Policy*, 63:119–129.
- McGuirk, E. F. (2013). The illusory leader: natural resources, taxation and accountability. *Public choice*, 154(3-4):285–313.
- Milesi-Ferretti, G. M. (2004). Good, bad or ugly? on the effects of fiscal rules with creative accounting. *Journal of Public Economics*, 88(1-2):377–394.
- Minea, A. and Tapsoba, R. (2014). Does inflation targeting improve fiscal discipline? *Journal of International Money and Finance*, 40:185–203.
- Minea, A. and Villieu, P. (2009). Can inflation targeting promote institutional quality in developing countries? In *The 26th Symposium on Money, Banking and Finance*, University of Orléans, pages 25–26. Citeseer.

- Mkandawire, T. (2010). On tax efforts and colonial heritage in africa. *The Journal of Development Studies*, 46(10):1647–1669.
- Mudiyanselage, H. K., Rammohan, A., and Chen, S. (2020). Tax effort in developing countries: Where is sri lanka? *Journal of Tax Administration*, 6(1):162–189.
- Murshed, S. M., Bergougui, B., Badiuzzaman, M., and Pulok, M. H. (2020). Fiscal capacity, democratic institutions and social welfare outcomes in developing countries. *Defence and Peace Economics*, pages 1–26.
- Neuenkirch, M. and Neumeier, F. (2015). The impact of un and us economic sanctions on gdp growth. *European Journal of Political Economy*, 40:110–125.
- Neuenkirch, M. and Neumeier, F. (2016). The impact of us sanctions on poverty. *Journal of Development Economics*, 121:110–119.
- Neyapti, B. (2013). Fiscal decentralization, fiscal rules and fiscal discipline. *Economics Letters*, 121(3):528–532.
- Nordhaus, W. D. (1975). The political business cycle. *The review of economic studies*, 42(2):169–190.
- Ogrokhina, O. and Rodriguez, C. M. (2018). The role of inflation targeting in international debt denomination in developing countries. *Journal of International Economics*, 114:116–129.
- Ogrokhina, O. and Rodriguez, C. M. (2019). The effect of inflation targeting and financial openness on currency composition of sovereign international debt. *Journal of International Money and Finance*, 97:1–18.
- Okunogbe, O. and Santoro, F. (2022). *The promise and limitations of information technology for tax mobilisation*. ICTD Working Paper No. 135.
- Olson, M. (1993). Dictatorship, democracy, and development. *American political science review*, 87(3):567–576.
- Ostrom, E. (2008). Tragedy of the commons. *The new palgrave dictionary of economics*, 2.

- Ostry, J. D., Ghosh, A. R., Kim, J. I., Qureshi, M. S., et al. (2010). *Fiscal space*. IMF Staff Position Note 10/11.
- Panizza, U. and Presbitero, A. F. (2013). Public debt and economic growth in advanced economies: A survey. *Swiss Journal of Economics and Statistics*, 149:175–204.
- Panizza, U. and Presbitero, A. F. (2014). Public debt and economic growth: is there a causal effect? *Journal of Macroeconomics*, 41:21–41.
- Papagni, E., Baraldi, A. L., and Alfano, M. R. (2023). Ballot structure and political selection. evidence from changes in electoral rules. *Journal of Comparative Economics*, 51(1):324–347.
- Perotti, R. and Kontopoulos, Y. (2002). Fragmented fiscal policy. *Journal of Public Economics*, 86(2):191–222.
- Pessino, C. and Fenochietto, R. (2010). Determining countries' tax effort. *Hacienda Pública Española / Revista de Economía Pública*, pages 65–87.
- Pharr, S. J. and Putnam, R. D. (2000). *Disaffected democracies: What's troubling the trilateral countries?* Princeton University Press.
- Piancastelli, M. (2001). *Measuring the tax effort of developed and developing countries: cross country panel data analysis-1985/95*. IPEA Working Paper No. 818, Available at SSRN: <https://ssrn.com/abstract=283758>.
- Polavieja, J. et al. (2013). Economic crisis, political legitimacy, and social cohesion. *Economic crisis, quality of work and social integration: The European experience*, pages 256–278.
- Primo, D. M. (2006). Stop us before we spend again: Institutional constraints on government spending. *Economics & Politics*, 18(3):269–312.
- Queralt, D. (2019). War, international finance, and fiscal capacity in the long run. *International Organization*, 73(4):713–753.
- Rasmussen, M. (2016). The social policy around the world (spaw) database.
- Resilience, T. H. (2011). Sustaining mdg progress in an age of economic uncertainty. *United Nations Development Programme*.

- Reuter, W. H. (2015). National numerical fiscal rules: Not complied with, but still effective? *European Journal of Political Economy*, 39:67–81.
- Ricciuti, R., Savoia, A., and Sen, K. (2018). How do political institutions affect fiscal capacity? explaining taxation in developing economies. *Journal of Institutional Economics*, *Forthcoming*.
- Ricciuti, R., Savoia, A., and Sen, K. (2019). How do political institutions affect fiscal capacity? explaining taxation in developing economies. *Journal of Institutional Economics*, 15(2):351–380.
- Rodrigues, E. d. S. F. L. (2021). *Citizens' confidence in government and inefficient public spending: is there a trust trap?* REM Working Paper No 0199-2021.
- Roger, S. (2010). Inflation targeting turns 20. *Finance and Development*, 47(1):46–49.
- Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and statistics*, 71(1):135–158.
- Sachs, J. D. (1989). Conditionality, debt relief, and the developing country debt crisis. In *Developing Country Debt and Economic Performance, Volume 1: The International Financial System*, pages 255–296. University of Chicago Press.
- Sachs, J. D. and Warner, A. M. (2001). The curse of natural resources. *European economic review*, 45(4-6):827–838.
- Saka, O., Eichengreen, B., and Aksoy, C. G. (2022). Epidemic exposure, financial technology, and the digital divide. *Journal of Money, Credit and Banking*, 54(7):1913–1940.
- Salvi, M., Schaltegger, C. A., and Schmid, L. (2020). Fiscal rules cause lower debt: Evidence from switzerland's federal debt containment rule. *Kyklos*, 73(4):605–642.
- Samarina, A. and Sturm, J.-E. (2014). Factors leading to inflation targeting—the impact of adoption. *Applied Economics Letters*, 21(13):918–923.
- Sarwat, J. (2012). Inflation targeting: Holding the line imf. *Finance & Development March*, 28:2012.
- Savoia, A. and Sen, K. (2020). *The political economy of the 'resource curse'*. WIDER Working Paper 2020/123.

- Schaechter, M. A., Kinda, M. T., Budina, M. N., and Weber, A. (2012). *Fiscal Rules in Response to the Crisis: Toward the "Next-Generation" Rules: A New Dataset*. IMF Working Paper No. WP/12/187.
- Schaltegger, C. A. and Feld, L. P. (2009). Do large cabinets favor large governments? evidence on the fiscal commons problem for swiss cantons. *Journal of public Economics*, 93(1-2):35–47.
- Schlager, E. (2004). Common-pool resource theory. *Environmental governance reconsidered: challenges, choices, and opportunities*, pages 145–175.
- Schumpeter, J. A. and Swedberg, R. (1918). *The crisis of the tax state*.
- Sen Gupta, A. (2007). *Determinants of tax revenue efforts in developing countries*. IMF Working Paper No. 07/184.
- Shi, M. and Svensson, J. (2006). Political budget cycles: Do they differ across countries and why? *Journal of public economics*, 90(8-9):1367–1389.
- Stasavage, D. (2002). Private investment and political institutions. *Economics & politics*, 14(1):41–63.
- Stotsky, J. G. and WoldeMariam, A. (1997). *Tax effort in sub-Saharan Africa*. IMF working Paper No. 97/107.
- Tanzi, V. (1978). Inflation, real tax revenue, and the case for inflationary finance: Theory with an application to argentina (inflation, recettes fiscales réelles et avantages du financement inflationniste: théorie et application au cas de l'argentine)(inflación, ingreso tributario real y financiamiento inflacionario: Teoría y aplicación al caso de argentina). *Staff Papers-International Monetary Fund*, pages 417–451.
- Tanzi, V. (1992a). Structural factors and tax revenue in developing countries: a decade of evidence. In: Goldin, I., Winters, A.L. (Eds.), *Open Economies: Structural Adjustment and Agriculture*. Cambridge University Press, New York, pp. 205–241.
- Tanzi, V. (1992b). Structural factors and tax revenue in developing countries: a decade of evidence.

- Tapp, S. (2013). The use and effectiveness of fiscal rules in canadian provinces. *Canadian Public Policy*, 39(1):45–70.
- Tapsoba, R. (2012). Do national numerical fiscal rules really shape fiscal behaviours in developing countries? a treatment effect evaluation. *Economic Modelling*, 29(4):1356–1369.
- Taydas, Z. and Peksen, D. (2012). Can states buy peace? social welfare spending and civil conflicts. *Journal of Peace Research*, 49(2):273–287.
- Thornton, J. (2014). Does foreign aid reduce tax revenue? further evidence. *Applied Economics*, 46(4):359–373.
- Tian, X. and Xu, J. (2022). Do place-based policies promote local innovation and entrepreneurship? *Review of Finance*, 26(3):595–635.
- Tilly, C. (1975). Reflections on the history of european state-making. *The formation of national states in Western Europe*, 38.
- Tilly, C. et al. (1992). *Coercion, capital, and European states, AD 990-1992*. Blackwell Oxford.
- Timmons, J. F. (2005). The fiscal contract: States, taxes, and public services. *World Politics*, 57(4):530–567.
- Tübbicke, S. (2022). Entropy balancing for continuous treatments. *Journal of Econometric Methods*, 11(1):71–89.
- Vahabi, M. (2018). The resource curse literature as seen through the appropriability lens: a critical survey. *Public Choice*, 175(3-4):393–428.
- van der Crujssen, C., de Haan, J., and van Rooij, M. (2023). *The impact of high inflation on trust in national politics and central banks*. De Nederlandsche Bank Working Paper No. 762, Available at SSRN: <https://ssrn.com/abstract=4330151> or <http://dx.doi.org/10.2139/ssrn.4330151> Nederlandsche Bank Working Paper.
- Veiga, F. J., Veiga, L. G., and Morozumi, A. (2017). Political budget cycles and media freedom. *Electoral Studies*, 45:88–99.

- Velasco, A. et al. (1999). A model of endogenous fiscal deficits and delayed fiscal reforms. *Fiscal institutions and fiscal performance*, 6336(January):37–58.
- Von Hagen, J. (2002). Fiscal rules, fiscal institutions, and fiscal performance. *Vol. XX, No. XX, Issue, Year*.
- Von Hagen, J. and Harden, I. J. (1995). Budget processes and commitment to fiscal discipline. *European Economic Review*, 39(3-4):771–779.
- Von Hagen, J. and Wolff, G. B. (2006). What do deficits tell us about debt? empirical evidence on creative accounting with fiscal rules in the eu. *Journal of Banking & Finance*, 30(12):3259–3279.
- Wang, R. F., Irwin, T. C., and Murara, L. K. (2015). Trends in fiscal transparency: Evidence from a new database of the coverage of fiscal reporting. In *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association*, volume 108, pages 1–37. JSTOR.
- Weber, M. (1919). *Politics as a vocation. essays in sociology*.
- Weingast, B. R., Shepsle, K. A., and Johnsen, C. (1981). The political economy of benefits and costs: A neoclassical approach to distributive politics. *Journal of political Economy*, 89(4):642–664.
- Wierds, P. (2007). Can expenditure rules counter expenditure pressures from revenue windfalls? In *Paper for the ECB Public Finance Workshop of*, volume 6.
- Wierds, P. (2012). How do expenditure rules affect fiscal behaviour? *Available at SSRN 2004456*.
- Wyplosz, C. (2018). Fiscal councils and fiscal rules: Complements or substitutes? *Independent fiscal councils: Watchdogs or lapdogs*.
- Xu, G. (2019). The colonial origins of fiscal capacity: Evidence from patronage governors. *Journal of Comparative Economics*, 47(2):263–276.
- Zhang, B., Wang, Y., and Sun, C. (2023). Urban environmental legislation and corporate environmental performance: End governance or process control? *Energy Economics*, 118:106494.

Appendix

Table A1 – Sample alteration

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	Excluding post-cold war years	Drop post and GFC years	Drop post Addis Ababa conference	Excluding hyperinflation episodes	Excluding tax havens	Excluding fragile states	Excluding non-fiscal rules countries
Fiscal rules	0.723** (0.2825)	1.277*** (0.4780)	1.182*** (0.3217)	1.074*** (0.2943)	0.761** (0.3341)	1.100*** (0.2773)	1.239*** (0.3559)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1162	685	1170	1254	1078	1088	652
	[8]	[9]	[10]	[11]	[12]	[13]	[14]
	Excluding non-fiscal rules countries	Excluding non-fiscal rules countries	Drop bottom 10% fiscal capacity	Drop top 10% fiscal capacity	Excluding major changes	Including developed countries	Including time trend
Fiscal rules	1.239*** (0.3559)	1.108*** (0.2859)	1.040*** (0.3235)	1.248*** (0.2971)	2.089*** (0.4265)	0.687*** (0.1821)	1.154*** (0.2804)
Time trend	Yes	Yes					Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	Yes	Yes	Yes	No
Observations	652	652	1166	1145	969	1837	1275

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All specifications include the covariates defined in the baseline model.

Table A2 – Confounding factors and pre-treatment test

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Fiscal rules w/o IMF programs	1.568*** (0.3529)							
Fiscal rules w/o IT		1.305*** (0.3456)						
Fiscal rules (t+1)			0.173 (0.2102)					
Fiscal rules (t+2)				-0.121 (0.2209)				
Fiscal rules (t+3)					0.054 (0.2255)			
Fiscal rules (t+4)						-0.040 (0.2270)		
Fiscal rules (t+5)							-0.292 (0.2207)	
Random fiscal rules								0.020 (0.1361)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1145	1207	941	959	977	993	1011	1275

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All specifications include the covariates defined in the baseline model.

Table A3 – Additional control variables

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity	Fiscal capacity
Fiscal rules	0.771*** (0.2920)	1.153*** (0.4101)	0.635** (0.3014)	1.398*** (0.3269)	1.385*** (0.3917)	0.830** (0.4000)	1.069*** (0.2855)	0.388* (0.2086)	1.524*** (0.4051)	0.942** (0.4225)
War	-0.249 (0.4539)				1.019 (0.7138)	0.726 (0.6350)			1.519** (0.7630)	1.154* (0.6842)
Government stability	0.200*** (0.0728)				0.226*** (0.0757)	0.154** (0.0663)			0.198*** (0.0725)	0.128** (0.0617)
Clientelism	-7.721*** (2.0174)				-7.144* (4.0154)	-4.706 (3.6883)			-6.880* (4.0071)	-5.202 (3.6555)
Chief executive eligible for reelection	-0.345* (0.1981)				-0.156 (0.2956)	0.044 (0.2829)			-0.150 (0.3029)	0.035 (0.2963)
Inequality		-10.998** (5.5846)			-0.043 (5.5980)	-1.692 (5.1256)			3.304 (5.4977)	1.338 (5.2144)
Ethnic fractionalization		-13.010 (10.5024)			-9.780 (17.0667)	-5.232 (16.4927)			-5.317 (17.3683)	0.264 (16.4680)
Political polarization		0.090 (0.2762)			1.093*** (0.3186)	0.371 (0.3094)			1.078*** (0.3184)	0.359 (0.3158)
Social policy legislation		0.124 (0.6977)			0.038 (0.9103)	-0.274 (0.8018)			0.153 (0.9049)	-0.223 (0.8000)
Access to public services		3.016*** (0.9016)			3.361*** (0.9827)	3.311*** (1.0119)			3.208*** (1.0561)	3.053*** (1.0944)
ODA			-0.075*** (0.0266)		-0.058 (0.0745)	-0.020 (0.0667)			-0.058 (0.0732)	-0.027 (0.0660)
KOF globalisation index			-0.105** (0.0470)		-0.091 (0.0708)	-0.047 (0.0711)			-0.079 (0.0786)	-0.067 (0.0796)
Trade openness			0.019** (0.0086)		0.012 (0.0158)	0.010 (0.0141)			0.010 (0.0164)	0.009 (0.0143)
Real resource prices			-0.024 (0.0181)		-0.045** (0.0225)	0.009 (0.0193)			-0.051** (0.0235)	0.010 (0.0215)
Remittances			0.614*** (0.2344)		0.231* (0.1260)	0.246* (0.1257)			0.156 (0.1184)	0.182 (0.1157)
Informal sector				0.055 (0.0832)	0.005 (0.0885)	0.107 (0.0926)			0.010 (0.0942)	0.079 (0.0875)
Urban population				-0.038 (0.0595)	0.092 (0.0876)	0.025 (0.0768)			0.070 (0.0881)	-0.007 (0.0809)
Education				0.024* (0.0136)	0.073*** (0.0162)	0.063*** (0.0162)			0.084*** (0.0162)	0.072*** (0.0167)
Financial development				0.123 (0.2911)	0.804* (0.4155)	0.131 (0.3929)			0.896** (0.4296)	0.324 (0.4300)
Tax expenditure				-0.028 (0.0481)	-0.091 (0.0552)	-0.076 (0.0472)			-0.099* (0.0570)	-0.085* (0.0494)
Real GDP per capita				-0.002 (0.0035)	0.029* (0.0169)	0.019 (0.0179)			0.022 (0.0169)	0.017 (0.0173)
Climate vulnerability				-0.327 (0.4345)	0.466 (0.5015)	0.182 (0.4734)			0.579 (0.4673)	0.158 (0.4418)
Lag fiscal capacity						0.314*** (0.0685)		0.615*** (0.0483)		0.312*** (0.0696)
Entropy balancing covariates	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Observations	1161	867	1144	800	464	460	1300	1283	464	460

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All specifications include the covariates defined in the baseline model except in columns [7] and [8].

Table A4 – Alternative definition of fiscal capacity and covariate balance moment

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Fiscal rules	1.109*** (0.2930)	1.331*** (0.4166)	1.235*** (0.3205)	1.055*** (0.2818)	0.658*** (0.2078)	2.210*** (0.5877)	2.754*** (0.8690)	2.007*** (0.6881)	1.359*** (0.3371)	1.359*** (0.3371)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1275	1045	1269	1275	1298	1160	1298	1099	1275	1275

Unreported constant included. Standard errors in bracket. All specifications include the covariates defined in the baseline model. *** p<0.01, ** p<0.05, * p<0.1. Note: Columns [1]-[2] use fiscal capacity augmented by the following variables: column [1]: output gap; column [2]: ODA, lagged public debt, output gap, GDP per capita squared, urbanization, colonial past, wars, and tax havens. Column [3] lags the variables included in the baseline fiscal capacity model; column [4] drops institutional quality in the baseline fiscal capacity model. Columns [5]-[8] respectively use the following as dependent variables: total tax revenue (%GDP), direct tax to total revenue ratio, total tax revenue relative to average tax revenue of developed countries, and tax revenue dissimilarity. Columns [9]-[10] use variance and skewness respectively to estimate the treatment effect of entropy balancing. In these two columns, the dependent variable is the fiscal capacity of the baseline model.

Table A5 – Alternative estimation methods

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	OLS	OLS	OLS	OLS	IV first stage	OLS-IV	System GMM
Fiscal rules	3.149*** (0.9065)	2.799*** (0.6420)	2.262*** (0.8710)	1.708** (0.7005)		0.684** (0.2889)	0.965*** (0.2413)
Contiguity IV					0.974*** (0.0050)		
Lag fiscal capacity							0.786*** (0.0270)
Kleibergen-Paap rk statistic						786.05	
Stock-Wright p-value						0.0162	
AR(1)/AR(2) p-value							0.001/0.275
Hansen test p-value							0.400
No instruments							59
Country fixed effects	No	Yes	Yes	Yes	Yes	Yes	No
Year fixed effects	No	No	Yes	Yes	Yes	Yes	Yes
Observations	2017	2017	2017	1886	2023	1802	1828

Unreported constant included. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. All specifications include the covariates defined in the baseline model except in columns [1]-[3]. Note: OLS: Ordinary Least Square; IV first stage: two-stage least-squares (OLS-IV/2SLS) first-stage equation in which the dependent variable is fiscal rules adoption and the interest variable that is the instrument is fiscal rules adoption in neighboring countries named contiguity; OLS-IV: two-stage least-squares (2SLS); System GMM: [Blundell and Bond \(1998\)](#) GMM System estimator.

Table A6 – Fiscal rules countries

Fiscal rules countries	Non-fiscal rules countries
Argentina	Albania
Azerbaijan	Algeria
Bahamas, The	Angola
Botswana	Bangladesh
Brazil	Belarus
Bulgaria	Bolivia
Burkina Faso	Brunei Darussalam
Colombia	China
Congo, Rep.	Dominican Republic
Costa Rica	Egypt, Arab Rep.
Cote d'Ivoire	El Salvador
Croatia	Gambia, The
Ecuador	Guatemala
Gabon	Guinea
Guinea-Bissau	Haiti
India	Honduras
Indonesia	Jordan
Iran, Islamic Rep.	Kuwait
Jamaica	Lebanon
Kenya	Madagascar
Liberia	Malawi
Mongolia	Moldova
Namibia	Morocco
Niger	Mozambique
Nigeria	Nicaragua
Panama	Philippines
Paraguay	Saudi Arabia
Peru	Sierra Leone
Romania	South Africa
Senegal	Tunisia
Singapore	Ukraine
Sri Lanka	Venezuela, RB
Tanzania	Zambia
Thailand	Zimbabwe
Togo	
Uganda	
Uruguay	

Table A7 – Sample country list

Country	Country
Angola	Kuwait
Albania	Lebanon
Argentina	Liberia
Azerbaijan	Sri Lanka
Burkina Faso	Morocco
Bangladesh	Moldova
Bulgaria	Madagascar
Bahamas, The	Mongolia
Belarus	Mozambique
Bolivia	Malawi
Brazil	Namibia
Brunei Darussalam	Niger
Botswana	Nigeria
China	Nicaragua
Cote d'Ivoire	Panama
Congo, Rep.	Peru
Colombia	Philippines
Costa Rica	Paraguay
Dominican Republic	Romania
Algeria	Saudi Arabia
Ecuador	Senegal
Egypt, Arab Rep.	Singapore
Gabon	Sierra Leone
Guinea	El Salvador
Gambia, The	Togo
Guinea-Bissau	Thailand
Guatemala	Tunisia
Honduras	Tanzania
Croatia	Uganda
Haiti	Ukraine
Indonesia	Uruguay
India	Venezuela, RB
Iran, Islamic Rep.	South Africa
Jamaica	Zambia
Jordan	Zimbabwe
Kenya	

Table A8 – Statistics description of the main variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Fiscal capacity	2,017	55.5305	18.4431	3.2021	91.4031
Fiscal rules	2,518	0.2156	0.4114	0	1
Financial openness	2,202	-0.149	1.4511	-1.9166	2.3467
Government fractionalization	2,209	0.1745	0.2593	0	0.9125
Political system	2,133	0.1299	0.3362	0	1
Democracy	2,229	3.435	1.3482	0	6
Member of currency union	2,518	0.1235	0.3291	0	1
Public debt (lag)	1,975	68.1338	74.8384	0.3182	2092.92
GDP growth	2,437	3.5719	4.951	-42.4511	49.4474
Fiscal balance	1,814	-2.219	6.9943	-151.309	43.304
executive constraints	2,320	0.3229	0.1991	0.027	0.865
Rule of law	2,421	0.4572	0.2407	0.009	0.977
Inflation	2,377	0.8201	3.3266	-54.556	112.1111
Property rights	2,421	0.6762	0.1976	0.002	0.948
Regime support groups	2,409	0.1876	0.1568	0	0.6

Justification of the additional control variables

First, institutional variables can influence fiscal capacity. For example, common shocks such as war can enhance the development of fiscal capacity by increasing national identity (Hintze, 1906; Tilly et al., 1992; Stasavage, 2002; Besley and Persson, 2014). Government stability can positively influence fiscal capacity (Besley et al., 2013). Specifically, as noted by Albers et al. (2023), governments' motivation to invest in fiscal capacity depends on their stability given the uncertainty surrounding returns on that investment when government turnover is high. Clientelism and the ability of the head of the executive to be re-elected negatively affect fiscal capacity due to, respectively, the effect of clientelism on the quality of institutions, including the rule of law, and the political costs of raising taxes, which can undermine the re-election chances of the incumbent government (Christensen and Garfias, 2021; Lindberg et al., 2022).

Second, the literature provides a rationale for the role of social policy variables in the construction of fiscal capacity. Indeed, as Besley and Persson (2014) noted, a rise in inequality could induce governments to implement tax policies to ensure their redistributive function. Moreover, higher inequality can negatively affect tax collection through the reduction of the tax base arising from lower growth or the labor force flight following the introduction of a progressive tax to correct income disparities (Berg et al., 2018; Deng, 2019). Ethnic fractionalization negatively influences fiscal capacity not only because of its effect on development but also due to tensions within countries that could increase animosity between groups and reduce national identity (Easterly and Levine, 1997; Besley and Persson, 2014). We include political polarization defined as a dummy variable taking 1 if the government has left-wing ideologies to account for the orientation of incumbent politicians that might explain fiscal policy outcomes (Beramendi et al., 2019; Andersson, 2022). The intuition behind this variable comes from the argument that left-wing parties tailor public policy to the working class. As a result, they are more likely than right-wing parties to increase both the overall level and progressivity of taxation when in power, in order to finance redistributive public goods that benefit their working-class base. However, since government orientation alone would not be enough to capture the redistributive tendencies of the government fully, we follow Andersson (2022) by including a variable indicating the number of social policies that we expect to be positively associated with fiscal capacity building. Finally, we include access to public

services in our baseline model (Timmons, 2005; Aboagye and Hillbom, 2020; Mascagni and Santoro, 2023). Indeed, the social contract that binds citizens to their government emphasizes the accountability of taxation. Consequently, a government can benefit from a greater tax civism/moral of its population if it offers the latter the required public services.

Three, we include variables related to globalization—and international economics. First, we include ODA to capture its effect on the tax collection effort. Indeed, ODA, through its exemptions or extraversion principle, can reduce countries' fiscal capacity unless the funds are invested in projects that promote growth or increase the efficiency of public administration (Gambaro et al., 2007; Sen Gupta, 2007; Clist and Morrissey, 2011; Thornton, 2014; Albers et al., 2023). Second, we include globalisation index to isolate its effect on tax revenues and therefore on fiscal capacity. Indeed, if globalisation can represent an opportunity for growth (Dreher, 2006a), for example through the diffusion of "best" practices, ideas, and norms, and through technological spillover, it can also offer an alternative to what Evertsson (2016) calls *a crime of globalization*, by creating the possibility for economic agents to evade taxes. Placing these discussions together we conclude that the effect of globalization on fiscal capacity is ambiguous, i.e. positive or negative. Next, we focus on a particular globalisation employed in the literature, namely trade openness, which we expect to positively determine fiscal capacity as Beramendi et al. (2019). Finally, we include real resource prices as Albers et al., 2023 and remittances to control for the effect of the natural resource curse and the favorable effect of remittances on fiscal capacity (McGuirk, 2013; Asatryan et al., 2018; Albers et al., 2023).

Finally, structural and tax policy variables can influence fiscal capacity. For example, informal sector can negatively influence fiscal capacity. Indeed, in modern economies, a large informal sector limits a government's ability to tax effectively this part of the economy difficult, as a large informal sector makes widespread taxation of income virtually impossible (Besley and Persson, 2014; Grier et al., 2022). Urban population may positively influence the development of fiscal capacity. Indeed, urbanization reduces tax administration costs as it is easier, from an organizational viewpoint, to develop tax infrastructure in states where the population is concentrated in urban areas (Herbst, 2014; Ricciuti et al., 2019). Education can have a positive influence on investment in fiscal

capacity. Specifically, a higher level of education in a country leads to greater specialization and thus to more sophisticated production methods or economic activities that can increase tax revenue. Moreover, higher levels of education promote social engagement, which in turn raises awareness of the benefits of taxation (Castro and Camarillo, 2014). We include financial development since access to financial tools is a valuable asset for third-party development that provides information on the taxpayer's ability to pay tax, thereby reducing tax evasion or fraud and increasing compliance (Gordon and Li, 2009; Kleven et al. (2016); Apeti and Edoh, 2023). To raise tax revenue and thus fiscal capacity, policymakers often indicate that base-broadening measures, such as tax expenditure limitations or reductions, can raise revenue while being less damaging to economic activity (Feldstein, 2015; Dabla-Norris and Lima, 2023). Based on this observation, we extend our baseline model by including tax expenditure. Next, we include the real GDP per capita, which positively determines fiscal capacity. Using this variable allows us to capture a time-varying confounding factor, which simultaneously generates growth, development, technological development, and modernization of the economy, leading to a higher tax take (Besley et al., 2013; Andersson, 2022). Finally, we include climate vulnerability as Buonanno et al. (2023) stressed exposure to climate risks increases the population's contribution to the public good and thus taxpayer's compliance.

Sources, and definitions of the data

Fiscal capacity: tax effort. Source: authors' calculation based on ICTD / UNU-WIDER Government Revenue Dataset

Total tax revenue (%GDP): non-resource tax excluding social contributions (%GDP). Source: authors' calculation based on ICTD / UNU-WIDER Government Revenue Dataset

Direct tax to total revenue ratio: share of direct taxes in total tax revenue. Source: Authors' calculation based on ICTD / UNU-WIDER Government Revenue Dataset

Fiscal rules: dummy variable equal to 1 if a country had in place a numerical limit on fiscal aggregates (expenditure, revenue, budget balance, debt) and 0 otherwise. Source: IMF Fiscal Rules Dataset

BBR: dummy: Budget balance rule in place (1 if yes). Source: IMF Fiscal Rules Dataset

DR: dummy: Debt rule in place (1 if yes). Source: IMF Fiscal Rules Dataset

ER: dummy: Expenditure rule in place (1 if yes). Source: IMF Fiscal Rules Dataset

RR: dummy: Revenue rule in place (1 if yes). Source: IMF Fiscal Rules Dataset

Inflation: inflation, average consumer prices (Percent change). Source: IMF World Economic Outlook (IMF-WEO)

Financial openness: financial openness. Source: [Chinn and Ito \(2006\)](#)

Government fractionalization index: government fragmentation. Source: Database of Political Institutions (2017)

Political system: 1 if parliamentary system. Source: DPI

Democracy: democratic accountability. Source: International Country Risk Guide (ICRG)

GDP growth: GDP growth (annual %). World Development Indicators (WDI)

Public debt: general government gross debt (Percent of GDP). Source: [Ali Abbas et al. \(2011\)](#)

Fiscal balance: fiscal balance, % of GDP. Source: [Kose et al. \(2017\)](#)

Executive constraints: we follow the definition of [Albers et al., 2023](#) using liberal democracy index. Source: V-DEM (Varieties of Democracy) database

Rule of law: rule of law index. Source: V-DEM (Varieties of Democracy) database

Property rights : property rights. Source: V-DEM (Varieties of Democracy) database

Property rights : we follow [Andersson \(2022\)](#) by defining a variable indicating whether

the most important regime support group in a particular year is either the aristocracy or agrarian elites. Source: Authors' construction based on V-DEM (Varieties of Democracy) database

Fiscal rules strength : variable defining fiscal rules force. Source: Authors' calculation based on IMF Fiscal Rules Dataset

Fiscal transparency : fiscal transparency index. Source: [Wang et al. \(2015\)](#)

Political competition : vote share of opposition parties. Source: DPI

Freedom of expression : freedom of academic exchange and dissemination. Source: V-DEM (Varieties of Democracy) database

IT: Dummy variable equal to 1 if a country is under IT regime in a given year; 0 otherwise. Source: [citeroger2010inflation](#); [Sarwat \(2012\)](#); [Hammond et al. \(2012\)](#); [Agénor and da Silva \(2019\)](#); and websites of various central banks

Real commodity prices : commodity price index. Source: [Gruss and Kebhaj \(2019\)](#)

Output gap: output gap computed using Hodrick-Prescott filter. Source: Authors' calculations based on WDI

Contiguity IV: captures fiscal rule diffusion in neighboring countries. Source: Authors' calculations based Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and IMF Fiscal Rules datasets

fiscal council: dummy variable equal to 1 if a country had a fiscal council. Source: IMF Fiscal Council Dataset

IMF program dummy: 1 if IMF program. Source: [Dreher \(2006b\)](#)

Inflation targeting (IT): dummy variable equal to 1 if a country is under IT regime in a given year; 0 otherwise. Source: [Roger \(2010\)](#); [Sarwat \(2012\)](#); [Hammond et al. \(2012\)](#); and websites of various central banks

Growth: GDP growth. Source: WDI

War : we follow [Andersson \(2022\)](#) using legislature declares war by law. Source: Authors' construction based on V-DEM (Varieties of Democracy) database

War : we follow [Andersson \(2022\)](#) using legislature declares war by law. Source: Authors' construction based on V-DEM (Varieties of Democracy) database

Trade openness: trade (% of GDP). Source: WDI

Government stability: government stability index. Source: International Country Risk Guide (ICRG)

Clientelism : clientelism index. Source: V-DEM (Varieties of Democracy) database

Chief executive eligible for reelection : chief executive eligible for reelection. Source:

DPI

Inequality : Gini index. Source: World Inequality Database (WID)

Ethnic fractionalization : ethnic fractionalization index. Source: [Dražanová \(2020\)](#)

Political polarization : 1 if the government in power has a left-wing ideology. Source:

DPI

Social policy legislation : we follow [Andersson \(2022\)](#) using the number of social policy legislation. Source: [Rasmussen \(2016\)](#)

Access to public services : access to public services distributed by socio-economic position. Source: V-DEM (Varieties of Democracy) database

ODA: net official development assistance (ODA) received (% of GNI). Source: WDI

KOF globalisation index: KOF globalisation index. Source: [Dreher \(2006a\)](#) ; [Gygli et al. \(2018\)](#)

Tax havens: 1 if the country is classified as a tax haven. Source: authors' calculations based on Corporate Tax Haven Index

Remittances: personal remittances, received (% of GDP). Source: WDI

Informal sector: informal sector. Source: [Elgin et al. \(2021\)](#)

Urbanization : urban population (% of total population). Source: WDI

Education : education. Source: WDI

Financial development : Domestic credit to private sector (% of GDP). Source: [Kose et al. \(2017\)](#)

Education : education. Source: WDI

Tax expenditure (% GDP): revenue forgone (% of GDP). Source: Global Tax Expenditures Database (GTED)

Real GDP per capita: real GDP per capita. Source: Maddison Project Database

Climate vulnerability: Vulnerability to climate change. Source: Notre Dame Global Adaptation Index