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► **To cite this version:**

Bao-We-Wal Bambe, Jean-Louis Combes, Manegdo Ulrich Doamba, Chantale Riziki Oweggi. Institutions Matter: Press Freedom and Government Spending Efficiency. 2024. hal-04828819

**HAL Id: hal-04828819**

**<https://hal.science/hal-04828819v1>**

Preprint submitted on 10 Dec 2024

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# Institutions Matter: Press Freedom and Government Spending Efficiency

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## Abstract

We examine the effect of media freedom on public expenditure efficiency, using a panel of 158 advanced and developing countries from 1994 to 2016. We find robust evidence that media freedom significantly improves government efficiency, and the effect is strongly complementary to per capita income, level of education, Internet access, and fiscal rules. We further empirically examine the underlying mechanisms and show that the effect of media freedom on efficiency is mainly channeled through reduced corruption, improved transparency and accountability in the public sector, and enhanced electoral competition. These findings underscore the critical role of media freedom in fostering good governance and efficient resource use.

Keywords: • Government spending efficiency • Media freedom • Institutions

JEL Classification: C23; E62; H6; H11

Acknowledgments: We thank our colleagues for their valuable comments and ideas. The findings and conclusions presented in this paper are solely the authors' responsibility and do not necessarily reflect the views of their institutions.

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# 1 Introduction

Press freedom has been declining since the early 2000s, in both advanced and developing countries —as highlighted in several recent reports, including those from Freedom House (Gorokhovskaia and Grothe, 2024) and Reporters Without Borders (RSF).<sup>1</sup> This is mainly due to the emergence of several authoritarian and populist regimes, with leaders becoming increasingly hostile to a free and independent press (Kenny, 2020). Yet, media freedom is a key foundation of a strong and viable democracy. Indeed, a free and independent press acts as a counter-power by reducing information asymmetry between those who govern and those they are supposed to serve, thus enhancing decision-makers accountability through reputational oversight and sanctions (Islam, 2002; Schudson, 2002; Stiglitz et al., 2002; Silverblatt, 2004; Gentzkow et al., 2006).

Numerous studies show that governments have considerable scope for improving their expenditure efficiency, which measures the performance of the public sector in delivering goods and services. This suggests that more public services could be delivered using the same amount of public resources, or the same level of services could be maintained with reduced public resources (e.g., see Afonso et al., 2005; Apeti et al., 2023b; Afonso et al., 2024b). The issue of public spending efficiency<sup>2</sup> is all the more crucial for governments amidst tightening budgetary constraints in advanced and developing countries, exacerbated by recent crises. Consequently, in the context of the general decline in press freedom and dwindling budgetary funds, where particular attention is paid to more efficient use of public resources, we examine whether improved media freedom significantly increases public expenditure efficiency. We argue that by reducing information asymmetry between policy-makers and those they are supposed to serve, press freedom may incentivize decision-makers to be more responsive and accountable for their decisions, thus promoting greater transparency and reducing budgetary waste and corruption (e.g., see Ahrend, 2002; Brunetti and Weder, 2003; Chowdhury, 2004; Freille et al., 2007), with

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<sup>1</sup><https://rsf.org/en/2024-world-press-freedom-index-journalism-under-political-pressure>

<sup>2</sup>In this study, the terms “public expenditure efficiency” and “government efficiency” are used interchangeably.

positive effects on government efficiency.

Our Tobit regressions based on a panel of 158 advanced and developing countries over the period 1994-2016 suggest that press freedom indeed significantly improves government efficiency. The results are robust to a battery of tests, including when considering alternative specifications, subsamples, measures, and estimators such as the ordinary least squares (OLS) method and the bias-corrected fixed effects (LSDVC). In addition, partially building on previous studies (e.g., see [Persson and Tabellini, 2009](#); [Giuliano et al., 2013](#); and [Acemoglu et al., 2019](#)), we exploit an exogenous source of variation, instrumenting the press freedom index by the average press freedom in neighboring countries. The estimates from the instrumental variables strategy do not alter our main conclusions. We obtain similar results when estimating average treatment effects, using the entropy balancing method. Overall, the estimated coefficients are economically reasonable and become more significant for country/year observations with a free press. We further conduct a series of heterogeneity analyses, and find that the favorable effect of media freedom on government efficiency holds across all the regions considered and is amplified by complementary factors such as higher per capita income, improved education levels, greater Internet access, and the presence of fiscal rules. Lastly, the analysis of the main transmission channels reveals that the positive effect of media freedom on government efficiency is mainly channeled through reduced corruption, improved transparency and accountability in the public sector, and enhanced electoral competition.

The document is organized as follows. The following section discusses potential mechanisms linking press freedom and government efficiency. Section [3](#) briefly reviews the literature on government efficiency and discusses our efficiency measure. Section [4](#) describes our main data and provides descriptive statistics. The empirical strategy and the main results are presented in Section [6](#), with a range of robustness checks. While our main results are based on Tobit regressions, Section [7](#) relies on alternative estimation methods. Section [8](#) presents results using treatment effects. Section [9](#) discusses the economic size of our estimates. Sections [10](#) and [11](#) conduct several heterogeneity analyses, and empirically examine the main transmission channels, respectively. The last section

concludes our analysis.

## 2 Background

While governments need to spend to meet various socio-economic needs, their budgets are nevertheless limited and constrained by the need to avoid waste, which is crucial to promote efficiency (Spilimbergo et al., 2009). Inefficiency in government spending is all the more plausible given the lack of competition in the public sector (Hallaert and Primus, 2022), and can occur via “active” or “passive” waste. The former refers to corruption in public procurement, involving a lack of transparency in the management of public funds; while the latter includes various types of expenditure with high costs and low social benefits, expenditure for individual interests (“perks”), waste through negligence, or cost overruns (see Bandiera et al., 2009). With that said, in a context of shrinking budget funds, governments must be “more productive and less wasteful” in delivering public goods and services to ensure fiscal sustainability (Jackson and McLeod, 1982; Spilimbergo et al., 2009; Hallaert and Primus, 2022; Apeti et al., 2023b; Afonso and Alves, 2023b). This is particularly crucial as public finances have worsened in most economies due to the pandemic crisis and higher military budgets resulting from geopolitical tensions, leaving governments with little scope for fiscal policy (SIPRI, 2024).

A long and well-established literature discusses the role of institutions in economic development (e.g., see North and Thomas, 1973; North, 1991; North and North, 1992; Knack and Keefer, 1995; Acemoglu et al., 2001; Acemoglu et al., 2005). Relatedly, considered an institution in their own right, mass media play a central role in socio-political and economic discourse, and shape human interactions (Schudson, 2002; Silverblatt, 2004). Commonly referred to as the fourth estate, media do not have the formal power to sanction public officials (in contrast to the three branches of government: executive, legislative, and judicial), but do exert external pressure to ensure government accountability and effectiveness. By providing information and serving as a link between citizens and their political representatives, a free and independent press acts as a watchdog

(Norris, 2004) and helps ensure checks and balances within government bodies (Donohue et al., 1995). This contributes to promoting accountability and transparency within the public service (Donohue et al., 1995; Stapenhurst, 2000; Norris, 2004), thus supporting a strong and viable democratic framework (Donohue et al., 1995; Stapenhurst, 2000; Norris, 2004; De Smaele, 2006). Along these lines, authors emphasize the critical role of media in fighting corruption in public offices, since studies find that high levels of media freedom reduce corruption (Donohue et al., 1995; Stapenhurst, 2000; Norris, 2004; Camaj, 2013; Kalenborn and Lessmann, 2013; Bhattacharyya and Hodler, 2015; García-Sánchez et al., 2016; Dutta and Roy, 2016). Relatedly, another strand of the literature suggests that the dissemination of information by a free press reduces political budget cycles (e.g., see Vergne, 2009; Petrarca, 2014; Veiga et al., 2017; Repetto, 2018) and promote economic development in terms of output growth (Nguyen et al., 2021) and FDI inflows (Alam and Ali Shah, 2013). However, the literature equally highlights a risk to press freedom if media companies are excessively concentrated in the hands of the same pressure groups (Posner, 1977; Loevinger, 1980). In such cases, market forces could wipe out pluralism within the press, although in this study we focus on the public sector. The same applies to populist regimes, where information control is important (Kenny, 2020).

In line with the above literature, we argue that free and independent media may reduce government drifts and foster greater accountability and transparency within the public sector, thus providing incentives for governments to be more efficient in delivering public goods and services (i.e., “to do more with less”) —for instance via reduced waste or corruption. The favorable effect of press freedom on efficiency is all the more plausible, given that in the presence of low information asymmetry between governments and those they govern, inefficient use of spending or budgetary drifts are likely to be punished by citizens, for example via uprisings, sanctions during elections, or reduced tax compliance. Indeed, while taxes are used to finance public goods and services (Cowell and Gordon, 1988), the individual’s perception of his tax payments compared to the provision of public goods may influence his decision to comply with the tax system. Since a

free and independent press is useful for informing citizens about public sector management, inefficient provision of public goods and services should send a negative signal to the taxpayer about his perceived use of taxes, which may reduce his compliance with the tax system (Bordignon, 1993). Lastly, electoral competition is another potential channel through which press freedom can affect public spending efficiency. The literature shows that independent media contribute to reducing the manipulation of information and increasing voter turnout, and thus to greater political competition.<sup>3</sup> Yet a large body of literature has explored the link between political competition and government performance. Taking a more skeptical view, Buchanan and Wagner (1977) consider that political competition in democracies can encourage politicians to implement generous and inefficient policies via higher deficits (without compensating by taxation), to maximize their popularity and increase their chances of re-election. However, other perspectives are more nuanced. For example, Yogo and Ngo Njib (2018) show that in the presence of strong electoral competition, the financing of public policies likely to satisfy voters can also involve greater tax mobilization. This may therefore promote an accountability mechanism that encourages governments to strengthen tax administration and combat tax evasion, to maximize the utility of the expenditure incurred. Similarly, Gootjes and De Haan (2022) suggest that strong domestic political competition may lead governments to be more inclined to adhere to responsible fiscal frameworks, such as fiscal rules. In this vein, greater electoral competition promoted by press freedom could lead governments to implement policies aimed at maximizing collective welfare, to prevent the opposition from taking advantage of government failures to mobilize voters and strengthen its position. In short, our reading is that by reducing information asymmetry between governments and those they govern, a free media environment should promote public spending efficiency, mainly via lower corruption and greater transparency and accountability in public service, especially since low efficiency could reduce taxpayer compliance, and penalize policymakers in the presence of strong electoral competition.

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<sup>3</sup>However, it must be acknowledged that excessive audience research can sometimes lead to sensationalist or polarized news, thus compromising the quality of political information (Piolatto and Schuett, 2015).

### 3 Public expenditure efficiency: The Apeti et al. index

As mentioned above, public expenditure efficiency refers to government performance in delivering public goods and services given the public resources used. Starting from studies on firms, the literature on efficiency has extended to the public sector, and has grown considerably over the last decades given the fiscal sustainability challenges facing economies (important contributions include, among others, [Gupta and Verhoeven, 2001](#); [Afonso et al., 2005](#); [Afonso et al., 2010](#); [Hauner and Kyobe, 2010](#); [Afonso et al., 2013](#); [Grigoli and Kapsoli, 2018](#); [Mohanty et al., 2023](#); [Olanubi and Olanubi, 2023](#); [Apeti et al., 2023a](#); [López-Herrera et al., 2023](#); [Afonso and Alves, 2023a](#); [Afonso et al., 2024a](#); [Afonso et al., 2024b](#)). While the mainstream literature has long examined government efficiency in sectors such as education, health, and infrastructure, [Afonso et al. \(2005\)](#) provide data for industrialized countries over the period 1990–2000, including other dimensions of the public sector that have so far received little or no consideration in measuring government efficiency. More specifically, in addition to traditional sectors such as education, health, and infrastructure, the authors consider public administration and Musgravian dimensions—which capture the traditional functions of government, namely: allocation, distribution, and stabilization.

More recently, [Apeti et al. \(2023b\)](#) have extended the paper by [Afonso et al. \(2005\)](#), considering the same dimensions of the public sector, while including a large panel of 158 advanced and developing countries over the period 1990–2017. Empirically, the efficiency scores are measured based on the distance between inefficient units and those considered efficient, representing the efficiency frontier. The authors consider technical efficiency, which refers to the public sector’s capacity to produce a set of outputs with the least possible inputs, independent of input prices. First, they compute what they call public sector performance indices, which measure government outcomes for each of the dimensions considered through an aggregate index (those outcomes indicators are described in [Table A.3](#) in the Appendix). Second, the efficiency scores are calculated for



each dimension of the public sector, using the composite outcome index as the dependent variable and public expenditure relating to each dimension as input (see Table A.3 in the Appendix for more details). Therefore, the overall efficiency index is a composite indicator combining all the dimensions considered. The authors rely on a parametric approach (a Stochastic Frontier Analysis following [Kumbhakar et al., 2015](#)), which allows capturing the influence of stochastic shocks and considering unobserved country-specific and time-invariant characteristics. In this study, given the advantages discussed—which are probably non-exhaustive—we approximate our dependent variable by the Apeti et al. index.

## 4 Data

Our dependent variable—public expenditure efficiency—is approximated by the Apeti et al. index ([Apeti et al., 2023b](#)), which includes several dimensions of the public sector for a large sample of countries over 1990-2017. Our study period is limited to 1994-2016 due to data availability on the press freedom variable, but we keep all countries for which data is provided, i.e., 158 countries (34 advanced and 124 developing). The efficiency scores can vary between 0 and 1, where higher values indicate better performance. For easier readability, we multiply the indicator by 100. The press freedom variable is taken from the Freedom House database and captures the level of press freedom in each country, including three broad categories. The first category relates to the legal environment and captures laws and regulations likely to influence the content of the media, or even constrain them. The second aspect measures the degree of political influence on media content. The third category measures the media’s economic environment, i.e., its ownership structure, transparency, cost of establishment, barriers to news production and distribution, subsidies from the government, etc. The initial index can range between 0 (total media freedom) to 100 (total lack of media freedom). To enhance the readability of our results and facilitate comparison with other institutional measures used for robustness checks, we invert the index by subtracting it from 100, so that higher values

represent greater press freedom.

Drawing on previous studies (e.g., see [Hauner and Kyobe, 2010](#) and [Apeti et al., 2023b](#)), we include a series of determinants of the efficiency scores as control variables, namely: population density, total factor productivity, trade openness, and capital openness. While [Hauner and Kyobe \(2010\)](#) suggest a positive influence of population density on public expenditure efficiency through a reduction in the costs of public service provision due to economies of scale, [Apeti et al. \(2023b\)](#) discuss other additional mechanisms, making the relationship more ambiguous. The authors argue that higher population density can also contribute to pressure on natural resources or infrastructure, or indirectly affect public expenditure efficiency via tax revenue collection, given the positive relationship between the latter channel and population density —as suggested by [Riezman and Slemrod \(1987\)](#). The link between total factor productivity and efficiency seems intuitive. Better productivity reflects more efficient use of production factors, and can be associated with technical progress that can encourage the adoption of techniques and methods aimed at improving public sector management. However, this argument needs to be qualified, as the public sector includes many services such as education and health, whose productivity gains are limited compared to the rest of the economy.<sup>4</sup> Regarding globalization, the relationship with efficiency is not so clear-cut. Globalization does not only involve exchanges of goods, services, or capital. Still, it may also be associated with exchanges of ideas, and transfers of knowledge, technologies, and know-how, with important side effects on expenditure efficiency. Furthermore, the literature shows that financial liberalization tends to discipline monetary ([Grilli and Milesi-Ferretti, 1995](#); [Gruben and McLeod, 2002](#); [Gupta, 2008](#)) and fiscal policies ([Bartolini and Drazen, 1997](#); [Kim, 2003](#)), for fear of being penalized by the capital markets, and all the more so as capital mobility makes taxation difficult ([Swank, 2016](#); [Jha and Gozgor, 2019](#)). Enhanced fiscal discipline promoted by liberalization may reflect governments' willingness to achieve better socio-economic objectives in an economy of means. Nevertheless, the literature acknowledges that globalization can equally trigger economic instability or

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<sup>4</sup>We lag the productivity variable by one year to reduce potential simultaneity bias with government efficiency.

increase income inequalities (e.g., see [Rodrik et al., 1998](#); [Kose et al., 2006](#); [Furceri and Loungani, 2018](#) for a comprehensive discussion).

Trade openness and population density are taken from the World Bank’s WDI (World Development Indicators) database. Trade openness is measured as the sum of imports and exports, as a percentage of GDP. Population density is the mid-year population divided by the area in square kilometers. Total factor productivity measures the share of output not explained by the quantity of inputs used in production, and is from the Penn World Table (PWT). The index approximately ranges from 0.2 to 2.2 over our study period and sample size, where higher values reflect better performance. Capital openness is measured by the [Chinn and Ito \(2008\)](#) index and can range from -1.9 to 2.3, where higher values suggest lower restrictions. Table [A4](#) in the Appendix provides the description and source of the variables in the baseline model and the additional controls used for robustness.

## 5 Descriptive statistics and correlational evidence

Our full sample includes 158 advanced and developing countries from 1994-2016. While our study period is constrained by data availability on the press freedom index, 1994 also represents (almost) the beginning of the post-Cold War era, with major institutional changes in many countries. [Figure 1](#) shows the average trend in public expenditure efficiency for the countries in our sample and over our study period. We observe a surge in the efficiency index from the mid-1990s onwards in advanced countries, and slightly later in developing economies (from the late 1990s onwards), with a peak around the early 2000s. The index then seems to stagnate, until it significantly declines following the 2008-2009 global financial crisis, illustrating the profound effects of the crisis on the world economy, with an upturn in the efficiency index from 2015 onwards. We report an average efficiency score of around 67 over our sample and study period. Since the estimated scores reflect technical efficiency, this suggests that, on average, governments can reduce their expenditure by approximately 33% while maintaining the same level

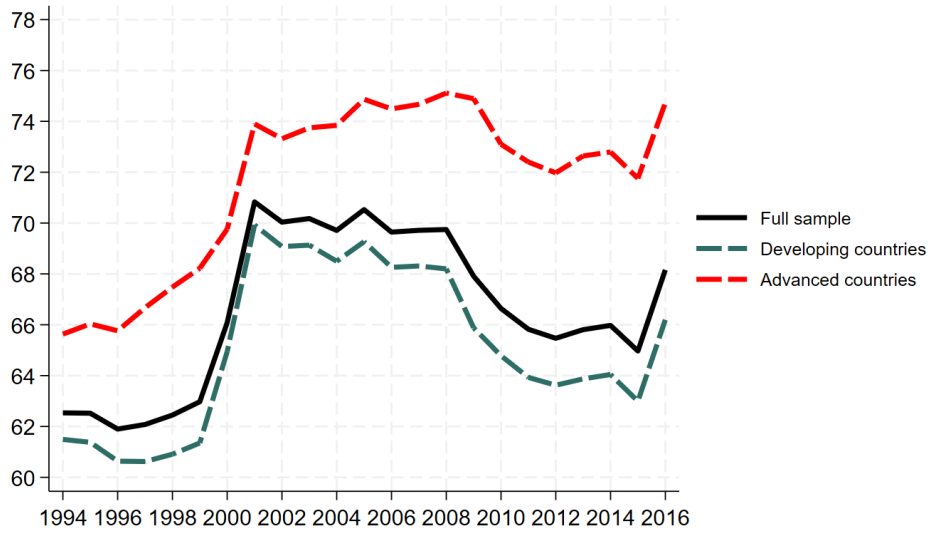
of output; or increase their output by around 33% for the same level of expenditure. Advanced countries appear closer to their efficiency frontier than their developing peers, with an average score of around 72 versus 65. Over our study period, the United States seems to be the most efficient country in the sample and over the study period, with a score of around 82, followed by the United Kingdom (78), Australia (76), Israel (75), and Japan (74). On the other hand, the Democratic Republic of Congo, Yemen, Togo, Nigeria, and Tanzania report the lowest average scores in the sample, ranging from around 48 to 57. Looking at regional distributions, Europe reports the highest efficiency score (70), followed by Latin America (67), and Asia (66), while Sub-Saharan Africa reports the lowest score (63).

Figures 2 and 3 show the evolution of the press freedom index over our study period, for our overall sample and according to the level of economic development, respectively. In the 1990s, the index showed a fairly volatile trend —mainly driven by fluctuations in developing countries— while a significant increase in press freedom was reported in advanced countries, but also in developing countries in the late 1990s. The improvement in press freedom in the 1990s is due in particular to the notable expansion of democracy in many countries following the end of the Cold War, with the fall of the Berlin Wall in 1989 and the collapse of the Soviet Union in 1991. Many Eastern European nations and other regions initiated democratic reforms that led to freer and more independent media, a plurality of voices, and less influence from political and economic powers. However, since the early 2000s, there has been a significant decline in press freedom in both advanced and developing countries. This is mainly due to the emergence of several authoritarian regimes hostile to a free and independent press ([Gorokhovskaia and Grothe, 2024](#)), but also to the emergence of populist regimes in several regions around the world, with leaders often referring to journalists as political opponents, denouncing the press as “the enemy of the people”, and implementing restrictive laws against the media ([Kenny, 2020](#)). Populist or authoritarian regimes often reinforce surveillance mechanisms and repress civil liberties via technological tools, including recent tools such as AI ([Negrea et al., 2024](#)). The press freedom index fell from around 56 in 2002 to

52 in 2016 when referring to our full sample; from 82 to 78 in advanced countries; and from 49 to 45 in developing countries; illustrating the global downward trend in press freedom. We report an average score of 54, suggesting that on average and over the study period, the media in the countries in the sample are partially free. The statistics indicate that the media are predominantly free in advanced countries, which report an average score of almost 80, while their developing counterparts report a score below the sample average, i.e., around 47. Norway, Sweden, Belgium, Denmark, and Switzerland report the highest average scores in the sample and over the study period, i.e., around 90, while Myanmar, Uzbekistan, Belarus, Equatorial Guinea, and Iran report average scores below 20. Europe reports the highest score (72), followed by Latin America (58) and Africa (44), while Asia reports a low score of 37.

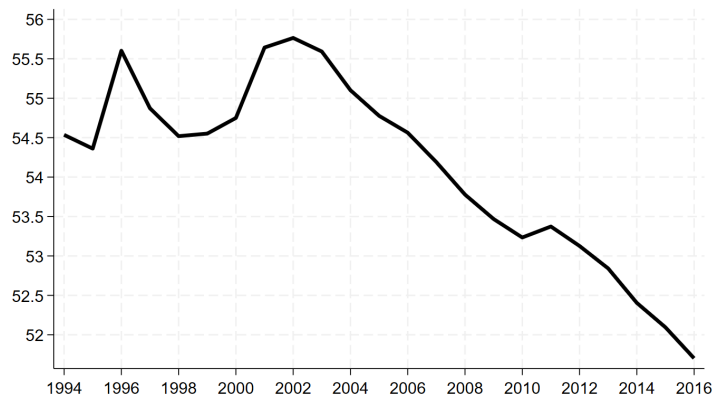
We report a positive correlation between the press freedom index and the efficiency scores—around 0.33—suggesting that press freedom is associated with higher government efficiency. While these stylized facts suggest a potential correlation between media freedom and government efficiency, they do not establish the causal relationship that the study aims to uncover. Therefore, the remainder of the analysis employs econometric techniques to estimate the effect of press freedom on public expenditure efficiency.

Figure 1: Trends in Public Expenditure Efficiency (1994-2016)



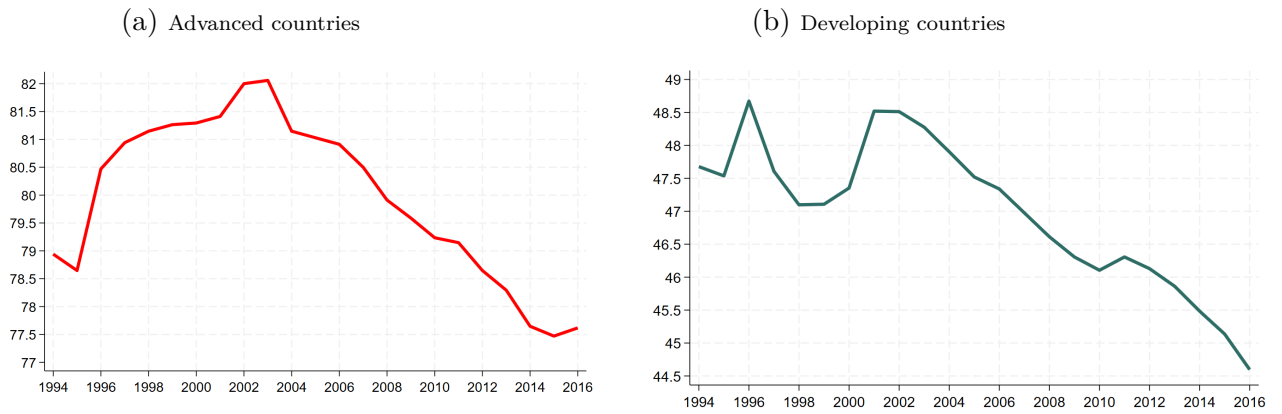
**Notes:** This figure reports trends in public expenditure efficiency in our sample (158 advanced and developing countries) over the period 1994-2016. Higher values indicate better performance.

Figure 2: Trends in Press Freedom, Full Sample (1994-2016)



**Notes:** This figure reports trends in press freedom in our sample (158 advanced and developing countries) over the period 1994-2016. Higher values indicate better performance.

Figure 3: Trends in Press Freedom, By Income Level (1994-2016)



Notes: Higher values indicate better performance.

## 6 Tobit estimates

### 6.1 Baseline results

Numerous studies employ Tobit regressions to analyze public sector efficiency (e.g., Afonso et al., 2006, 2010; Adam et al., 2011; Apeti et al., 2023b), as this method is well-suited for dependent variables that are censored or represent corner solutions. This includes efficiency scores, which, by design, are bounded between 0 and 1, as is the case in our study. Hence, as a first approach, we estimate the following model using random-effects Tobit regression<sup>5</sup>

$$\delta_{i,t} = f(Z_{i,t}) + \varepsilon_{i,t} \quad (1)$$

where  $\delta_{i,t}$  captures public expenditure efficiency (approximated by the Apeti et al. index) for the country  $i$ , in the year  $t$ . The initial index, which varies between 0 and 1, has been multiplied by 100 to facilitate the readability of the results.  $Z_{i,t}$  is a set of controls described in Section 4. To ensure robustness, we re-estimate our baseline model using ordinary least squares (OLS) and a dynamic model with a bias-corrected fixed effects (LSDVC) specification, which accounts for the persistence of government efficiency. Furthermore, we strive to mitigate endogeneity issues that may arise from measurement error or reverse causality, using an instrumental variable approach based on the average press freedom in neighboring countries. Our results are not altered when using these alternative estimation methods.

Before proceeding with the econometric analyses, we apply unit root tests on the baseline model variables and find all the variables are stationary in level, except for trade openness and capital openness. We have therefore transformed trade openness and financial openness in first difference to make them stationary or I(1).<sup>6</sup> Column [1]

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<sup>5</sup>Specific effects in our random-effects Tobit model are included in the residual term, since including fixed effects as dummies in Tobit, Probit, and Logit models may lead to the so-called incidental parameter problems (e.g., see Greene, 2004; Wooldridge, 2010; Fernández-Val and Weidner, 2016; Amore and Murtinu, 2021).

<sup>6</sup>The results are available on request.



of Table 1 reports the main results, including all the controls of the baseline model. We find a positive and significant effect of media freedom on government efficiency. Although the dependent variable is bounded, the results of the Tobit regression can be interpreted in the same way as those of the OLS regression. Thus, a 10 percent increase in the press freedom indicator improves efficiency by around 1.3 percentage points, with significance at the 1% threshold. Regarding the control variables, the baseline model suggests that total factor productivity is positively associated with efficiency. After establishing a positive and significant effect of media freedom on public expenditure efficiency, we further examine the sensitivity of our results via a series of robustness tests and heterogeneity analysis.

## 6.2 Robustness checks

### 6.2.1 Additional controls

As a first robustness check, we consider alternative specifications, thus including a series of additional controls to examine whether the omission of some relevant determinants of efficiency induces bias in our main estimates. Taking due note of the heterogeneity of our sample, which includes both advanced and developing countries, we control for the logarithm of real per capita income to account for the level of economic development and expect a positive effect given the positive correlation between institutional quality and per capita income. Next, we also consider other potential determinants of government efficiency, such as the level of financial development; political checks and balances; fiscal rules; the inflation-targeting regime; natural resources; elections; and income inequality.<sup>7</sup>

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<sup>7</sup>The literature suggests that financial development can help improve tax revenue mobilization, particularly in developing countries (e.g., see [Gnangnon, 2021](#); [Apeti and Edoh, 2023](#)). Although taxation can trigger adverse side effects (for instance, see [Barro, 1990](#); [Minea and Villieu, 2009](#); and [Ehrhart et al., 2014](#) for contributions on the Laffer curve), one can expect, to some extent, favorable effects on efficiency, especially through greater accountability. We expect a positive effect of political checks and balances on efficiency, as studies show that they contribute to reducing budgetary pressures, and the scope for governments to incur more debt ([Alesina and Perotti, 1996](#)). We can infer the same relationship for fiscal rules, as the literature shows that they promote sound fiscal sustainability (see [Heinemann et al., 2018](#) for a meta-regression-analysis). We expect the inflation-targeting framework to improve efficiency, since it has been shown that the reduction in seigniorage revenues resulting from the adoption of the monetary framework leads to greater fiscal discipline (e.g., see [Minea and](#)

Table 1: Press Freedom and Public Expenditure Efficiency: Main results

|                                      | [1]                 | [2]                 | [3]                 | [4]                 | [5]                 | [6]                 | [7]                 | [8]                 | [9]                 | [10]                | [11]                | [12]                |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Media freedom                        | 0.129***<br>(0.014) | 0.104***<br>(0.015) | 0.142***<br>(0.016) | 0.120***<br>(0.014) | 0.125***<br>(0.014) | 0.131***<br>(0.014) | 0.126***<br>(0.016) | 0.130***<br>(0.014) | 0.147***<br>(0.022) | 0.094***<br>(0.015) | 0.190***<br>(0.028) | 0.220***<br>(0.042) |
| Log. Population density              | 0.177<br>(0.245)    | 0.078<br>(0.227)    | 0.092<br>(0.254)    | 0.099<br>(0.231)    | 0.108<br>(0.239)    | 0.135<br>(0.252)    | 0.160<br>(0.252)    | 0.212<br>(0.255)    | 1.833**<br>(0.721)  | -0.099<br>(0.249)   | 0.209<br>(0.244)    | 0.313<br>(0.380)    |
| Lag.Total factor productivity (Log.) | 8.842***<br>(1.140) | 6.689***<br>(1.266) | 9.873***<br>(1.436) | 8.939***<br>(1.137) | 8.222***<br>(1.138) | 9.135***<br>(1.158) | 8.877***<br>(1.146) | 8.698***<br>(1.144) | 8.405***<br>(1.162) | 7.078***<br>(1.192) | 9.182***<br>(1.141) | 3.758***<br>(1.775) |
| Δ Trade openness                     | 0.022<br>(0.016)    | 0.022<br>(0.016)    | 0.032*<br>(0.018)   | 0.017<br>(0.016)    | 0.025<br>(0.016)    | 0.021<br>(0.016)    | 0.022<br>(0.016)    | 0.021<br>(0.016)    | 0.010<br>(0.015)    | 0.026<br>(0.016)    | 0.022<br>(0.016)    | 0.023<br>(0.017)    |
| Δ Capital openness                   | 0.534<br>(0.376)    | 0.551<br>(0.376)    | 0.775*<br>(0.412)   | 0.560<br>(0.375)    | 0.584<br>(0.374)    | 0.535<br>(0.375)    | 0.532<br>(0.376)    | 0.479<br>(0.374)    | 0.415<br>(0.342)    | 0.729**<br>(0.370)  | 0.520<br>(0.375)    | 0.743***<br>(0.372) |
| Log. GDP per capita                  | 1.184***<br>(0.321) |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     | 1.227*<br>(0.716)   |
| Financial development                |                     |                     | 0.016**<br>(0.006)  |                     |                     |                     |                     |                     |                     |                     |                     | 0.007<br>(0.007)    |
| Political checks and balances        |                     |                     |                     | 0.360***<br>(0.118) |                     |                     |                     |                     |                     |                     |                     | 0.321***<br>(0.119) |
| Fiscal rules index                   |                     |                     |                     |                     | 1.404***<br>(0.304) |                     |                     |                     |                     |                     |                     | 0.111<br>(0.354)    |
| Inflation targeting dummy            |                     |                     |                     |                     |                     | -0.884<br>(0.557)   |                     |                     |                     |                     |                     | -0.775<br>(0.655)   |
| Log.Natural resources                |                     |                     |                     |                     |                     |                     | -0.092<br>(0.334)   |                     |                     |                     |                     | 0.371<br>(0.414)    |
| Election dummy                       |                     |                     |                     |                     |                     |                     |                     | 4.039***<br>(1.099) |                     |                     |                     | 7.254***<br>(1.499) |
| Lag.Gini index                       |                     |                     |                     |                     |                     |                     |                     |                     | 1.212***<br>(0.118) |                     |                     | 0.510***<br>(0.127) |
| Economic freedom                     |                     |                     |                     |                     |                     |                     |                     |                     |                     | 0.220***<br>(0.031) |                     | 0.194***<br>(0.042) |
| Trend * Media freedom                |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     | -0.000**<br>(0.000) | -0.000<br>(0.000)   |
| Trend                                |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     | 0.002***<br>(0.001) | 0.002<br>(0.001)    |
| Observations                         | 1930                | 1930                | 1548                | 1876                | 1930                | 1930                | 1930                | 1930                | 1844                | 1867                | 1930                | 1379                |
| Pseudo-R-squared                     | 0.4415              | 0.4421              | 0.5552              | 0.458               | 0.4425              | 0.4416              | 0.4415              | 0.4421              | 0.4742              | 0.4648              | 0.4418              | 0.6182              |

We report the results of the effect of press freedom on public expenditure efficiency, using a Tobit analysis. The main results are reported in Column [1]. Columns [2]-[12] include additional controls. We lag total factor productivity and income inequality by one year to mitigate simultaneity bias. All regressions include the constant, not reported in the table. The pseudo-R-squares are calculated from the log-likelihoods. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Moreover, to account for the effect of reforms potentially correlated with media freedom and spending efficiency, we account for economic freedom —defined as the extent to which countries’ policies and institutions are conducive to economic liberty, based on personal choice, voluntary exchange, freedom to enter markets and compete, as well as security of the person and private property (Gwartney et al., 2021). Indeed, since the literature shows that improvements in economic freedom are associated with subsequent improvements in press freedom (Bjørnskov, 2018), we may wonder whether our results are not driven primarily by economic freedom rather than press freedom. Hence, we include the Heritage Foundation Index of Economic Freedom, which includes 12 quantitative and qualitative variables divided into four sub-categories: regulatory efficiency, size of government, rule of law, and market openness. Lastly, regional copying and adoption issues can result in cross-sectional dependencies not only in terms of press freedom diffusion, but also in terms of government efficiency. In other words, movements in press freedom diffusion at the regional level may overlap with changes in government efficiency, without the latter being fully explained by the influence of press freedom. To alleviate these problems, we also include a linear trend variable in interaction with the media

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Tapsoba, 2014; Combes et al., 2018; Ardakani et al., 2018), notably via improvements in institutional quality or the strengthening of the state’s fiscal capacity (Minea et al., 2021). Numerous studies show that natural resource abundance contributes to deteriorating the institutional framework through rent-seeking behavior (Torvik, 2002; Robinson et al., 2006; Bhattacharyya and Hodler, 2010) —even though resource efficiency itself is highly endogenous to institutional quality— and to generating procyclical fiscal behavior (Apeti et al., 2023c). This may (probably) undermine efficiency. The effect of elections on efficiency is not so straightforward. According to Rogoff (1987)’s equilibrium budget cycle model, decision-makers may favor visible spending during election years —i.e., current expenditures such as wages and subsidies— rather than investment spending, which is more likely to improve economic outcomes. Empirically, Schuknecht (2000) concludes that investment spending tends to increase during election years, while Vergne (2009) finds that political-budgetary cycles are characterized by an increase in current spending. The effect of income inequality on public spending efficiency is not so clear-cut. One might expect high-income inequality to lead to redistributive policies, with increased social spending at the expense of productive investment, potentially slowing long-term growth (Alesina and Rodrik, 1994). However, other studies on the link between inequality and redistributive policies reveal ambiguous results, suggesting that high levels of inequality do not always lead to greater redistribution (e.g., see Bassett et al., 1999; Borck, 2007, Mohl and Pamp, 2009). Financial development is approximated by domestic credit to the private sector (as a percentage of GDP). Political checks and balances can range from 0 to 18 and are from the Database of Political Institutions. We follow previous studies (for instance, see Gootjes et al., 2021 and Apeti et al., 2024) and compute the fiscal rules index as an aggregation of five aspects of fiscal rules (coverage; legal basis; supporting procedures; enforcement; and flexibility), based on the IMF Fiscal Rules Dataset. The index can range from 0 to 5, where higher values indicate a strengthening of existing fiscal rules.

freedom index. Columns [2]-[12] of Table 1 report the results with the new controls included distinctly, then the last column considers a multivariate regression including all the new controls. The coefficient of the media freedom variable remains positive, significant, and highly stable. Furthermore, since the inclusion of the economic freedom variable does not alter our results, we can safely conclude that the effect obtained is not driven by alternative reforms, but rather by press freedom. In the same vein, neither the trend variable in isolation nor the interactive term with the media freedom index is significant, suggesting that common trends correlated with press freedom and government efficiency are unlikely to drive our results. Overall, the coefficients for the controls of the baseline model remain also robust, with financial openness showing a positive but not robust effect. Regarding the new controls, Column [12] suggests a positive and significant effect of per capita income, political checks and balances, elections, income inequality, and economic freedom on efficiency.

Our results (not reported but available on request) also hold when considering alternative subsamples, excluding from the main sample fragile states (i.e., countries considered by the IMF to have high levels of socioeconomic instability and poor institutions) and the 2008-09 global financial crisis. In addition, we ensure that our results are robust to outliers by excluding observations below the first quartile and above the 90th percentile for both the press freedom index and the efficiency scores.

### **6.2.2 Alternative press freedom measures**

Press freedom may be measured differently from one institution to another, depending on the dimensions considered. Therefore, for robustness, we use two additional indicators from the Quality of Government Standard Dataset (Teorell et al., 2016), to ensure that our results do not differ significantly depending on the indicator used. First, we consider the media corruption variable, which captures to what extent journalists, editors, or broadcasters accept payments in exchange for a change in media coverage, and ranges approximately from 0 to 4 (total absence of corruption). Over our sample and study period, we report a positive and significant correlation between media freedom and

corruption indicators, with a magnitude of 0.77, suggesting that a high degree of probity in the media environment is associated with greater media freedom. To make the index comparable with our measure of media freedom, we readjust the indicator to a scale of 0 to 100. Next, we consider a measure of information transparency, which includes three important aspects: the existence of free and independent media; fiscal transparency; and political constraints on the media. The indicator can range from 0 to 100, where higher values indicate better performance. The results for media corruption and information transparency are reported in Columns [2] and [3] of Table B1, respectively. It emerges that greater probity in the press and improved information transparency significantly increase government efficiency. Moreover, the new coefficients remain very close to those obtained using the Freedom House indicator.

### 6.2.3 Alternative efficiency measures

[Apeti et al. \(2023b\)](#) provide other measures of spending efficiency for robustness purposes. For instance, they rely on a subjective approach when computing the outcome indicators for economic performance, replacing GDP per capita with a happiness measure. They further re-calculate the efficiency scores from the main model, drawing on the [Greene \(2005\)](#) method.<sup>8</sup> Lastly, they exclude public administration from the sectors considered, arguing that other agencies, institutions, or authorities, although part of the public domain, can operate with an independent budget and autonomous management. For robustness, we re-estimate the baseline model using these alternative measures. The new coefficients reported in Columns [4]-[6] of Table B1 respectively support our conclusions, despite some minor variations.

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<sup>8</sup>The main scores are computed building on the approach by [Kumbhakar et al., 2015](#).

## 7 Alternative methods and endogeneity concerns

### 7.1 OLS and LSDVC estimates

In Column [1] of Table B2, we re-estimate our baseline model using the OLS estimator, accounting for year and country fixed-effects. The results remain stable. Next, to account for persistency in government efficiency, we estimate a dynamic model using a bias-corrected fixed effects (LSDVC) specification, which takes into account inertia in the dependent variable, while mitigating the so-called Nickell bias (see [Debrun et al., 2008](#) and [Gootjes et al., 2021](#) for a similar approach). The new results reported in Column [2] of Table B2 confirm the strong persistence of government efficiency, but more importantly, the coefficient on the press freedom variable remains positive and significant, despite a slight decrease.

### 7.2 IV estimates

As with any subjective institutional variable, press freedom measurement may be subject to bias due to individual perceptions. Indeed, the “halo effect” concept stipulates that people would overestimate institutional quality in rich countries because they have good economic performance, while systematically underestimating institutions in poor countries. In addition, reverse causation or feedback may run from government efficiency to press freedom, as countries may enhance their institutional framework when their economic performance improves ([Acemoglu et al., 2019](#)). Endogeneity would lead to a systematic correlation between the coefficient of interest and the error term, which could strongly bias our results. A common solution would therefore be to rely on instrumental variables to exploit an exogenous source of variation. A large body of literature instruments domestic institutions and reforms through reforms in neighboring countries, arguing that reforms in regional peers can have important spillover effects on domestic reforms, via coercion, imitation, or competition (see [Huntington, 1991](#); [Dobbin et al., 2007](#); and [Shipan and Volden, 2008](#)). Against this background, a growing body of lit-

erature exploits regional reforms to instrument domestic reforms and institutions (see, among others, [Persson and Tabellini, 2009](#); [Giuliano et al., 2013](#); [Acemoglu et al., 2019](#)), arguing that in many countries, democratization events often occur as regional waves and that these waves are not explained by regional economic trends, but rather by the demand for democracy that spreads from one country to another. Regarding studies on press freedom, [Kalenborn and Lessmann \(2013\)](#) use the average press freedom index of neighboring countries as an instrument for the degree of press freedom. Following this approach, we enhance identification in our robustness checks by instrumenting national press freedom with the average press freedom in neighboring countries. Our identification hypothesis is, therefore, that press freedom in regional peers may play an important role in determining domestic press freedom, without directly affecting domestic government efficiency (conditional on the vector of controls). The results of the first-stage equation reported in Column [3] of Table B2 suggest a positive and significant effect of regional press freedom on domestic press freedom, supporting the relevance of our instrument. Likewise, the Cragg-Donald F-statistic is far higher than the Stock-Yogo critical value for weak instruments, suggesting that the instruments used are strong. Turning to the IV estimate reported in Column [4], we find a positive and significant effect of press freedom on efficiency, even after instrumentation. Although the IV estimate shows a slightly higher coefficient than the Tobit regression (0.13 versus 0.51), the two effects remain qualitatively comparable. Thus, by exploiting plausible exogenous variations in press freedom, we obtain impact estimates consistent with our Tobit results. This suggests that our main findings are not driven by the endogeneity of press freedom.

## 8 Treatment effects

Our results so far are based on the press freedom index, which can vary between 0 and 100. A continuous index allows us to capture greater variability in press freedom, thus providing somehow a measure of the strength of the index. The Freedom House database provides an alternative classification, indicating whether the media environ-

ment is considered “free”, “partially free”, or “not free”. Consequently, following (Gootjes et al., 2021), we consider an alternative measure, distinguishing two groups. Treated units are country/year observations where the media environment is considered “free” ( $T = 1$ ), while untreated units are country/year observations where the media environment is considered “partially free” or “not free” ( $T = 0$ ). Although a binary variable leads to a loss of information compared to a continuous index, it allows us to mitigate endogeneity bias by using impact analysis or matching methods, thus circumventing potential limitations resulting from instrumental variables.

The literature on impact analysis methods has expanded considerably in recent years, with entropy balancing developed by Hainmueller (2012) in vogue among recent developments.<sup>9</sup> The first step in entropy balancing consists in computing weights, to achieve balance in a set of covariates that may affect the probability of a country having a free media environment. Partially drawing on Barro (1999) who identifies a series of determinants of democracy, which may equally be important drivers of press freedom, we include the following covariates: lagged GDP per capita, lagged human capital, natural resources, and population urbanization.<sup>10</sup> Table 2 reports descriptive statistics related to the first stage equation. Panel A, which shows a comparison of pre-weighting sample means for the matching covariates between treated units (Column [2]) and control units (Column [1]), suggests statistically significant differences between the two groups (all p-values in Column [5] are below the usual thresholds). In Panel B, we re-weight the control units to make the pre-treatment covariates of the control group, on average,

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<sup>9</sup>A non-exhaustive list of studies using entropy balancing includes Neuenkirch and Neumeier, 2016; Apeti, 2023; Caselli and Wingender, 2021; Ogrokhina and Rodriguez, 2019; Combes et al., 2024; Apeti et al., 2024; Sawadogo, 2024. See Neuenkirch and Neumeier, 2016 for a discussion on the advantages of the method.

<sup>10</sup>A nation’s wealth (captured by GDP per capita) can explain the quality of its institutions, including press freedom, in many ways. For instance, populations may have more resources to finance free and transparent presses as they become wealthier. Similarly, better-educated populations are more likely to claim their rights and get involved in civic and political life. We lag GDP per capita and human capital to limit reverse causality issues. Natural resources may be negatively correlated with institutional quality, as it has been shown that, on average, resource-rich economies have worse institutions and more conflict than resource-poor economies (Mehlum et al., 2006). Although the link between urbanization and the quality of institutions is not so clear-cut, some studies argue that institutions are more likely to be weaker in rural areas, as the rural population has a limited capacity for organization and is therefore easy for a dictator to suppress (e.g., see Barro, 1999). All our covariates are extracted from the World Bank’s WDI database, except for human capital, which is taken from the Penn World Table (PWT).



Table 2: Covariate balancing

|   | [1]                      | [2]                  | [3] = [1] - [2]        | [4]           | [5]           |
|---|--------------------------|----------------------|------------------------|---------------|---------------|
| <b>Panel A : Descriptive statistics</b> | <b>Non-Treated units</b> | <b>Treated units</b> | <b>Difference</b>      | <b>t-Test</b> | <b>p-Val.</b> |
| Natural resources                       | 9.278                    | 1.691                | 7.587                  | 26.599        | 0.000         |
| Lagged Human capital                    | 2.126                    | 2.958                | -0.832                 | -39.129       | 0.000         |
| Lagged Log. GDP per capita              | 8.787                    | 10.262               | -1.475                 | -40.889       | 0.000         |
| Urbanization rate                       | 48.901                   | 69.95                | -21.049                | -28.088       | 0.000         |
| <i>Observations</i>                     | <i>1853</i>              | <i>990</i>           |                        |               |               |
| <b>Panel B : Covariate balancing</b>    | <b>[1]</b>               | <b>[2]</b>           | <b>[3] = [1] - [2]</b> | <b>[4]</b>    | <b>[5]</b>    |
|   | <b>Non-Treated units</b> | <b>Treated units</b> | <b>Difference</b>      | <b>t-Test</b> | <b>p-Val.</b> |
| Natural resources                       | 1.822                    | 1.691                | 0.131                  | -0.71         | 0.477         |
| Lagged Human capital                    | 2.953                    | 2.958                | -0.005                 | 0.14          | 0.892         |
| Lagged Log. GDP per capita              | 10.258                   | 10.262               | -0.004                 | 0.05          | 0.957         |
| Urbanization rate                       | 69.93                    | 69.95                | -0.02                  | 0.01          | 0.992         |
| <i>Observations</i>                     | <i>1853</i>              | <i>990</i>           |                        |               |               |
| <i>Total of weights</i>                 | <i>990</i>               | <i>990</i>           |                        |               |               |

**Notes:** We lag human capital and per capita income by one year to avoid potential simultaneity bias with press freedom.

as comparable as possible to those of the treated units. The weighing eliminated any statistically significant pre-treatment differences between the means of the treated and synthetic covariates, as all differences are no longer significant at the usual thresholds. In other words, the synthetic group reflects a near-perfect representation of the treated group, therefore the difference in government efficiency between the two groups can be attributed to press freedom. Using the weights calculated in the first stage, the second stage of entropy balancing estimates the average treatment effect, i.e., the impact of media freedom on government efficiency. The results are reported in Column [6] of Table B2 and suggest a positive and significant effect of media freedom on government efficiency, compared to a non-free media environment. More specifically, a free media environment improves government efficiency by almost 4 percentage points compared to a non-free media environment.

## 9 Size of the estimates

Although our results suggest a positive, significant, and robust effect of media freedom on government efficiency, another follow-up question is whether the effect obtained is equally economically significant. Overall, Tobit regressions including the whole sample suggest an increase of around 1.3 percentage points in government efficiency when the

media freedom indicator increases by 10 percent. The effect obtained, although relatively small, seems reasonable since the estimated coefficient represents around 1 percent of the standard deviation of the efficiency index. The coefficient increases moderately with the IV regression, representing almost 7 percent of the standard deviation of the efficiency variable. The economic size of the effect increases further when turning to the average treatment effect obtained from entropy balancing (almost 4 percentage points). In our sample and over the study period, we report an average efficiency score of around 64 in countries with an unfree media environment. Therefore, the treatment effect from entropy balancing suggests that for an average country in the sample with a non-free media environment, the transition to a free media environment would increase efficiency by, on average, around 5 percent, which is quite substantial. Overall, we can conclude from these analyses that the effect of media freedom on efficiency is economically reasonable, and becomes more important for countries with a free media environment.

## 10 Heterogeneity

This section performs heterogeneity analyses, examining the role of regional, economic, and institutional factors. We consider our baseline regression and augment it with several interactive terms. Since it is not common to use interactive terms in Tobit models, we rely on the OLS estimator. We distinguish countries according to the considered heterogeneity variable, by taking the deviation from the sample average (except for the regional variable and the colonial origin).<sup>11</sup> The results are reported in Table 3.

We first look at the effect of media freedom on efficiency according to geographical regions. One might expect greater effects in countries with a high level of freedom, assuming that better institutions may also reflect better economic performance, including in the public sector. But one could also argue that, since countries with low levels of media freedom have greater scope for improvement, a marginal increase in the press

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<sup>11</sup>GDP per capita, the level of education, and Internet access are from the World Bank's WDI dataset. Democracy is measured by the Polity IV index. The fiscal rules index is computed based on the approach described previously. The colonial origin variable is from the Quality of Government (QOG).

freedom indicator could have a greater effect than countries with a higher press freedom index. The results reported in Columns [1]-[4] suggest that the favorable effect of media freedom on efficiency holds in all the regions considered, but is higher in Latin America. Second, we look at the role of per capita income. Numerous studies highlight a positive correlation between GDP per capita and institutional quality; and the economic literature even presents institutional quality as an important factor explaining differences in per capita income across countries ([Acemoglu et al., 2005, 2014](#)). Regarding the link between press freedom and per capita income, one may consider that an independent press requires important funding to ensure editorial freedom and journalistic integrity. With this in mind, it can be argued that as populations become wealthier, they may have more resources to finance a free and transparent press. There is a positive and significant interaction between press freedom and per capita income in Column [5], corroborating our intuition. Third, we examine potential heterogeneity between press freedom and the level of education. It seems fairly intuitive to assume that better education can foster population participation in political and civic life, which may suggest a certain complementarity between human capital and media freedom (even though [Acemoglu et al., 2014](#) find no evidence that institutions are more likely to emerge when human capital is high). The pattern in Column [6] is clear. The interactive term is significant and sizeable, suggesting a greater impact of media freedom in countries with high levels of education. In Column [7], we examine the complementarity between press freedom and media access, proxied by the share of the population with Internet access, in the idea that greater dissemination of information by free media is important for greater efficiency. The results suggest that a free press contributes to greater government efficiency in countries where Internet access is widespread. Column [8] examines a potentially heterogeneous effect of media freedom regarding fiscal frameworks, notably fiscal rules, given their favorable effects on fiscal discipline. The results suggest that media freedom is more conducive to government efficiency when countries strengthen their fiscal rules. The last two columns examine the role of historical factors, notably the type of colonies, as it has been shown that countries with a common law tradition tend to develop more transparent and accountable institutions than those with a civil law tradition or French

colonial institutions (La Porta et al., 1999). No heterogeneity seems to emerge with regard to colonial origin.

## 11 Mechanisms

We have so far hypothesized that, by reducing information asymmetry between governments and those they govern, the positive effect of media freedom on efficiency would notably transit through reduced corruption, improved transparency and accountability in the public sector, and greater political competition. This section empirically examines our main channels. In the first step, we regress the potential channel on a vector of controls using an OLS-estimated fixed-effects panel model.<sup>12</sup> Since our channels essentially include institutional factors, we consider the same controls as those discussed in Section 8, i.e., GDP per capita, human capital, natural resources, and population urbanization. We consider two potential channels relating to corruption: the Worldwide Governance Indicators (WGI) corruption control index and the V-Dem public sector corruption index. We also consider the Quality of Government (QOG) accountability transparency index, thus accounting for fiscal transparency. The V-Dem index has been transformed so that positive values indicate better performance, for comparison with the other two indicators. Following Gootjes and De Haan (2022), we approximate domestic political competition using the total vote share of all opposition parties from the Database of Political Institutions. The results are reported in Table 4. Although the overall fit of our models is relatively poor, reflected by low r-squared, the results for all four channels are straightforward and suggest that press freedom improves corruption control, transparency and accountability in the public sector, and political competition.

In the second step, we consider a Tobit model, using as a dependent variable our efficiency index and replacing the press freedom variable with the potential channel. This second model is therefore very similar to our main linear regression Equation 1, except that the right-hand side variable is different. The results reported in Table 5 suggest

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<sup>12</sup>For instance, see Acemoglu et al., 2019; Apeti and Edoh, 2023; Bambe, 2023; and Bambe et al., 2024 for a similar approach.

Table 3: Press Freedom and Public Expenditure Efficiency: Heterogeneity

|                                    | [1]                 | [2]                 | [3]                | [4]                | [5]                 | [6]                 | [7]                 | [8]                | [9]                 | [10]                |
|------------------------------------|---------------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
| Media freedom                      | 0.167***<br>(0.055) | 0.180***<br>(0.055) | 0.125**<br>(0.062) | 0.106*<br>(0.056)  | 0.091*<br>(0.053)   | 0.095*<br>(0.052)   | 0.090*<br>(0.051)   | 0.124**<br>(0.050) | 0.178***<br>(0.053) | 0.166***<br>(0.058) |
| Media freedom * Europe             | -0.096<br>(0.149)   |                     |                    |                    |                     |                     |                     |                    |                     |                     |
| Media freedom * Sub-Saharan Africa |                     | -0.138<br>(0.144)   |                    |                    |                     |                     |                     |                    |                     |                     |
| Media freedom * Asia               |                     |                     | 0.085<br>(0.099)   |                    |                     |                     |                     |                    |                     |                     |
| Media freedom * Latin America      |                     |                     |                    | 0.291**<br>(0.129) |                     |                     |                     |                    |                     |                     |
| Media freedom * GDP per capita     |                     |                     |                    |                    | 0.195***<br>(0.062) |                     |                     |                    |                     |                     |
| Media freedom * Human capital      |                     |                     |                    |                    |                     | 0.086***<br>(0.029) |                     |                    |                     |                     |
| Media freedom * Internet access    |                     |                     |                    |                    |                     |                     | 0.132***<br>(0.029) |                    |                     |                     |
| Media freedom * Fiscal rules       |                     |                     |                    |                    |                     |                     |                     | 0.089**<br>(0.040) |                     |                     |
| Media freedom * British Colony     |                     |                     |                    |                    |                     |                     |                     |                    | -0.104<br>(0.126)   |                     |
| Media freedom * French Colony      |                     |                     |                    |                    |                     |                     |                     |                    |                     | -0.093<br>(0.077)   |
| Observations                       | 1930                | 1930                | 1930               | 1930               | 1930                | 1930                | 1930                | 1930               | 1930                | 1930                |
| R-squared                          | 0.2974              | 0.299               | 0.2976             | 0.3075             | 0.3166              | 0.3046              | 0.3351              | 0.3051             | 0.298               | 0.2972              |
| Country & Year fixed effects       | Yes                 | Yes                 | Yes                | Yes                | Yes                 | Yes                 | Yes                 | Yes                | Yes                 | Yes                 |

Each variable in isolation (without interaction with press freedom) and controls are included but not reported for space purposes. All regressions include the constant, not reported in the table. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Table 4: Press Freedom and Public Expenditure Efficiency: Channels

|                              | [1]                 | [2]                      | [3]                             | [4]                   |
|------------------------------|---------------------|--------------------------|---------------------------------|-----------------------|
|                              | Corruption control  | Public sector corruption | Accountability and transparency | Political competition |
| Media freedom                | 0.006***<br>(0.001) | 0.001*<br>(0.001)        | 0.327***<br>(0.050)             | 0.237**<br>(0.096)    |
| Natural resources            | -0.004*<br>(0.002)  | 0.000<br>(0.001)         | -0.124<br>(0.078)               | 0.034<br>(0.122)      |
| Lagged Human capital         | -0.025<br>(0.119)   | 0.010<br>(0.058)         | -7.829<br>(6.012)               | 10.130<br>(8.610)     |
| Lagged Log. GDP per capita   | 0.281***<br>(0.081) | 0.032<br>(0.039)         | 0.889<br>(3.195)                | -2.643<br>(5.353)     |
| Urbanization rate            | 0.000<br>(0.004)    | -0.001<br>(0.001)        | -0.160<br>(0.171)               | 0.006<br>(0.348)      |
| Observations                 | 2312                | 2820                     | 2048                            | 2776                  |
| R-squared                    | 0.0974              | 0.0344                   | 0.1537                          | 0.1088                |
| Country & year fixed effects | Yes                 | Yes                      | Yes                             | Yes                   |

We report the results of the effect of press freedom on the potential key channels, using the OLS estimator. Higher values in each channel indicate better performance. All regressions include the constant, not reported in the table.  
\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

a positive and significant effect of corruption control, transparency and accountability within the public sector, and political competition on government efficiency, corroborating our intuitions. In summary, the results in Tables 4 and 5 taken together seem to support the hypothesis that lower levels of corruption, greater transparency and accountability in the public sector, and higher political competition resulting from greater media freedom are the main channels explaining our main results.

Table 5: Press Freedom and Public Expenditure Efficiency: Channels

| Dependent: Government efficiency     | [1]                 | [2]                 | [3]                  | [4]                  |
|--------------------------------------|---------------------|---------------------|----------------------|----------------------|
| Log. Population density              | -0.163<br>(0.238)   | 0.004<br>(0.221)    | 0.411<br>(0.279)     | 0.078<br>(0.266)     |
| Lag.Total factor productivity (Log.) | 4.834***<br>(1.320) | 7.318***<br>(1.156) | 12.230***<br>(1.347) | 10.414***<br>(1.145) |
| Δ Trade openness                     | 0.042**<br>(0.017)  | 0.023<br>(0.016)    | 0.023<br>(0.016)     | 0.029*<br>(0.016)    |
| Δ Capital openness                   | 0.882**<br>(0.417)  | 0.604<br>(0.381)    | 0.488<br>(0.363)     | 0.554<br>(0.378)     |
| Corruption control                   | 0.099***<br>(0.011) |                     |                      |                      |
| Public sector corruption             |                     | 8.261***<br>(1.024) |                      |                      |
| Accountability and transparency      |                     |                     | 0.109***<br>(0.018)  |                      |
| Political competition                |                     |                     |                      | 0.060***<br>(0.008)  |
| Observations                         | 1605                | 1931                | 1381                 | 1887                 |
| Pseudo-R-squared                     | 0.539               | 0.4396              | 0.6121               | 0.4523               |

We report the results of the effect of the key potential channels on public expenditure efficiency, using Tobit analysis. Higher values in each channel indicate better performance. All regressions include the constant, not reported in the table. The pseudo-R-squares are calculated from the log-likelihoods. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

## 12 Conclusion

Press freedom has been steadily declining since the early 2000s, with leaders —mainly in authoritarian and populist regimes— becoming increasingly hostile to free and independent press. Yet free and independent media are the cornerstone of democratic expression, acting as a “watchdog” vis-à-vis political power. Meanwhile, economies are facing growing fiscal deficits, exacerbated by the pandemic crisis and rising military spending due to geopolitical tensions, leaving little room for fiscal policy. Therefore, amidst tightening public funds and growing needs, alongside a significant decline in media freedom, we examine how improved press freedom affects public expenditure efficiency —a key determinant of public finance sustainability. We argue that by reducing information asymmetry between policymakers and those they are supposed to serve, free and independent media may strengthen government accountability through reputation oversight and sanctions, leading them to be more efficient in delivering public goods and services. Using a panel of 158 advanced and developing countries over the period 1994-2017, we find strong evidence that greater press freedom indeed improves public expenditure efficiency, and this effect is strongly complementary to per capita income, the level of education, Internet access, and fiscal rules. The channels through which media freedom increases government efficiency include reduced corruption, improved transparency and accountability in the public sector, and enhanced political competition.

While press freedom is crucial for sustaining strong democratic institutions, our findings indicate that a free and independent press is equally important for enhancing economic performance, particularly in terms of public spending efficiency. The policy implications of our results are clear. In light of the global decline in media freedom, this study supports policies that promote and guarantee press freedom and independence in both developed and developing countries. Governments should foster an environment where the press is free, independent, and diverse, and where media can operate safely without political pressure or interference. This requires establishing clear and reliable mechanisms, such as safeguards ensuring freedom of expression in the press, preventing political interference in editorial decisions, protecting journalists and their sources, and



guaranteeing media pluralism. We also endorse international policies to support the media, including diplomatic efforts to pressure leaders who are hostile to the press to ensure media freedom and independence.

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## Appendix A Sample and descriptive statistics

Table A1: Summary statistics of the baseline model variables

| <b>Variables</b>          | <b>Obs.</b> | <b>Mean.</b> | <b>Sd</b> | <b>Min</b> | <b>Max</b> |
|---------------------------|-------------|--------------|-----------|------------|------------|
| Government efficiency     | 3335        | 66.736       | 7.601     | 24.664     | 87.796     |
| Press freedom             | 3613        | 54.12        | 23.333    | 0          | 95         |
| Log. Population density   | 3585        | 4.14         | 1.356     | 0.397      | 8.976      |
| Log. Productivity         | 2231        | -0.068       | 0.226     | -1.608     | 0.794      |
| $\Delta$ Trade openness   | 3156        | 0.42         | 9.492     | -99.074    | 106.161    |
| $\Delta$ Capital openness | 3284        | 0.015        | 0.353     | -2.529     | 3.222      |

Table A2: Average Public Expenditure Efficiency and Press Freedom scores (1994-2016)

| Country                       | PSE   | Press freedom | Country                | PSE   | Press freedom | Country                  | PSE   | Press freedom |
|-------------------------------|-------|---------------|------------------------|-------|---------------|--------------------------|-------|---------------|
| United States                 | 81.79 | 83.61         | Hungary                | 67.92 | 70.61         | Vietnam                  | 65.21 | 21.22         |
| United Kingdom                | 77.9  | 79.35         | Colombia               | 67.85 | 43            | Armenia                  | 65.11 | 38.7          |
| Australia                     | 75.97 | 83.61         | Bulgaria               | 67.67 | 63.43         | Saudi Arabia             | 65.04 | 18.61         |
| Israel                        | 74.77 | 70.57         | Serbia                 | 67.63 | 61.18         | Oman                     | 64.99 | 29.22         |
| Japan                         | 74.65 | 78.65         | Latvia                 | 67.5  | 76.48         | Maldives                 | 64.94 | 38.39         |
| New Zealand                   | 74.5  | 87.87         | Dominica               | 67.5  | 80.13         | Burkina Faso             | 64.9  | 59.96         |
| Germany                       | 73.83 | 84.13         | Seychelles             | 67.43 | 46.7          | Eswatini                 | 64.89 | 23.96         |
| Korea, Rep                    | 73.62 | 70.52         | Bosnia and Herzegovina | 67.4  | 45.74         | Jordan                   | 64.86 | 39.39         |
| Norway                        | 73.47 | 91.52         | Belize                 | 67.37 | 76.91         | Venezuela, RB            | 64.86 | 39.13         |
| Netherlands                   | 73.34 | 87            | Argentina              | 67.35 | 57.57         | Ghana                    | 64.84 | 60.78         |
| Italy                         | 73.04 | 69.61         | Timor-Leste            | 67.26 | 66.38         | Solomon Islands          | 64.81 | 75.39         |
| Canada                        | 72.79 | 82.96         | Uzbekistan             | 67.22 | 12.43         | Niger                    | 64.58 | 42.13         |
| Costa Rica                    | 72.74 | 82.39         | Kiribati               | 67.21 | 75.17         | Fiji                     | 64.53 | 52            |
| Denmark                       | 72.54 | 89.52         | Russian Federation     | 67.13 | 30.57         | India                    | 64.47 | 60.61         |
| Austria                       | 72.39 | 81.13         | Luxembourg             | 67.12 | 88.48         | Cambodia                 | 64.29 | 37.17         |
| Iceland                       | 72.21 | 88.39         | Panama                 | 67.09 | 61.13         | Mongolia                 | 64.26 | 64.09         |
| China                         | 71.9  | 16.57         | Estonia                | 67.07 | 81.48         | Guatemala                | 64.02 | 41.74         |
| Ireland                       | 71.62 | 83.22         | Greece                 | 67.07 | 67.65         | Guinea-Bissau            | 63.76 | 44.09         |
| Singapore                     | 71.58 | 33.74         | Mexico                 | 67.03 | 46.22         | Bahamas, The             | 63.62 | 85            |
| Malta                         | 71.38 | 80.3          | Bahrain                | 66.84 | 26.83         | Mali                     | 63.56 | 70            |
| Slovenia                      | 71.13 | 75.09         | Georgia                | 66.83 | 44.13         | Blutan                   | 63.47 | 36.13         |
| Kazakhstan                    | 71.13 | 25.65         | Paraguay               | 66.79 | 44.43         | Albania                  | 63.4  | 46.09         |
| Belgium                       | 71.05 | 89.74         | Botswana               | 66.75 | 65.65         | Cameroon                 | 63.38 | 30.65         |
| Peru                          | 70.92 | 51.83         | Trinidad and Tobago    | 66.67 | 74.17         | Bangladesh               | 63.36 | 41.09         |
| Portugal                      | 70.85 | 83.61         | Ecuador                | 66.65 | 53.35         | Sudan                    | 63.33 | 17.78         |
| Poland                        | 70.81 | 75.74         | Chile                  | 66.62 | 71.7          | Lesotho                  | 63.28 | 50.96         |
| France                        | 70.49 | 76.83         | Ukraine                | 66.6  | 45.39         | Azerbaijan               | 63.24 | 23.35         |
| Sri Lanka                     | 70.49 | 38.22         | El Salvador            | 66.6  | 58.09         | Malawi                   | 63.15 | 50.43         |
| Uruguay                       | 70.41 | 73            | Senegal                | 66.59 | 55.7          | Central African Republic | 62.88 | 35.3          |
| Czech Republic                | 70.14 | 79.91         | Thailand               | 66.56 | 49.48         | Namibia                  | 62.83 | 68.61         |
| Spain                         | 70.06 | 78            | Indonesia              | 66.51 | 43.74         | Honduras                 | 62.8  | 46.17         |
| Switzerland                   | 69.86 | 89.13         | Sweden                 | 66.4  | 89.87         | Zimbabwe                 | 62.64 | 25.39         |
| Belarus                       | 69.67 | 14.78         | Jamaica                | 66.29 | 84.26         | Liberia                  | 62.51 | 33.83         |
| Slovak Republic               | 69.63 | 71.39         | Suriname               | 66.26 | 72.52         | Madagascar               | 62.37 | 52.17         |
| Mauritius                     | 69.58 | 74            | Cote d'Ivoire          | 66.23 | 34.17         | Pakistan                 | 62.37 | 38.83         |
| Egypt, Arab Rep               | 69.52 | 31.04         | Samoa                  | 66.02 | 71.61         | Benin                    | 62.21 | 67.87         |
| Cyprus                        | 69.39 | 78.7          | Croatia                | 65.95 | 54.22         | Afghanistan              | 61.94 | 22.32         |
| Cabo Verde                    | 69.35 | 69.96         | South Africa           | 65.88 | 69.78         | Nicaragua                | 61.71 | 54.04         |
| Lithuania                     | 69.32 | 78.78         | Vanuatu                | 65.84 | 69.13         | Iran, Islamic Rep        | 61.57 | 16.74         |
| Lebanon                       | 69.27 | 43.52         | Morocco                | 65.82 | 40.04         | Zambia                   | 61.36 | 38.35         |
| Tonga                         | 69.23 | 66.3          | Moldova                | 65.82 | 41.96         | Uganda                   | 61.2  | 49.91         |
| Finland                       | 68.99 | 88.17         | Iraq                   | 65.8  | 19.35         | Kenya                    | 60.91 | 40.09         |
| Brazil                        | 68.54 | 61.43         | Mozambique             | 65.8  | 54.43         | Myanmar                  | 60.55 | 9.22          |
| Turkey                        | 68.52 | 40.52         | Nepal                  | 65.72 | 41.57         | Equatorial Guinea        | 60.38 | 14.91         |
| Lao PDR                       | 68.49 | 22.65         | Malaysia               | 65.71 | 34.65         | Congo, Rep               | 59.52 | 41.57         |
| Bolivia                       | 68.46 | 65.74         | Rwanda                 | 65.66 | 21.5          | Burundi                  | 59.42 | 21.48         |
| St Vincent and the Grenadines | 68.39 | 83.3          | Kuwait                 | 65.66 | 45.09         | Angola                   | 59.07 | 30.78         |
| Tunisia                       | 68.33 | 30.17         | Tajikistan             | 65.43 | 16.78         | Ethiopia                 | 57.73 | 27.96         |
| Grenada                       | 68.29 | 78.35         | Philippines            | 65.41 | 59            | Papua New Guinea         | 57.3  | 72.48         |
| Barbados                      | 68.16 | 82.61         | Sierra Leone           | 65.4  | 37.26         | Tanzania                 | 56.6  | 49.09         |
| Algeria                       | 68.07 | 28.3          | Kyrgyz Republic        | 65.36 | 34.52         | Nigeria                  | 55.98 | 41.13         |
| Dominican Republic            | 68.06 | 63.26         | Qatar                  | 65.34 | 36.22         | Togo                     | 55.83 | 28.83         |
|                               |       |               | Yemen, Rep             |       |               | Yemen, Rep               | 54.98 | 25.91         |
|                               |       |               | Congo, Dem Rep         |       |               | Congo, Dem Rep           | 48.26 | 18.26         |

Table A3: Sources of variables for the calculation of the efficiency scores

| Variables   |  | Nature     | Sources   |
|---|--|------------|---|
| <b>1. Public expenditure (inputs)</b>                               |  |            |   |
| Education expenditure (%GDP)  |  | Continuous | Public Expenditures for Economic Development (SPEED)  |
| Infrastructure expenditure (%GDP)                                   |  | Continuous | SPEED   |
| Health expenditure (%GDP)   |  | Continuous | SPEED   |
| Government final consumption (%GDP)                                 |  | Continuous | World Economic Outlook (WEO)                          |
| <b>2. Sectoral performance indices (outcomes)</b>                   |  |            |   |
| Education   |  |            |   |
| — Primary enrollment  |  | Continuous | World Development Indicators (WDI)                    |
| — Secondary enrollment  |  | Continuous | WDI   |
| — Expected years of schooling                                       |  | Continuous | WDI   |
| Health  |  |            |   |
| — Life expectancy at birth  |  | Continuous | World Development Indicators (WDI)                    |
| — Infant mortality rate (per 1000 live births)                      |  | Continuous | WDI   |
| Infrastructure :  |  |            |   |
| — Total length of roads in kilometers                               |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Number of paved roads (% total roads)                             |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Fixed telephone subscriptions (per 100 people)                    |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Fixed broadband subscriptions (per 100 people)                    |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Faults for 100 fixed telephone lines per year                     |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Proportion of households with electricity                         |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Electric power consumption (in kWh per capita)                    |  | Continuous | World Telecommunication/ICT Indicators Database       |
| — Electric power transmission and distribution losses (%production) |  | Continuous | World Telecommunication/ICT Indicators Database       |
| Administration  |  |            |   |
| — Independence of the judiciary                                     |  | Continuous | Teorell et al. (2021)                                 |
| — Quality of property rights  |  | Continuous | Teorell et al. (2021)                                 |
| — Quality of government   |  | Continuous | Teorell et al. (2021)                                 |
| — Level of the shadow economy                                       |  | Continuous | Teorell et al. (2021)                                 |
| Stability   |  |            |   |
| — Standard deviation of the three-year moving average of GDP growth |  | Continuous | Authors, from WDI                                     |
| — Standard deviation of the three-year moving of inflation          |  | Continuous | Authors, from WDI                                     |
| Distribution  |  |            |   |
| — Gini index  |  | Continuous | Standardized World Income Inequality Database (SWIID) |
| Economic performance  |  |            |   |
| — GDP per capita  |  | Continuous | WDI   |
| — GDP growth (10-year average)                                      |  | Continuous | WDI   |
| — Unemployment rate (10-year average)                               |  | Continuous | WDI   |

Table A4: Press Freedom and Public Expenditure Efficiency: Sources of variables

|  | Variables                      | Nature                                    | Sources  |
|--|--------------------------------|---|--|
|  | <b>1. Main model variables</b> |   |  |
|  | Public Expenditure Efficiency  | Scores ranging from 0 to 100              | Authors, from <a href="#">Apeti et al. (2023b)</a>   |
|  | Press Freedom                  | Scores ranging from 0 to 100              | Freedom House database   |
|  | Trade openness                 | Continuous                                | World Development Indicators   |
|  | Population density             | Continuous                                | World Development Indicators   |
|  | Total factor productivity      | Scores ranging from 0.2 to 2.2            | Penn World Table   |
|  | Financial openness             | Index ranging approximately from -2 to 2  | <a href="#">Chinn and Ito (2008)</a>   |
|  | <b>2. Additional controls</b>  |   |  |
|  | Financial development          | Continuous                                | World Development Indicators   |
|  | Political checks and balances  | Index ranging approximately from 0 to 18  | Database of Political Institutions   |
|  | Fiscal rules index             | Index ranging approximately from 0 to 5   | Authors, from IMF Fiscal Rules Dataset   |
|  | Inflation targeting            | Dummy                                     | <a href="#">Rose (2007)</a> ; <a href="#">Roger (2010)</a> ; <a href="#">Apeti et al. (2023d)</a> ; <a href="#">Bambe (2023)</a> ; <a href="#">Bambe et al. (2024)</a> |
|  | Natural resources              | Continuous                                | World Development Indicators   |
|  | Elections                      | Dummy                                     | Database of Political Institutions   |
|  | Gini index                     | Index ranging approximately from 0 to 100 | The Standardized World Income Inequality Database  |
|  | Economic reforms/Freedom       | Index ranging approximately from 0 to 100 | Heritage Foundation  |



## Appendix B Robustness

Table B1: Press Freedom and Public Expenditure Efficiency: Alternative measures

|                                     | [1]                 | [2]                 | [3]                 | [4]                 | [5]                 | [6]                  |
|-------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|
|                                     | Main model          |                     |                     |                     |                     |                      |
| Media freedom                       | 0.129***<br>(0.014) |                     |                     | 0.091***<br>(0.014) | 0.125***<br>(0.013) | 0.049***<br>(0.017)  |
| Log. Population density             | 0.177<br>(0.245)    | 0.076<br>(0.252)    | 0.083<br>(0.242)    | 0.058<br>(0.261)    | -0.053<br>(0.242)   | 1.168***<br>(0.381)  |
| Lag.Total factor productivity (Log) | 8.842***<br>(1.140) | 9.036***<br>(1.127) | 8.267***<br>(1.267) | 9.116***<br>(1.127) | 5.937***<br>(1.096) | 12.952***<br>(1.121) |
| $\Delta$ Trade openness             | 0.022<br>(0.016)    | 0.027<br>(0.016)    | 0.023<br>(0.016)    | -0.000<br>(0.017)   | 0.028*<br>(0.016)   | -0.019<br>(0.015)    |
| $\Delta$ Capital openness           | 0.534<br>(0.376)    | 0.638*<br>(0.379)   | 0.567<br>(0.357)    | 0.143<br>(0.407)    | 0.435<br>(0.375)    | 0.446<br>(0.334)     |
| Media corruption                    |                     | 0.086***<br>(0.013) |                     |                     |                     |                      |
| Information transparency            |                     |                     | 0.169***<br>(0.016) |                     |                     |                      |
| Observations                        | 1930                | 1931                | 1384                | 1971                | 1930                | 1831                 |
| Pseudo-R-squared                    | 0.4415              | 0.4143              | 0.4515              | 0.4842              | 0.4401              | 0.438                |

We report the results of the effect of press freedom on public sector efficiency, using a Tobit analysis. The result of the baseline model is reported in Column [1]. In Columns [2] and [3], we consider alternative measures of press freedom, i.e., media corruption and information transparency, respectively. Both variables range from 0 to 100 (higher values indicate better performance). Columns [4]-[6] consider alternative measures of public sector efficiency. In Column [4], the efficiency scores are re-estimated following [Greene \(2005\)](#), in Column [5] they are re-estimated by exploiting a subjective measure (happiness) among the outcome indicators for economic performance, and in Column [6] they are re-estimated excluding public administration from the public sector dimensions considered. All regressions include the constant, not reported in the table. The pseudo-R-squares are calculated from the log-likelihoods. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table B2: Press Freedom and Public Expenditure Efficiency: Alternative econometric methods

|                                      | [1]                 | [2]                  | [3]                 | [4]                  | [5]                   |
|--------------------------------------|---------------------|----------------------|---------------------|----------------------|-----------------------|
|                                      | OLS                 | LSDVC                | IV first-stage      | IV estimates         | Treatment effects     |
| Media freedom                        | 0.149***<br>(0.050) | 0.053**<br>(0.023)   |                     | 0.506***<br>(0.104)  | 3.550***<br>(0.819)   |
| Log. Population density              | -7.123<br>(5.014)   | -2.019***<br>(0.580) | 0.364<br>(1.471)    | -7.585***<br>(1.360) | -11.471***<br>(2.747) |
| Lag.Total factor productivity (Log.) | 10.845**<br>(4.296) | 1.494<br>(1.543)     | 2.883*<br>(1.649)   | 8.665***<br>(1.349)  | 3.442<br>(2.891)      |
| $\Delta$ Trade openness              | 0.022<br>(0.017)    | 0.021<br>(0.014)     | -0.019<br>(0.021)   | 0.029*<br>(0.017)    | 0.032<br>(0.027)      |
| $\Delta$ Capital openness            | 0.201<br>(0.373)    | 0.394<br>(0.290)     | 0.209<br>(0.381)    | 0.131<br>(0.351)     | 0.212<br>(0.501)      |
| Lag. Expenditure efficiency          |                     | 0.792***<br>(0.014)  |                     |                      |                       |
| Regional media freedom               |                     |                      | 0.778***<br>(0.107) |                      |                       |
| Observations                         | 1930                | 1915                 | 1971                | 1930                 | 1931                  |
| R-squared                            | 0.2968              |                      | 0.9441              | 0.453                | 0.519                 |
| Cragg-Donald Wald stat.              |                     |                      |                     | 88.95                |                       |
| Stock-Yogo stat.                     |                     |                      |                     | 16.38                |                       |
| Country & year fixed effects         | Yes                 | Yes                  | Yes                 | Yes                  | Yes                   |

In Column [4], we instrument domestic press freedom by the average press freedom in neighboring countries. In Column [5], we estimate average treatment effects using the entropy balancing method. Treated units are country/year observations where the media environment is considered “free”, while untreated units are country/year observations where the media environment is considered “partially free” ( $T=1$ ) or “not free” ( $T=0$ ). All regressions include the constant, not reported in the table. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$