Elections and Government Take in Mining Rent in Africa: Evidence from Spatial Regression

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# Abstract

Mining taxation is challenging and can be subject to electoral manipulations. On the one hand, certain interest groups within the mining sector may provide financial support for electoral campaigns in exchange for promises of tax policies favorable to their interests. On the other hand, to appeal to the median voter, candidates may pledge tax reforms aimed at increasing domestic revenue. We test this assumption by investigating the effect of elections on the Average Effective Tax Rate (AETR) of the mining sector in Africa. Using a Spatial Durbin Model (SDM) on a sample of 20 countries over the period 2000- 2019, we find three key results. First, presidential elections negatively affect the AETR. However, the effects on neighboring countries are positive, implying positive externali- ties on neighboring countries. This result is only observed for presidential elections, not parliamentary ones. Second, the negative effect of elections is conditional on the level of democracy, transparency and quality of institutions. In democratic countries, the effect of elections on the AETR is positive. Transparency, in particular Extractive Industry Transparency Initiative (EITI) membership, and the quality of institutions attenuated the negative effect of elections. Finally, the type of institutions matters. Institutions that matter for improving the government’s share of rent-sharing are corruption control, government efficiency and accountability. Indeed, good governance of the mining sector implies informed citizens who hold their rulers to account, as well as the control of corrup- tion. In addition, the administrative capacity of government is important for the sharing of rents. This paper stresses the need to take account of spillover effects in work on the sharing of mining rents. These results are robust to a number of sensitivity tests, as well as to changes in the spatial matrix.

*Keywords:* Mining; Elections, Rent-sharing; Spatial Durbin Model; Africa.

*JEL Codes:* H2; H3; P0; Q3.

# Introduction

Africa account for 30% of the world’s mineral reserves[1](#_bookmark0) including gold, bauxite, dia- monds, cobalt, copper, iron and many others. While debates about the economic benefits of exploiting these mineral resources are still ongoing, these minerals are subject to inter- national rivalry. There is growing international interest in security and mineral supply. For example, in 2022, the Critical Minerals Centre (CMIC) was established by the United Kingdom (U.K.) government. The mission of the center is to collect and analyze infor- mation on minerals and so-called critical raw materials for the benefit of the country’s economic activity and national security. The CMIC is hosted by the British Geological Survey (BGS), a high-potential work program in the U.K. and abroad. In 2023, with the aim of diversifying the United States’ supply chains for essential minerals and strength- ening the economy and national security, a high-level study program is created by United States Institute of Peace (USIP). To this end, USIP is recruiting individuals with in-depth knowledge of mining, the African continent itself, U.S. African policy and other topics. The aim of this program is not just to make recommendations on how the U.S. can es- tablish mutually beneficial partnerships in the field of essential minerals in Africa, but to counter the Chinese expansion which has been growing steadily for decades.

According to the latest British Geological Survey (BGS) report ([Idoine et al.](#_bookmark61), [2023](#_bookmark61)),

gold is the only mineral mined in forty of fifty-four countries on the continent. It’s prized for its unique properties ([Bernstein](#_bookmark34), [2012](#_bookmark34)) among all mining commodities, not only be- cause of its role in financial markets but also because of its global production footprint, including in many developing economies ([Trench et al.](#_bookmark88), [2024](#_bookmark88)). Like other natural re- sources, the imposition of gold is a challenge for gold-rich countries to increase theirs tax revenue ([Ossowski and Gonza´les](#_bookmark79), [2012](#_bookmark79); [Thomas and Trevino](#_bookmark87), [2013](#_bookmark87); [Crivelli and Gupta](#_bookmark51), [2014](#_bookmark51)). One of the characteristics of the mining sector is its ability to generate surplus income, known as rent[2](#_bookmark1). Rent is therefore a surplus that can be fully taxed by the state without causing economic distortions and without affecting investor choice, hence its in- terest as a source of revenue for states ([Charlet et al.](#_bookmark47), [2013](#_bookmark47)). Thus, the objective of maximizing internal resources implies taxing rent at 100%. Taxing 100% of rent is eco- nomically neutral according to optimal rent taxation theory, as the investment decision and production trajectory should not be altered ([Boadway and Keen](#_bookmark37), [2010](#_bookmark37)). The ad- ditional tax resources revenue derived from the taxation of mining rents are defined as Average Effective Tax Rate (AETR) which is the state’s share of mining rents ([Laporte](#_bookmark70) [et al.](#_bookmark70), [2015](#_bookmark70)).

Faced with growing demand[3](#_bookmark2) for gold in the mid-2000s, most countries revised their

mining codes one after the other in order to capture a significant share of the rent. Other countries have even “constitutionalized” mining law by incorporating it into the consti- tution in order to assert and/or strengthen their sovereignty over natural resources. For example, article 25-1 of the Senegalese constitution states that “Natural resources belong

1This percentage is estimated. In reality a large part of the mineral reserves of the African continent is still unexplored. This could suggest a slightly higher percentage than the 30%.

2Rent is shared between investors and the state. [Cottarelli](#_bookmark50) ([2012](#_bookmark50)) defines the rent as “the amount by which revenues exceed all production costs, including those of discovery and development, as well as the normal return on capital”.

3The number of exploration permits increased from 5 in 2002 to 25 in 2003, then to an average of 65 per year between 2004 and 2010. According to the 2013 report of [Central Bank of West African States](https://www.bceao.int/fr/publications/etude-monographique-sur-le-secteur-de-lor-dans-luemoa), in 2011 alone, some 200 permits were issued in the West African Economic and Monetary Union (WAEMU).

to the people. They are used to improve their living conditions. The development and management of natural resources must be transparent and in a way that generates eco- nomic growth, promotes the well-being of the general population and is environmentally sustainable”. This suggests mimetic behavior on the part of countries, and therefore a potential spatial correlation in the capture of mining rents with electoral commitments. In a context of global energy transition[4](#_bookmark3), the ”courting of minerals” means that voters’ sen- sitivity to mining issues is very high. Indeed, according to [Bourgouin](#_bookmark38) ([2011](#_bookmark38)), government involvement in mining is highly political in Africa. As elections approach, while candi- dates may focus their election platforms on maximizing mining revenues, they may still prioritize social programs or environmental concerns over maximizing mining revenues. This could mean lower taxes or royalties for mining companies, reducing the state’s share of mining rents.

After setting up the database on mining taxation by [Laporte et al.](#_bookmark70), [2015](#_bookmark70), studies using this database emerged. Indeed [Bouterige et al.](#_bookmark39) ([2019](#_bookmark39)) through an analysis on the evolution of mining taxation in Africa, shows that Chad, Democratic Republic of Congo, Kenya, Senegal and Tanzania are the countries that have experienced a significant increase in the AETR over the period 2016-2018. These are the countries that made reforms on their mining codes over the same period. By analyzing the AETR and discuss the differences between the WAEMU zone and other countries in the African sub-region, [Charlet et al.](#_bookmark46) ([2019](#_bookmark46)) find that the tax and customs regime applied to extractive industries in the zone is heterogeneous. Using the same database, [Laporte et al.](#_bookmark71) ([2022](#_bookmark71)) analyse tax design and rent sharing in mining sector and find that tax design depends essentially on the evolution of world prices and not on institutional variables much less on technical assistance. [Laporte](#_bookmark72) [and Diallo](#_bookmark72) ([2022](#_bookmark72)) showed that, as mining reforms have progressed, the scope for special agreements to operate within the general framework of common law and mining codes has narrowed. Other recent studies on the sharing of mining rents between the State and investors focuses on country risk, which can affect the sharing of rents either positively ([Adebayo et al.](#_bookmark29), [2021](#_bookmark29)) or negatively ([Amedanou and Laporte](#_bookmark32), [2024](#_bookmark32)). [Sanou](#_bookmark84) ([2024](#_bookmark84)) found that countries with no direct access to the sea should favor production-based taxes rather than profit-based taxes in the taxation of gold rents. None of these studies took into account the spatial dimension, let alone the effect that elections could have on rent sharing. The election year can be considered a high-risk year, given that in Africa elections very often rhyme with crises.

In this paper, we assess the effect of elections on government take[5](#_bookmark4) in mining rents

while considering the potential spatial spillovers. To this end, we use fixed-effect spatial autoregressive model with a sample of 20 African gold-producing countries other the period 2000-2020. We differentiate municipal elections from presidential elections with some control variables. Ours results are threefold. First, we find that presidential elections negatively affect the AETR. This result can be explained by the increased risk during election periods in Africa. However, the effects on neighboring countries are positive, implying positive externalities on neighboring countries. This result is only observed for presidential elections, not parliamentary ones. Next, we find that the negative impact of elections is conditional on the level of democracy, transparency and quality of institutions. In democratic countries, the effect of elections on the AETR is positive. Transparency,

4Gold plays a strategic role in global energy transition in terms of CO2 emissions during production and certain environmental risks ([Trench et al.](#_bookmark88), [2024](#_bookmark88)).

5We use government take and Average Effective Tax Rate (AETR) interchangeably.

in particular membership of the Extractive Industries Transparency Initiative (EITI), and the quality of institutions attenuated the negative effect of institutions. This result can be explained by the fact that election years represent a risk of instability for non- democratic countries. Finally, these results are conditional on the quality of a certain type of institution. These results are robust to a number of sensitivity tests, as well as to changes in the spatial matrix. We find that the institutions that matter for improving the government’s share of rent-sharing are corruption control, government efficiency and accountability. Indeed, good governance of the mining sector implies informed citizens who hold their rulers to account, as well as the control of corruption. In addition, the administrative capacity of government is important for the sharing of rents.

This paper extends a first line of literature on the taxation of mining rents. First, it stresses the need to take account of spillover effects in work on the sharing of mining rents in African gold-producing countries. Second, it broadens the literature of political budget cycles (PBC) in mining sector. To finish, it also contribute to the literature by establishing the role that the level of democracy, transparency and quality of institutions can play in the relationship AETR-elections.

The rest of the paper is organized as follows: the second section presents the literature review. The third section presents the methodology. The fourth section presents and discusses the estimation results. The fifth section presents robustness check. The last section concludes and presents the policy implications.

# Literature review

The first part of our study deals with the existence of political budget cycles. The literature on this topic focusing on election cycles in budget deficits, public spending and tax revenues was the subject of a specific study by [De Haan and Klomp](#_bookmark53) ([2013](#_bookmark53)). In the old models of political budget cycles ([Nordhaus](#_bookmark78), [1975](#_bookmark78)), to secure his re-election, the incumbent manipulates his economic policy. At the end of their mandate, the government adopt expansionist policies to stimulate economic activity. In recent models, the political budget cycle is attributed either to information asymmetries in how politicians explain election cycles ([Shi and Svensson](#_bookmark85), [2006](#_bookmark85)), or to the tolerance of certain informal activities before elections ([Imami et al.](#_bookmark62), [2022](#_bookmark62)). In any case, the objective of the holder, which is to use fiscal and non-fiscal policies to get re-elected, remains the same in both models.

If the incumbents are increasing tax and non-tax incentives to attract voters’ attention as elections approach as they have spent all their mandates in power without real policies for economic development and recovery ([Veiga and Veiga](#_bookmark89), [2007](#_bookmark89); [Lami and Imami](#_bookmark69), [2019](#_bookmark69); [Imami et al.](#_bookmark62), [2022](#_bookmark62); [Ivanovic et al.](#_bookmark65), [2023](#_bookmark65)), an existential question arises as to ”why rational voters choose to be manipulated by such unjust incumbents on the eve of elections?” Rational voters should evaluate the incumbent’s performance during his term, not just the last year due to elections. The age of democracy and the availability of information are the two answers proposed ([Brender](#_bookmark40), [2003](#_bookmark40); [Brender and Drazen](#_bookmark41), [2005](#_bookmark41); [Shi and Svensson](#_bookmark85), [2006](#_bookmark85); [Alt and Lassen](#_bookmark30), [2006](#_bookmark30)). The study of new democracies with up to 15 years of democratic experience is based on a survey of 68 low-income democratic countries from 1960 to 2001, as used by [Brender and Drazen](#_bookmark41) ([2005](#_bookmark41)). This means that the political budget cycle disappears when taking into account highly democratic countries due to the withdrawal of these so-called ’new democracies’. Political cycles in these countries that are referred to as new democracies collapse significantly after the second election and eventually disappear completely after the fourth election. The political manipulation of government by voters is facilitated by having a long experience in democracy. Moreover,

they mention that the percentage of total revenues as a percentage of GDP declines during the election period. [Persson and Tabellini](#_bookmark82) ([2003](#_bookmark82)) discovered similar results in the work of [Brender and Drazen](#_bookmark41) ([2005](#_bookmark41)) when assessing the existence of budget cycles in total spending by using a sample of 60 democratic countries over the period 1960-1998. [Lami and Imami](#_bookmark69) ([2019](#_bookmark69)) have carried out an empirical evaluation of the efficiency of tax revenue collection, in particular value-added tax (VAT), in 25 democratic countries of the Organisation for Economic Co-operation and Development (OECD) during election periods. The results of their research show the existence of budget cycles with a significant deterioration in VAT revenues prior to elections. Incumbents use every means to increase their chances of re-election. Characterized by a weaker institutional framework with little experience, the authors show that young democracies are countries in which budget cycles are more likely to be visible. Like [Brender and Drazen](#_bookmark41) ([2005](#_bookmark41)) and [Shi and Svensson](#_bookmark85) ([2006](#_bookmark85)), consolidated democracies are less vulnerable to budget cycles. Recent studies have carried out country- level analyses to highlight the existence of budget cycles. This is the case of [Ivanovic](#_bookmark65) [et al.](#_bookmark65) ([2023](#_bookmark65)), who analyze the political budget cycle in Serbia, a young post-Communist democracy. The results of their work suggest that there is clear evidence of a higher budget deficit prior to elections. [Imami et al.](#_bookmark63) ([2023](#_bookmark63)) show that incumbents used the COVID-19 pandemic and the earthquake in the same year in Albania, a middle-income country, to mobilize votes for re-election in the 2021 elections. Funding for earthquake relief and COVID-19 vaccinations increased significantly just before the elections, before falling back afterwards.

The idea that better institutions with informed, experienced and rational voters would

lead to a less politically manipulated economic policy prior to elections, is defended by several authors ([Ferejohn](#_bookmark57), [1986](#_bookmark57); [Persson et al.](#_bookmark83), [2003](#_bookmark83); [Shi and Svensson](#_bookmark85), [2006](#_bookmark85); [Brender and](#_bookmark42) [Drazen](#_bookmark42), [2007](#_bookmark42)). These characteristics are typical of mature democracies. [Shmuel](#_bookmark86) ([2020](#_bookmark86)) finds that when the level of democracy increases, this leads to an increase in the incentive of leaders to manipulate the economy for electoral purposes. However their ability to do so is more limited. In these mature democracies, the incumbent generally does not have enough time for a ”fiscal maneuver” before the election. So, other options may be considered. For [Shi and Svensson](#_bookmark85) ([2006](#_bookmark85)) there is a fundamental difference between developed and developing countries when it comes to political budget cycle. They find that before elections in developing countries, the deficit increases significantly, whereas such electoral fiscal policy is non-existent in developed countries. These divergences are largely explained by differences in institutional indicators such as corruption, rent-seeking behavior and access to the media in the two categories of countries. The lack or scarcity of information for the voters can result in high profitability for the incumbent. Under- informed voters can’t differentiate between pre-election manipulations and the actual skills of the incumbent ([Brender](#_bookmark40), [2003](#_bookmark40)). [Alt and Lassen](#_bookmark30) ([2006](#_bookmark30)) point to the lack of transparency due to the lack of information in new democracies to explain the existence of budget cycles. If voters are sufficiently informed, i.e. free access to information, this can lead politicians or the incumbent to be more receptive to their requests ([Besley and](#_bookmark36) [Burgess](#_bookmark36), [2001](#_bookmark36); [Vergne](#_bookmark90), [2009](#_bookmark90)).

The second part deals in general with the economic policy of natural resources and in

particular with the sharing of the mining rent which returns to the State at a given price of gold. The literature on the sharing of gold mining rents is sparse. By constructing a database[6](#_bookmark5) that takes into account fiscal instruments and other out-of-pocket expenses,

6This database is on behalf of the Foundation for Studies and Research on International Development.

[Laporte et al.](#_bookmark70) ([2015](#_bookmark70)) show a convergence of average effective tax rates (AETRs) between English-speaking and French-speaking countries from 2010 onwards. Previous studies had not taken these tax instruments into account. Using this database set up by [Laporte et al.](#_bookmark70) ([2015](#_bookmark70)), [Charlet et al.](#_bookmark46) ([2019](#_bookmark46)) analyze the AETR and discuss the differences between the WAEMU zone and other countries in the African sub-region. They find that the tax and customs regime applied to extractive industries in the zone is heterogeneous. Through a study based on fiscal design and rent sharing in gold-producing countries in Africa, [Laporte et al.](#_bookmark71) ([2022](#_bookmark71)) show that the fiscal design of the state’s share of the rent depends essentially on world prices and not on the institutional framework, let alone technical assistance. [Amedanou and Laporte](#_bookmark32) ([2024](#_bookmark32)) are critical of the [Adebayo et al.](#_bookmark29) ([2021](#_bookmark29)) study, which measured AETR as de facto. They therefore use the FERDI database set up by [Laporte et al.](#_bookmark70) ([2015](#_bookmark70)) which gives a de jure measure of AETR. They then assess the impact of country risk on de jure AETR using pooled Ordinary Last Squares (OLS) regression with Driscoll-Kraay’s methods. They find that country risk has a negative impact on AETR. These results run counter to those of the theoretical model by [Adebayo et al.](#_bookmark29) ([2021](#_bookmark29)), which stipulates that the relationship between AETR and country risk must be positive. Differentiating between the share of production-based taxes and the share of profit-based taxes in AETR, [Sanou](#_bookmark84) ([2024](#_bookmark84)) found that coastal countries must prioritize production-based taxes rather than profit-based taxes in the taxation of gold rents.

Generally speaking, increasing the state’s share of mining rents can have two incentive

effects for the incumbent in gold-producing countries. Firstly, this increase in the state’s share of mining rents gives politicians extra credit for staying in power. As a result, they use these resources for certain pre-electoral activities such as political budget cycles, which are generally tools for strengthening political control. Secondly, the incumbent’s probability of contesting may increase with the share of state rent. Thus, the incumbent may use these additional resources from mineral rent sharing to encourage certain produc- tive activities by reducing taxes ([De Mesquita and Smith](#_bookmark54), [2010](#_bookmark54)) and/or non-productive activities ([Imami et al.](#_bookmark62), [2022](#_bookmark62)). Since most of the mining companies operating on the African continent are of foreign origin, the governments of gold-rich countries can only benefit from higher taxation of the rents[7](#_bookmark6). Thus, during the election campaign, gold rents are seen as a tool for maintaining public services at a reasonable level, or for reducing taxes. Like all other natural resource rents (coal rents, forest rents, natural gas rents and oil rents), gold rents are hidden from public view. In other words, the state’s share of mining rents is known only by the government. When gold mining is carried out by public companies, this creates an alternative to the non-transparency of mining rents, which facilitates budgetary policies ([Klomp and de Haan](#_bookmark68), [2016](#_bookmark68)).

Before the elections, the government may decide to increase its share of the mining

rent. This can be done either by increasing mining (by granting multiple mining permits), or by increasing mining fees, tariffs and taxes (usually when the mining company is foreign- owned). Conversely, the government may still request a smaller share of rent during the pre-electoral period because of the rent-seeking behaviour of the incumbent ([Cabrales](#_bookmark43) [and Hauk](#_bookmark43), [2011](#_bookmark43)). As we assess the effect of elections on AETR, we begin by examining whether state mining rents increase in election years. If not, we consider spatial spillovers in the relationship between AETR and elections.

It can be accessed via the following link: <https://fiscalite-miniere.ferdi.fr/>

7According to [Deacon et al.](#_bookmark55) ([2011](#_bookmark55)), the share of revenues from the exploitation of natural resources that go directly into the state coffers is estimated at more than 80%.

# Methodology

* 1. *Data*
     1. *Measuring government take in mining sector*

To assess the effect of elections on the share of gold mining rent that goes to the state, we use AETR of low-grade mine as our dependent variable in a sample of 20 gold- producing countries[8](#_bookmark8) over the period 2000-2020. This variable comes from the FERDI database set up by [Laporte et al.](#_bookmark70) ([2015](#_bookmark70)). Based on strong economic assumptions, [Laporte](#_bookmark70) [et al.](#_bookmark70) ([2015](#_bookmark70)) have identified 3 types of mine for the calculation of AETR: (i) the low-grade mine, operating mainly as an open-pit with an ore grade of 1.8g/t; (ii) the medium-grade mine, also operating as an open-pit with an ore grade of 3.0g/t; and (iii) the high-grade mine, with an ore grade of between 4.0g/t (open-pit) and 5.5g/t (underground). Table [1](#_bookmark7) presents these economic assumptions.

Table 1: Economic assumptions for the three types of mine

Law-grade, open-pit Medium-grade, open-pit High-grade, open-pit and underground Life cycle 13 years 13 years 13 years

Area 150 km2 150 km2 150 km2

Stripping ratio 1/9 1/9 1/9

Mineral grade 1.8g/t 3.0g/t 4.0g/t(open-pit); 5.5g/t(underground)

Recovery rate 86% 88% 88%(open-pit); 95%(underground) Initial investment USD 190 million USD 150 million USD 290 million

Length of investment 2 years 2 years 2 years Renewable investment USD 18 million USD 13.5 million USD 22.5 million

Extraction costs USD 2.5/t of waste rock mined USD 2.8/t of waste rock mined USD 3/t of waste rock mined Processing costs USD 15/t of mineral processed USD 20/t of mineral processed USD 22/t of mineral processed Administrative costs USD 3.5 million/year from year 3 USD 4 million/year from year 3 USD 5.1 million/year from year 3 Refining and sales costs USD 5/oz USD 5/oz USD 5/oz

Source: FERDI database.

The model used to calculate the AETR is a cash flow model whose logic is close to that of the Fiscal Analysis of Resource Industries (FARI) Model developed by the International Monetary Fund ([Luca and Puyo](#_bookmark75), [2016](#_bookmark75)). It is the ratio of discounted government revenues from a mining project to the net cash flow before taxes of the same project. In other words, the AETR represents the share of the mining rent captured by the state on a mining project, provided that the discount rate is high enough to reflect the opportunity cost of capital ([Laporte et al.](#_bookmark70), [2015](#_bookmark70)). It is based on national legislation and economic data available on the Foundation for Studies and Research on International Development (FERDI).

[Otto](#_bookmark81) ([1998](#_bookmark81), [2006](#_bookmark80)) identified two types of tax levies: (i) in rem taxes or ”production- based taxes” and (ii) in personam taxes or ”profit-based taxes”. Among the tax in- struments used to calculate the AETR, annual ground fees, fixed fees, mining royalties, withholding taxes on interest and turnover minimum tax constitute production-based taxes, while withholding taxes on dividends, corporate income tax, and the payment of dividends to the State constitute profit-based taxes. Other tax instruments that may affect the AETR have not been considered since the information needed to calculate their value is not available. These include fuel and petroleum product taxes, value added tax (VAT) credits not reimbursed by the tax authorities to operating companies, and customs

8These countries are : Burkina Faso, Cote d’Ivoire, Cameroon,Democratic Republic of the Congo,Republic of Congo, Gabon, Ghana, Guinea, Kenya, Madagascar, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Chad, Tanzania, South Africa,Zimbabwe.

duties levied on imports of capital goods. It is important to note that the model consid- ers the specificities of each country’s legislation with respect to each tax instrument. As mining reforms have progressed, the scope for special agreements to operate within the general framework of common law and mining codes has narrowed ([Laporte and Diallo](#_bookmark72), [2022](#_bookmark72)). The model assumes that the company operating the mine benefits from a stability clause[9](#_bookmark10) guaranteeing the maintenance of the tax regime over the life of the project (on average over 13 years). Thus, in a given country and a given year, the AETRs obtained reflect the distribution of pensions defined by the legislation in force.

Data are extracted based on the annual average gold price[10](#_bookmark11). Medium- and low-grade mines AETR’s are used for the robustness of our results.

Figure 1: Average effective tax rate according to mine grade

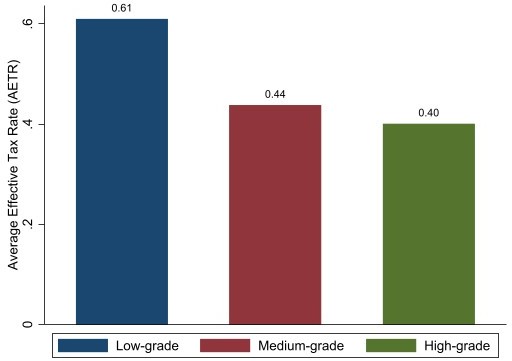


Figure [1](#_bookmark9) shows the average share of gold rents accruing to the state in the countries in our sample. The higher the grade of the mine, the lower the State’s share of the rent. The low-grade mine is the most profitable for the state in terms of rent-sharing. With low-grade AETR’s, figure [2](#_bookmark12) shows that Niger is the country with the highest average share, followed by Guinea and Cameroon. However, the lowest AETRs are attributed to Nigeria, Zimbabwe and South Africa.

Figure [3](#_bookmark13) is a spatial display of the AETR of low-grade mine accross countries. As can be seen, there is a potential spatial correlation in the AETR of the various gold-producing countries in Africa, regardless of mine grade (Figure [A1](#_bookmark92) in the appendix for medium- and high-grade mines spatial display).

9The guarantee period covered by the stability clause stability clause is usually the duration of the validity of the mining title (South Africa, Tanzania, Burkina Faso, Cote d’Ivoire and Mali), but it can also be longer it may also be longer (Mauritania and Senegal) or be counted in years (Ghana).

10For example, in 2020, when the average gold price was around 1770.25 U.S. dollars per oz, let’s consider 1800 U.S. dollars per oz to extract the data. The database does not have data for the year in which the average price is below 1,000 U.S. dollars. We therefore consider 1000 U.S. dollars per oz as the average price if the average price is less than 1,000 U.S. dollars per oz.

Figure 2: Average effective tax rate across countries

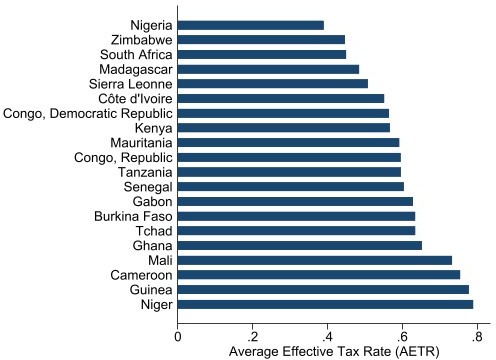
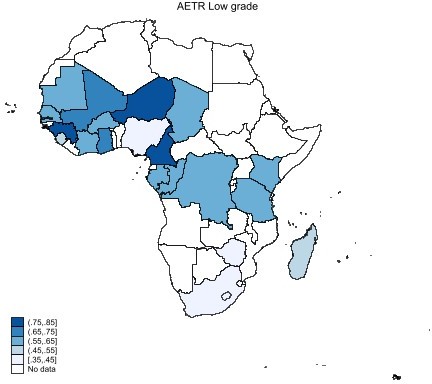


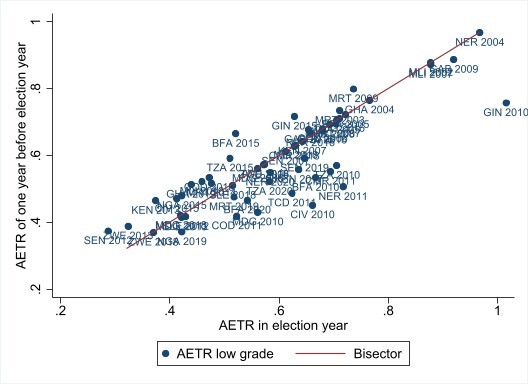
Figure 3: Spatial display of Average effective tax rate across countries



* + 1. *Measuring elections*

Our election variable which is the interest variable, is based on suggestions made by [Franzese Jr](#_bookmark59) ([2000](#_bookmark59)). It takes into account the month in which elections take place during an election year. Considering M as the election month, our election variable takes the value [(12-M)/12] in a pre-election year and [M/12] in an election year. All other years are set to zero (0). The advantage of this approach is that it minimizes measurement error ([Klomp and de Haan](#_bookmark68), [2016](#_bookmark68)) when compared with use of a dummy variable (1 in an election year and 0 otherwise), which is typical of this type of study. Data are extracted from the Database of Political Institutions 2020 (DPI2020) set up by [Cruz et al.](#_bookmark52) ([2021](#_bookmark52)). Depending on whether it is a presidential or legislative election, the election variable is constructed in the same way. Figure [4](#_bookmark14) is a graphical representation of AETR in presidential election year as a function of AETR of one year before election year. Points to the left or above the bisector represent countries in which the AETR of one year before election year is higher than AETR in election year. Conversely, points to the left or below the bisector are countries in which AETR in election year is higher than AETR of one year before election. Bisecting points mean that there has been no variation in AETR during the period. The density of points below the bisector is higher. This suggests a negative relationship between presidential elections and AETR.

Figure 4: AETR before election and election year



* + 1. *Other control variables*

To measure the level of development of the countries in our sample, we use GDP per capita (constant 2015 U.S. dollars) as a proxy. This variable is defined as the ratio between gross domestic product (GDP) and mid-year population. Data are extracted form Worldwide Governance Indicator (WDI) published by the World Bank ([Kaufmann](#_bookmark66) [et al.](#_bookmark66), [2010](#_bookmark66)). It is inserted in the model with its natural logarithm.

Foreign aid (% GNI) or net official development assistance (ODA) refers to loan dis- bursements on concessional terms (net of principal repayments) and grants provided by official agencies of Development Assistance Committee (DAC) members, by non-DAC countries and multilateral institutions to support development and welfare in DAC-ODA

recipient countries and territories. Data are extracted form Worldwide Governance Indi- cator (WDI) published by the World Bank ([Kaufmann et al.](#_bookmark66), [2010](#_bookmark66)) and inserted in the model with its natural logarithm.

Trade openness is the sum of exports and imports of goods and services measured as a share of gross domestic product (GDP). A country is said to be introverted when its trade openness values are low. Conversely, the country will be qualified as extroverted when these values are high. If the data comes from the Worldwide Governance Indicator (WDI) published by the World Bank ([Kaufmann et al.](#_bookmark66), [2010](#_bookmark66)), it is entered into our regressions with its natural logarithm.

Foreign Direct Investment (FDI) is the sum of short-term capital and long-term capital as shown in the balance of payments. it is entered into our regressions with its natural logarithm and provided from the Worldwide Governance Indicator (WDI) published by the World Bank ([Kaufmann et al.](#_bookmark66), [2010](#_bookmark66)).

Inflation, our measure of the change in the general price level in the economy as a whole, is extracted from the Worldwide Governance Indicator (WDI) published by the World Bank ([Kaufmann et al.](#_bookmark66), [2010](#_bookmark66)). This variable is measured by the annual growth rate of the implicit GDP deflator, which is the ratio of GDP in current local currency to GDP in constant local currency. In fact, the fiscal design of the average effective tax rate, defined as the share of the gold mining rent accruing to the State, depends essentially on the evolution of world gold prices ([Laporte et al.](#_bookmark71), [2022](#_bookmark71)).

The EITI variable refers to the country’s adoption or membership of the Extractive Industries Transparency Initiative (EITI). The promotion of transparent and responsi- ble management of natural resources is the main objective of the EITI. In other words, the EITI is recognized as a leading anti-corruption program promoting transparency, ac- countability and good governance of public revenues from oil, gas and mining. In fact, in developing resource-rich countries, [Haufler](#_bookmark60) ([2010](#_bookmark60)) presents the promotion of global trans- parency as a solution to the poor governance experienced almost daily in the extractive sector. The EITI variable is a dummy variable which takes 1 the year in which the country adheres to the initiative and 0 otherwise. It is constructed on the basis of information received from the official EITI website[11](#_bookmark15).

To construct our institutional variable, we used a Principal Component Analysis (PCA). The variables used for the PCA are control of corruption, government effective- ness, rule of law, regulatory quality and political stability and absence of violence, all taken from the World Governance Indicator (WGI) database by the World Bank. It is very important to take account of the institutions involved in the sharing of rents in the mining sector. Tax administrations in countries with poor institutions are notorious for their inefficiency in collecting taxes([Isham et al.](#_bookmark64), [2005](#_bookmark64); [Mehlum et al.](#_bookmark77), [2006](#_bookmark77)).

Our democracy variable measures the level of democracy in the country. It ranges from -10 to 10. A country with a high value (+10) of this variable means that it is highly democratic. Conversely, a low value (-10) indicates an autocratic regime. It comes from the Center for Systemic Peace database set up by [Marshall and Gurr](#_bookmark76) ([2020](#_bookmark76)).

Table [2](#_bookmark16) presents the descriptive statistics for our different variables. Among all three types of mine, the low-grade mine has the highest average share of gold rents accruing to the state (0.61), followed by the medium- (0.44) and high-grade (0.40) mines.

11It can be accessed via the following link: <https://eiti.org/countries>

Table 2: Descriptive statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | (1) | (2) | (3) | (4) | (5) |
|  | Obs | Mean | Std, dev, | Min | Max |
| AETR Low-grade | 335 | 0,610 | 0,166 | 0,273 | 1,111 |
| AETR Medium-grade | 335 | 0,438 | 0,084 | 0,244 | 0,760 |
| AETR High-grade | 335 | 0,401 | 0,086 | 0,229 | 0,869 |
| Presidential Election | 420 | 0,167 | 0,305 | 0 | 1 |
| Legislative Election | 420 | 0,184 | 0,312 | 0 | 1 |
| GDP per capita (log) | 420 | 7,026 | 0,784 | 5,776 | 8,937 |
| Foreign Aid (log) | 419 | 1,430 | 1,164 | -1,626 | 4,130 |
| Foreign Direct Investment (log) | 402 | 0,786 | 1,236 | -6,089 | 3,835 |
| Trade openness (log) | 419 | 4,070 | 0,367 | 2,794 | 5,055 |
| Inflation | 420 | 16,256 | 132,435 | -21,165 | 2630,123 |
| Control of Corruption | 400 | -0,784 | 0,463 | -1,575 | 0,550 |
| Government Effectiveness | 400 | -0,837 | 0,465 | -1,841 | 0,646 |
| Political Stability | 400 | -0,777 | 0,738 | -2,474 | 0,640 |
| Regulatory Quality Estimate | 400 | -0,695 | 0,521 | -2,202 | 0,820 |
| Rule of Law | 400 | -0,812 | 0,517 | -1,870 | 0,181 |
| Voice and Accountability | 400 | -0,565 | 0,604 | -1,734 | 0,746 |
| Democracy | 380 | 2,518 | 4,499 | -6 | 9 |
| EITI | 420 | 0,462 | 0,499 | 0 | 1 |
|  |  |  |  |  |  |
| Source: Authors. |  |  |  |  |  |

* 1. *Empirical strategy*
     1. *The Spatial Model*

Previous works on government’s AETR on mining sector ignore its potential spatial autocorrelation. However, there are several reasons to think that AETR may be correlated across countries. The first and the obvious one is tax competition. Countries may lower their tax rate in response to their neighbors’ behavior. As [Keen and Konrad](#_bookmark67) ([2013](#_bookmark67)) point out: “Like it or not, national tax policy makers are involved in a game with one another.” The second reason is consequential to the first one. To restrict downward pressures on tax, countries may decide to coordinate instead of competing against each other. In this regards, transparency and best practices between neighboring countries can lead to a convergence in mining tax policies. If a country sees success with a particular tax structure for a specific resource, others in the region might adopt a similar approach. For instance, Economic Community of West African States (ECOWAS) adopted its mining directive since 2009[12](#_bookmark18) and WAEMU has a mining code adopted in 2003 and revised in 2023.[13](#_bookmark19) The third reason is historical legacy. Colonial history can play a role. Former colonies might inherit similar legal system from their colonizers, leading to a spatial correlation across countries. Thirteen of the 20 countries of the sample are former French colonies (see the list of countries in appendix [6](#_bookmark28)). Fourth, regions with similar geological formations are more likely to have the same types of minerals. Countries within such regions might implement similar mining tax structures based on the shared characteristics of the resources being extracted.

Regarding these reasons, we resort to a spatial model. Our goal is to assess the effect

of elections on government take in mining rents while considering the potential spatial spillovers. Spatial econometrics provides several options for estimating spatial model. The spatial autoregressive model (SAR), the spatial error model (SEM), the spatial Durbin model (SDM) and the spatial autocorrelation model (SAC) among others. According to [LeSage and Pace](#_bookmark74) ([2009](#_bookmark74)) and [Elhorst et al.](#_bookmark56) ([2014](#_bookmark56)), the SDM is more convenient than both SAR and SEM model, hence we favor SDM in our empirical analysis. The SDM contain the SAR and the SEM, and provides a general starting point for spatial econometric analysis ([LeSage and Pace](#_bookmark74), [2009](#_bookmark74)). The SDM includes among the regressors the spatial lags for the explanatory variables and the dependent variable. It uses the marginal effects of the explanatory variables based on the SAR model in the nearby countries. However, we check the robustness of the results using alternative specifications. Following [LeSage](#_bookmark74) [and Pace](#_bookmark74) ([2009](#_bookmark74)), we construct the baseline regression model as follows:

*AETRit* = *ρWAETRit* + *β*1*Electit* + *β*2*WElectit* + *βXXit* + *λWXit* + *αi* + *εit* (1) where:

*AETRit* is the dependent variable for country *i* at year *t*. *ρ* is the spatial auto-regressive coefficient for the dependent variable. *W* is the spatial weights matrix, reflecting the spatial structure among the units. *Electit* is our variable of interest, e.g., elections, for country *i* at year *t*. *Xit* is a vector of control variables for country *i* at year *t*. *β*1 is the coefficient for the variable of interest. *βX* represents the direct effect coefficients for the

12[https://itie-bf.bf/download/harmonisation-des-principes-directeurs-et-des-politiq](https://itie-bf.bf/download/harmonisation-des-principes-directeurs-et-des-politiques-dans-le-secteur-minier/)

[ues-dans-le-secteur-minier/](https://itie-bf.bf/download/harmonisation-des-principes-directeurs-et-des-politiques-dans-le-secteur-minier/)

13[https://itie-bf.bf/download/reglement-n02-2023-cm-uemoa-du-16-juin-2023-portant-c](https://itie-bf.bf/download/reglement-n02-2023-cm-uemoa-du-16-juin-2023-portant-code-minier-communautaire/)

[ode-minier-communautaire/](https://itie-bf.bf/download/reglement-n02-2023-cm-uemoa-du-16-juin-2023-portant-code-minier-communautaire/)

control variables. *λ* represents the coefficients for the spatial lag of the control variables, capturing the indirect effects of neighboring units’ characteristics. *αi* represents the fixed effects for country *i*, capturing unobserved heterogeneity across countries that does not vary over time. *εit* is the error term for unit *i* at time *t*.

Equation [1](#_bookmark17) is estimated by using Quasi Maximum Likelihood (QML) estimator. In a spatial setting, an explanatory variable change in a particular unit affects not only that unit but also its neighbors ([LeSage and Pace](#_bookmark74), [2009](#_bookmark74)). These effects are often referred to as contextual effects.

* + 1. *Spatial weights matrix*

The selection of the spatial weighting is important in SDM since the model introduces the spatial lag terms using the spatial weights matrix in order to capture the spatial correlation of variables ([LeSage and Pace](#_bookmark74), [2009](#_bookmark74); [Chen et al.](#_bookmark48), [2022](#_bookmark48)). For the theoretical reasons behind the spatial model, we use contiguity weighting matrix in our baseline estimations. Our contiguity matrix *Wij* is defined as follow:

*Wij*

= 1 if countries *i* and *j* are contiguous*,*

0 otherwise*.*

(

However, for robustness purpose we will consider inverse distance matrix to check the sensitivity of our result to the choice of the weighting matrix. The inverse distance matrix *Mij* is defined as follow:

*Mij* =

1

*dij*

(

if *i ̸*= *j,*

0 if *i* = *j.*

Here, *dij* represents the distance between countries *i* and *j*, and *Mij* is set to 0 for all *i* = *j* to avoid division by zero, assuming the distance from a country to itself is not relevant or is considered infinite.

# Results and discussions

* 1. *Baseline results*

Table [3](#_bookmark21) presents our baseline results.[14](#_bookmark20) Our dependent variable is the Average Effective Tax Rate (AETR) of mining for low-grade scenario. We start by estimating a na¨ıve equation (column 1) where we only include our variable of interest, the presidential election in our spatial autoregressive (SAR) model. The result show that the coefficient of the spatial lag is positive and significant at 1% threshold. It suggests that there is a spatial correlation in in the AETR. In other words, countries with neighboring locations that have high levels of AETR are also likely to have high levels of AETR themselves. The direct effect of election is negative and significant while the indirect effect is positive and significant. In column 2, we challenge the na¨ıve equation by including macroeconomic variables: GDP per capita, foreign aid (Official Development Aid), trade openness, foreign direct investment (FDI) in log terms and inflation. The direct effect of presidential election is still negative and significant at 1% threshold while the indirect effect is positive and significant at 1% threshold as well. From column (3) to (5), we respectively add the

14The number of observations in the regressions is higher than the minimum because of the weighting matrix.

EITI membership, democracy index, and institutional quality. Our favorite specification is column (5) where we have all of our control variables included.

We find that presidential election exerts negative effect on government average effec- tive tax rate; the effect is strongly significant. This negative effect might operate through three mechanisms. First, elections can lead to policy shifts. Government take in mining is highly political in Africa ([Bourgouin](#_bookmark38), [2011](#_bookmark38)). As the election approach, the government may prioritize social programs or environmental concerns over maximizing mining rev- enue. This could result in lower taxes or royalties on mining companies, reducing the government’s effective tax rate. Second, elections engender regulatory uncertainty. The lead-up to elections and potential changes in leadership can create uncertainty around regulations in the mining sector. Companies might delay investments or production, leading to lower overall mining activity and government revenue. The last mechanism is mining rents for votes. Politicians might prioritize short-term political gains by offer- ing concessions to mining companies in exchange for campaign contributions or support from powerful mining lobbies. The neighboring effect of elections is positive and strongly significant. The coefficient is four time bigger than the coefficient of the direct effect in ab- solute term. Elections have positive spillovers effects on neighboring countries. Elections are major political risk in Africa ([Cazals and L´eon](#_bookmark45), [2023](#_bookmark45)) where pre and post electoral war, instability and violence are common ([Beaulieu](#_bookmark33), [2014](#_bookmark33); [Flores and Nooruddin](#_bookmark58), [2012](#_bookmark58); [Lars-Erik and Skrede](#_bookmark73), [2013](#_bookmark73); [Collier and Vicente](#_bookmark49), [2012](#_bookmark49); [Wahman and Goldring](#_bookmark91), [2020](#_bookmark91)). As the elections in a given country approach the neighboring countries may benefit from the perceived risk on investment in the mining sector in this country.

Most of the control variables are significant with the expected signs. For the direct

effect, GDP per capita and Trade openness are associated with less AETR. Less developed countries have less capacity to design tax policy. Also, countries openness to trade can mean less trade barriers, and hence lower level of taxation. Aid, foreign direct investment and inflation are not significant determinant of government average effective tax rate in the mining sector in Africa. As expected, EITI membership increase government take in the mining sector. EITI promotes good governance and transparence in the mining sector globally. The direct effect of democracy is not significant. Institutional quality is a composite index of all the six variables of world governance indicators namely voice and accountability, rule of law, political stability and absence of violence, government effectiveness, control of corruption and regulatory quality. Good institutional quality is positively associated with AETR. For the neighboring effects, the coefficient of GDP per capita positive but not significant. Foreign aid, trade openness and foreign direct invest- ment exert negative spillover effects on the government take in the mining sector. These three variables may signal competitive advantage for the receiving countries compared to the neighboring counterparts. Similarly, the EITI membership has negative and signifi- cant effect. EITI membership may constitute a comparative advantage; which favors the acceding country to the detriment of its neighbors. Democracy and institutional quality do not have neighboring effect. To justify the relevance of the choice of the spatial model we present results of a fixed effects model in Table [A5](#_bookmark93) in Appendix which ignores spatial interdependencies. The results show that the elections are not significant; a conclusion that would have been misleading given the results of the spatial model.

Table [4](#_bookmark22) presents the same specification as in Table [3](#_bookmark21) with legislative elections. The

results show that legislative elections have neither direct nor indirect effects on the AETR. The control variables display similar results as the baseline results in Table [3](#_bookmark21). We will focus on presidential elections in our remaining analyses. We now submit these baseline findings

to a series of sensitivity analyses. First, is the effect of presidential elections conditional to the level of democracy, the EITI membership and the quality of institutions?

Table 3: Baseline results: Presidential elections

Dependent variable: Low grade mining take

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
| Presidential election | -0.0335\*\*\* | -0.0316\*\*\* | -0.0298\*\*\* | -0.0333\*\*\* | -0.0271\*\*\* |
|  | (0.0105) | (0.00962) | (0.00956) | (0.00969) | (0.0101) |
| GDP per capita (log) |  | 0.0157 | -0.0150 | -0.0449 | -0.0830\* |
|  |  | (0.0380) | (0.0398) | (0.0414) | (0.0456) |
| Foreign Aid (log) |  | -0.0160 | -0.00979 | -0.00508 | -0.00286 |
|  |  | (0.0110) | (0.0111) | (0.0113) | (0.0121) |
| Trade Openness (log) |  | -0.0508\*\*\* | -0.0609\*\*\* | -0.0573\*\*\* | -0.0688\*\*\* |
|  |  | (0.0173) | (0.0177) | (0.0175) | (0.0192) |
| Foreign Direct Investment (log) |  | 6.00e-05 | 0.000475 | -0.000813 | -0.00145 |
|  |  | (0.00306) | (0.00304) | (0.00307) | (0.00315) |
| Inflation |  | -1.46e-05 | 7.01e-06 | -3.99e-05 | -2.07e-05 |
|  |  | (0.000100) | (9.97e-05) | (0.000103) | (0.000102) |
| EITI |  |  | 0.0408\*\* | 0.0451\*\*\* | 0.0500\*\*\* |
|  |  |  | (0.0163) | (0.0158) | (0.0167) |
| Democracy |  |  |  | 0.00293 | -9.62e-06 |
|  |  |  |  | (0.00189) | (0.00218) |
| Institutional Quality |  |  |  |  | 0.0435\*\*\* |
|  |  |  |  |  | (0.0135) |
| **Wx** |  |  |  |  |  |
| AETR low grade | 0.724\*\*\* | 0.539\*\*\* | 0.545\*\*\* | 0.542\*\*\* | 0.481\*\*\* |
|  | (0.0382) | (0.0498) | (0.0495) | (0.0506) | (0.0606) |
| Presidential election | 0.114\*\*\* | 0.126\*\*\* | 0.123\*\*\* | 0.117\*\*\* | 0.129\*\*\* |
|  | (0.0230) | (0.0209) | (0.0208) | (0.0211) | (0.0223) |
| GDP per capita (log) |  | 0.0752 | 0.116 | 0.0957 | 0.0240 |
|  |  | (0.0660) | (0.0846) | (0.0849) | (0.0923) |
| Foreign Aid (log) |  | -0.0545\*\* | -0.0673\*\* | -0.0778\*\*\* | -0.0741\*\* |
|  |  | (0.0260) | (0.0266) | (0.0274) | (0.0300) |
| Trade Openness (log) |  | -0.191\*\*\* | -0.178\*\*\* | -0.174\*\*\* | -0.220\*\*\* |
|  |  | (0.0393) | (0.0421) | (0.0421) | (0.0475) |
| Foreign Direct Investment (log) |  | -0.0241\*\*\* | -0.0248\*\*\* | -0.0236\*\*\* | -0.0278\*\*\* |
|  |  | (0.00682) | (0.00676) | (0.00683) | (0.00719) |
| Inflation |  | 6.63e-06 | 0.000198 | 0.000156 | 4.82e-05 |
|  |  | (0.000304) | (0.000310) | (0.000303) | (0.000299) |
| EITI |  |  | -0.0465\* | -0.0925\*\*\* | -0.0602\* |
|  |  |  | (0.0273) | (0.0287) | (0.0333) |
| Democracy |  |  |  | 0.0146\*\*\* | 0.00852 |
|  |  |  |  | (0.00534) | (0.00659) |
| Institutional Quality |  |  |  |  | 0.0589 |
|  |  |  |  |  | (0.0377) |
| Constant | 0.0414\*\*\* | 0.0335\*\*\* | 0.0332\*\*\* | 0.0334\*\*\* | 0.0339\*\*\* |
|  | (0.00159) | (0.00123) | (0.00122) | (0.00127) | (0.00132) |
| Observations | 380 | 400 | 400 | 380 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 611.8 | 739.9 | 743.2 | 701.7 | 659.6 |
| pseudo-R-squared | 0.0849 | 0.112 | 0.0702 | 0.120 | 0.156 |
| Chi-squared | 424.7 | 518.5 | 536.2 | 531.5 | 523.8 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

Table 4: Baseline results: Legislative elections

Dependent variable: Low grade mining take

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
| Legislative election | -0.0294\*\*\* | -0.00836 | -0.00798 | -0.00859 | -0.00539 |
|  | (0.00991) | (0.00989) | (0.00983) | (0.0100) | (0.0103) |
| GDP per capita (log) |  | 0.0255 | -0.0123 | -0.0519 | -0.0851\* |
|  |  | (0.0403) | (0.0422) | (0.0439) | (0.0484) |
| Foreign Aid (log) |  | -0.0126 | -0.00530 | -0.00195 | 0.00187 |
|  |  | (0.0116) | (0.0117) | (0.0119) | (0.0128) |
| Trade Openness (log) |  | -0.0478\*\*\* | -0.0603\*\*\* | -0.0562\*\*\* | -0.0610\*\*\* |
|  |  | (0.0183) | (0.0186) | (0.0185) | (0.0202) |
| Foreign Direct Investment (log) |  | -0.000703 | -0.000111 | -0.00146 | -0.00180 |
|  |  | (0.00327) | (0.00324) | (0.00328) | (0.00336) |
| Inflation |  | 3.01e-05 | 5.63e-05 | -1.30e-05 | 1.05e-05 |
|  |  | (0.000106) | (0.000105) | (0.000109) | (0.000108) |
| EITI |  |  | 0.0496\*\*\* | 0.0547\*\*\* | 0.0567\*\*\* |
|  |  |  | (0.0172) | (0.0168) | (0.0178) |
| Democracy |  |  |  | 0.00406\*\* | 0.00157 |
|  |  |  |  | (0.00200) | (0.00228) |
| Institutional Quality |  |  |  |  | 0.0423\*\*\* |
|  |  |  |  |  | (0.0141) |
| **Wx** |  |  |  |  |  |
| Legislative election | -0.0114 | 0.00233 | -0.00298 | -0.0119 | -0.00442 |
|  | (0.0244) | (0.0260) | (0.0263) | (0.0267) | (0.0276) |
| AETR low grade | 0.718\*\*\* | 0.542\*\*\* | 0.550\*\*\* | 0.542\*\*\* | 0.516\*\*\* |
|  | (0.0391) | (0.0501) | (0.0497) | (0.0511) | (0.0580) |
| GDP per capita (log) |  | 0.0722 | 0.105 | 0.0782 | 0.0305 |
|  |  | (0.0707) | (0.0923) | (0.0926) | (0.0999) |
| Foreign Aid (log) |  | -0.0566\*\* | -0.0708\*\* | -0.0785\*\*\* | -0.0839\*\*\* |
|  |  | (0.0276) | (0.0281) | (0.0290) | (0.0318) |
| Trade Openness (log) |  | -0.195\*\*\* | -0.181\*\*\* | -0.174\*\*\* | -0.213\*\*\* |
|  |  | (0.0434) | (0.0453) | (0.0454) | (0.0512) |
| Foreign Direct Investment (log) |  | -0.0207\*\*\* | -0.0219\*\*\* | -0.0215\*\*\* | -0.0236\*\*\* |
|  |  | (0.00736) | (0.00730) | (0.00737) | (0.00768) |
| Inflation |  | -0.000319 | -8.51e-05 | -8.59e-05 | -0.000152 |
|  |  | (0.000320) | (0.000326) | (0.000320) | (0.000316) |
| EITI |  |  | -0.0497\* | -0.0995\*\*\* | -0.0787\*\* |
|  |  |  | (0.0291) | (0.0305) | (0.0348) |
| Democracy |  |  |  | 0.0161\*\*\* | 0.0138\*\* |
|  |  |  |  | (0.00560) | (0.00675) |
| Institutional Quality |  |  |  |  | 0.0196 |
|  |  |  |  |  | (0.0381) |
| Constant | 0.0429\*\*\* | 0.0354\*\*\* | 0.0350\*\*\* | 0.0353\*\*\* | 0.0359\*\*\* |
|  | (0.00165) | (0.00131) | (0.00129) | (0.00134) | (0.00140) |
| Observations | 380 | 400 | 400 | 380 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 599.4 | 718.2 | 722.5 | 682 | 639.5 |
| pseudo-R-squared | 0.00872 | 0.115 | 0.0956 | 0.134 | 0.152 |
| Chi-squared | 369.2 | 420.7 | 441.2 | 437.8 | 432 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

* 1. *Conditional effects of elections*

Our goal here is to assess whether democracy, good institutions and transparency mitigate the adverse effect of elections on government’s AETR. Table [5](#_bookmark23) presents the results of the conditional effect of presidential elections. We consider our last specification from the baseline results where we add a multiplicative term between elections and democracy (column 1), EITI membership (column 2), and institutional quality (column 3). We report the direct and indirect effect (Wx) for each specification. Our previous results still hold. AETR has spillover effects on neighboring countries. Elections exert direct negative effect on AETR, while the indirect effect is positive.

The coefficient associated with the interaction between elections and democracy is positive and strongly significant. This means that elections do not exert a negative effect on government’s AETR when countries are democratic. In fact, the effect is even positive and significant even though the size of the coefficient is small. Democracy mitigates the political risk paused by elections in the sample countries. Countries might strengthen their democratic system to dampen the political paused by elections. In columns (2) and (3), we replicate the same exercise with EITI membership and the quality of institutions respectively. Just like democracy, EITI membership and institutional quality contribute to mitigate the negative effect of elections. However, what institutions even matter?

* 1. *Investigating the type of institutions*

In the previous regressions, we use a composite index of the quality of institutions applying principal component analysis method for the six indicators (voice and account- ability, rule of law, political stability and absence of violence, government effectiveness, control of corruption and regulatory quality). Now, we explore the specificity of each institution in Table [6](#_bookmark24). Our previous results hold. The results show that the institutions that matter foster government’s AETR are control of corruption, government effectiveness and voice and accountability.

Table 5: Conditional effects of election

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | | (3) | | |
| Direct | Wx | Direct | Wx | Direct | Wx |
| Presidential election | -0.0518\*\*\* | 0.124\*\*\* | -0.0737\*\*\* | 0.127\*\*\* | -0.0269\*\*\* | 0.127\*\*\* |
|  | (0.0131) | (0.0220) | (0.0233) | (0.0222) | (0.0100) | (0.0223) |
| GDP per capita (log) | -0.0713 | -0.0209 | -0.0861\* | 0.00662 | -0.0721 | -0.00315 |
|  | (0.0451) | (0.0922) | (0.0453) | (0.0919) | (0.0458) | (0.0932) |
| Foreign Aid (log) | -0.00345 | -0.0851\*\*\* | -0.00444 | -0.0821\*\*\* | -0.00236 | -0.0757\*\* |
|  | (0.0120) | (0.0298) | (0.0121) | (0.0300) | (0.0121) | (0.0299) |
| Trade Openness (log) | -0.0668\*\*\* | -0.214\*\*\* | -0.0694\*\*\* | -0.229\*\*\* | -0.0690\*\*\* | -0.214\*\*\* |
|  | (0.0189) | (0.0467) | (0.0191) | (0.0474) | (0.0191) | (0.0473) |
| Foreign Direct Investment (log) | -0.00132 | -0.0284\*\*\* | -0.00141 | -0.0273\*\*\* | -0.00142 | -0.0287\*\*\* |
|  | (0.00310) | (0.00708) | (0.00313) | (0.00714) | (0.00314) | (0.00717) |
| Inflation | -1.12e-05 | 6.74e-05 | 1.26e-05 | -2.92e-06 | -2.36e-05 | 5.05e-05 |
|  | (0.000101) | (0.000295) | (0.000103) | (0.000298) | (0.000102) | (0.000298) |
| EITI | 0.0505\*\*\* | -0.0576\* | 0.0354\*\* | -0.0547\* | 0.0517\*\*\* | -0.0556\* |
|  | (0.0164) | (0.0328) | (0.0178) | (0.0331) | (0.0166) | (0.0332) |
| Democracy | -0.00132 | 0.0103 | 8.08e-05 | 0.00935 | -0.000177 | 0.00790 |
|  | (0.00219) | (0.00651) | (0.00216) | (0.00655) | (0.00217) | (0.00656) |
| Institutional quality | 0.0429\*\*\* | 0.0458 | 0.0455\*\*\* | 0.0565 | 0.0409\*\*\* | 0.0583 |
|  | (0.0133) | (0.0373) | (0.0134) | (0.0375) | (0.0135) | (0.0375) |
| AETR low grade |  | 0.510\*\*\* |  | 0.481\*\*\* |  | 0.493\*\*\* |
|  |  | (0.0599) |  | (0.0604) |  | (0.0604) |
| ElectionXDemocracy | 0.00682\*\*\* |  |  |  |  |  |
|  | (0.00238) |  |  |  |  |  |
| ElectionXEITI |  |  | 0.0572\*\* |  |  |  |
|  |  |  | (0.0258) |  |  |  |
| ElectionXInstitution |  |  |  |  | 0.0172\* |  |
|  |  |  |  |  | (0.0104) |  |
| Constant | 0.0334\*\*\* |  | 0.0337\*\*\* |  | 0.0338\*\*\* |  |
|  | (0.00131) |  | (0.00131) |  | (0.00132) |  |
| Observations | 360 | 360 | 360 | 360 | 360 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 663.6 | 663.6 | 662.1 | 662.1 | 661 | 661 |
| pseudo-R-squared | 0.157 | 0.157 | 0.158 | 0.158 | 0.157 | 0.157 |
| Chi-squared | 550.2 | 550.2 | 536.5 | 536.5 | 533 | 533 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

Table 6: The type of institutions

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|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (1) | | (2) | | (3) | | (4) | | (5) | | (6) | | |
|  | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx |
| Presidential election | -0.0308\*\*\* | 0.113\*\*\* | -0.0331\*\*\* | 0.118\*\*\* | -0.0340\*\*\* | 0.118\*\*\* | -0.0345\*\*\* | 0.116\*\*\* | -0.0330\*\*\* | 0.117\*\*\* | -0.0271\*\*\* | 0.129\*\*\* |
|  | (0.00991) | (0.0216) | (0.00983) | (0.0214) | (0.00989) | (0.0216) | (0.00991) | (0.0216) | (0.00991) | (0.0217) | (0.0101) | (0.0223) |
| GDP per capita (log) | -0.0721 | -0.00559 | -0.0634 | 0.0421 | -0.0408 | 0.112 | -0.0283 | 0.135 | -0.0531 | 0.0917 | -0.0830\* | 0.0240 |
|  | (0.0459) | (0.101) | (0.0449) | (0.0948) | (0.0451) | (0.0934) | (0.0460) | (0.0923) | (0.0476) | (0.0900) | (0.0456) | (0.0923) |
| Foreign Aid (log) | -0.00608 | -0.0756\*\*\* | -0.00302 | -0.0717\*\* | -0.00429 | -0.0702\*\* | -0.00440 | -0.0797\*\*\* | -0.00186 | -0.0836\*\*\* | -0.00286 | -0.0741\*\* |
|  | (0.0120) | (0.0289) | (0.0119) | (0.0295) | (0.0121) | (0.0304) | (0.0121) | (0.0291) | (0.0124) | (0.0296) | (0.0121) | (0.0300) |
| Trade Openness (log) | -0.0592\*\*\* | -0.197\*\*\* | -0.0592\*\*\* | -0.194\*\*\* | -0.0660\*\*\* | -0.166\*\*\* | -0.0540\*\*\* | -0.136\*\*\* | -0.0570\*\*\* | -0.177\*\*\* | -0.0688\*\*\* | -0.220\*\*\* |
|  | (0.0198) | (0.0454) | (0.0190) | (0.0449) | (0.0189) | (0.0459) | (0.0200) | (0.0503) | (0.0193) | (0.0450) | (0.0192) | (0.0475) |
| Foreign Direct Investment (log) | 0.000217 | -0.0238\*\*\* | -0.00107 | -0.0240\*\*\* | -0.000498 | -0.0246\*\*\* | -0.000850 | -0.0245\*\*\* | -0.000757 | -0.0229\*\*\* | -0.00145 | -0.0278\*\*\* |
|  | (0.00315) | (0.00699) | (0.00313) | (0.00709) | (0.00315) | (0.00708) | (0.00319) | (0.00701) | (0.00315) | (0.00708) | (0.00315) | (0.00719) |
| Inflation | -3.50e-05 | 0.000130 | 1.05e-05 | 0.000300 | -1.93e-05 | 0.000206 | -1.29e-05 | 0.000272 | -1.24e-05 | 0.000174 | -2.07e-05 | 4.82e-05 |
|  | (0.000103) | (0.000298) | (0.000102) | (0.000298) | (0.000102) | (0.000301) | (0.000103) | (0.000301) | (0.000103) | (0.000301) | (0.000102) | (0.000299) |
| EITI | 0.0627\*\*\* | -0.0805\*\*\* | 0.0702\*\*\* | -0.0869\*\*\* | 0.0527\*\*\* | -0.0933\*\*\* | 0.0477\*\*\* | -0.109\*\*\* | 0.0521\*\*\* | -0.0990\*\*\* | 0.0500\*\*\* | -0.0602\* |
|  | (0.0174) | (0.0309) | (0.0181) | (0.0325) | (0.0167) | (0.0329) | (0.0168) | (0.0306) | (0.0168) | (0.0322) | (0.0167) | (0.0333) |
| Democracy | 0.00252 | 0.0135\*\* | 0.00280 | 0.0136\*\* | 0.00312 | 0.0127\*\* | 0.00303 | 0.0135\*\* | 0.00241 | 0.0155\*\*\* | -9.62e-06 | 0.00852 |
|  | (0.00200) | (0.00557) | (0.00199) | (0.00551) | (0.00202) | (0.00591) | (0.00201) | (0.00575) | (0.00208) | (0.00596) | (0.00218) | (0.00659) |
| AETR low grade |  | 0.507\*\*\* |  | 0.541\*\*\* |  | 0.544\*\*\* |  | 0.533\*\*\* |  | 0.545\*\*\* |  | 0.481\*\*\* |
|  |  | (0.0579) |  | (0.0524) |  | (0.0527) |  | (0.0528) |  | (0.0524) |  | (0.0606) |
| Control of Corruption | 0.0665\*\*\* | 0.0886 |  |  |  |  |  |  |  |  |  |  |
|  | (0.0239) | (0.0748) |  |  |  |  |  |  |  |  |  |  |
| Government Effectiveness |  |  | 0.0747\*\*\* | 0.0578 |  |  |  |  |  |  |  |  |
|  |  |  | (0.0274) | (0.0888) |  |  |  |  |  |  |  |  |
| Political Stability |  |  |  |  | -0.0104 | 0.0206 |  |  |  |  |  |  |
|  |  |  |  |  | (0.00898) | (0.0241) |  |  |  |  |  |  |
| Regulatory Quality |  |  |  |  |  |  | -0.0243 | -0.0929 |  |  |  |  |
|  |  |  |  |  |  |  | (0.0210) | (0.0792) |  |  |  |  |
| Rule of Law |  |  |  |  |  |  |  |  | 0.0212 | -0.0172 |  |  |
|  |  |  |  |  |  |  |  |  | (0.0224) | (0.0696) |  |  |
| Voice and Accountability |  |  |  |  |  |  |  |  |  |  | 0.0720\*\*\* | 0.0976 |
|  |  |  |  |  |  |  |  |  |  |  | (0.0223) | (0.0625) |
| Constant | 0.0340\*\*\* |  | 0.0339\*\*\* |  | 0.0341\*\*\* |  | 0.0341\*\*\* |  | 0.0342\*\*\* |  | 0.0339\*\*\* |  |
|  | (0.00133) |  | (0.00132) |  | (0.00133) |  | (0.00133) |  | (0.00133) |  | (0.00132) |  |
| Observations | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 658 | 658 | 657.8 | 657.8 | 655.2 | 655.2 | 655.4 | 655.4 | 654.8 | 654.8 | 659.6 | 659.6 |
| pseudo-R-squared | 0.157 | 0.157 | 0.147 | 0.147 | 0.103 | 0.103 | 0.214 | 0.214 | 0.123 | 0.123 | 0.157 | 0.157 |
| Chi-squared | 520.2 | 520.2 | 526.8 | 526.8 | 513.7 | 513.7 | 512.5 | 512.5 | 511.8 | 511.8 | 523.8 | 523.8 |
| Chi-squared-pvalue | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

# Robustness checks

* 1. *Sensitivity to the weighting matrix*

While implementing spatial regressions, the common treat is the sensitivity of the results to the spatial weighting matrix. Our spatial weighting matrix being a contiguity matrix in the baseline results, we test the sensitivity of the results by using an inverse distance weighting matrix. Table [7](#_bookmark25) presents the results. They are similar to the baseline results. The spatial lag is positive and strongly significant which justify the choice of a spatial specification. The direct effect of presidential elections remains negative and significant while the indirect effect is positive and significant. The signs and significance of the control variables are similar to the previous results. Our findings are not driven by the choice of the spatial weighting matrix.

* 1. *Sensitivity to mining grade*

The calculation of the AETR is based on assumption on mining grade. In our baseline estimations we use low-grade mines scenario. We relax this assumption by considering medium- and high-grade mines. The results are respectively in Tables [8](#_bookmark26) and [9](#_bookmark27). The results remain the same. Elections have negative effect on the government’s AETR and a positive effect on neighboring countries. The spatial spillovers of medium- and high-grade mines are however low compared to low-grade mine.

Table 7: Robustness: Inverse distance matrix

Regressions with inverse distance matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
| Presidential election | -0.0270\*\*\* | -0.0309\*\*\* | -0.0293\*\*\* | -0.0322\*\*\* | -0.0217\*\* |
|  | (0.00968) | (0.00899) | (0.00892) | (0.00907) | (0.00968) |
| GDP per capita (log) |  | -0.0219 | -0.0292 | -0.0304 | -0.0702 |
|  |  | (0.0388) | (0.0389) | (0.0391) | (0.0440) |
| Foreign Aid (log) |  | -0.0237\*\* | -0.0191\*\* | -0.0131 | -0.0204\*\* |
|  |  | (0.00948) | (0.00955) | (0.00969) | (0.0102) |
| Trade Openness (log) |  | -0.00856 | -0.0144 | -0.0146 | -0.0384\*\* |
|  |  | (0.0168) | (0.0173) | (0.0172) | (0.0191) |
| Foreign Direct Investment (log) |  | -0.00129 | -6.84e-05 | -0.000724 | -0.00322 |
|  |  | (0.00288) | (0.00300) | (0.00304) | (0.00314) |
| Inflation |  | -1.25e-06 | 2.84e-05 | 4.36e-05 | -2.05e-05 |
|  |  | (9.04e-05) | (9.10e-05) | (9.28e-05) | (9.23e-05) |
| EITI |  |  | 0.0404\*\* | 0.0419\*\*\* | 0.0615\*\*\* |
|  |  |  | (0.0159) | (0.0162) | (0.0171) |
| Democracy |  |  |  | 0.00394\* | 5.66e-05 |
|  |  |  |  | (0.00216) | (0.00256) |
| Institutional Quality |  |  |  |  | 0.0155 |
|  |  |  |  |  | (0.0129) |
| **Wx** |  |  |  |  |  |
| AETR low grade | 0.801\*\*\* | 0.562\*\*\* | 0.572\*\*\* | 0.532\*\*\* | 0.318\*\*\* |
|  | (0.0325) | (0.0582) | (0.0576) | (0.0638) | (0.0919) |
| Presidential election | 0.0929\*\*\* | 0.121\*\*\* | 0.124\*\*\* | 0.0911\*\*\* | 0.179\*\*\* |
|  | (0.0299) | (0.0320) | (0.0324) | (0.0352) | (0.0419) |
| GDP per capita (log) |  | -0.00111 | 0.00690 | -0.183 | -0.252\* |
|  |  | (0.0964) | (0.128) | (0.149) | (0.153) |
| Foreign Aid (log) |  | -0.0643 | -0.0986\* | -0.167\*\*\* | -0.161\*\*\* |
|  |  | (0.0458) | (0.0517) | (0.0570) | (0.0589) |
| Trade Openness (log) |  | -0.271\*\*\* | -0.239\*\*\* | -0.222\*\*\* | -0.248\*\*\* |
|  |  | (0.0523) | (0.0747) | (0.0750) | (0.0825) |
| Foreign Direct Investment (log) |  | -0.0149\* | -0.0169\* | -0.0179\*\* | -0.0364\*\*\* |
|  |  | (0.00876) | (0.00871) | (0.00877) | (0.00997) |
| Inflation |  | -0.000684 | -0.000677 | 0.000189 | -0.000483 |
|  |  | (0.000555) | (0.000618) | (0.000703) | (0.000722) |
| EITI |  |  | -0.0611 | -0.160\*\*\* | -0.0800 |
|  |  |  | (0.0545) | (0.0617) | (0.0678) |
| Democracy |  |  |  | 0.0385\*\*\* | -0.00669 |
|  |  |  |  | (0.0145) | (0.0187) |
| Institutional Quality |  |  |  |  | 0.248\*\*\* |
|  |  |  |  |  | (0.0600) |
| Constant | 0.0384\*\*\* | 0.0314\*\*\* | 0.0311\*\*\* | 0.0314\*\*\* | 0.0318\*\*\* |
|  | (0.00146) | (0.00115) | (0.00114) | (0.00118) | (0.00122) |
| Observations | 380 | 400 | 400 | 380 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 644.9 | 769.3 | 773 | 729.3 | 688.9 |
| pseudo-R-squared | 0.0463 | 0.0769 | 0.0754 | 0.0848 | 0.0856 |
| Chi-squared | 680.8 | 655.7 | 678.9 | 659 | 657.6 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

Table 8: Robustness: Medium mining grade

Dependent variable: Medium grade mining take

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
| Presidential election | -0.0184\*\* | -0.0158\*\* | -0.0131\*\* | -0.0126\*\* | -0.0129\*\* |
|  | (0.00796) | (0.00637) | (0.00623) | (0.00620) | (0.00638) |
| GDP per capita (log) |  | -0.0280 | -0.0411 | -0.0420 | -0.0492\* |
|  |  | (0.0250) | (0.0258) | (0.0263) | (0.0288) |
| Foreign Aid (log) |  | -0.0179\*\* | -0.0130\* | -0.00801 | -0.00440 |
|  |  | (0.00720) | (0.00718) | (0.00716) | (0.00766) |
| Trade Openness (log) |  | -0.0270\*\* | -0.0315\*\*\* | -0.0371\*\*\* | -0.0362\*\*\* |
|  |  | (0.0113) | (0.0113) | (0.0110) | (0.0119) |
| Foreign Direct Investment (log) |  | -0.000907 | -0.000386 | -0.000871 | -0.000474 |
|  |  | (0.00203) | (0.00198) | (0.00195) | (0.00200) |
| Inflation |  | -2.58e-05 | -2.26e-05 | -4.64e-05 | -1.58e-05 |
|  |  | (6.58e-05) | (6.44e-05) | (6.53e-05) | (6.44e-05) |
| EITI |  |  | 0.0242\*\* | 0.0369\*\*\* | 0.0383\*\*\* |
|  |  |  | (0.0106) | (0.0101) | (0.0106) |
| Democracy |  |  |  | 0.000987 | 0.000271 |
|  |  |  |  | (0.00120) | (0.00137) |
| Institutional Quality |  |  |  |  | 0.0131 |
|  |  |  |  |  | (0.00826) |
| **Wx** |  |  |  |  |  |
| AETR medium grade | 0.0680\*\*\* | 0.0857\*\*\* | 0.0861\*\*\* | 0.0857\*\*\* | 0.0823\*\*\* |
|  | (0.0172) | (0.0137) | (0.0134) | (0.0133) | (0.0139) |
| Presidential election |  | 0.140\*\*\* | 0.281\*\*\* | 0.298\*\*\* | 0.315\*\*\* |
|  |  | (0.0427) | (0.0549) | (0.0540) | (0.0590) |
| GDP per capita (log) |  | -0.00275 | -0.0222 | -0.0235 | -0.0326\* |
|  |  | (0.0171) | (0.0172) | (0.0173) | (0.0190) |
| Foreign Aid (log) |  | -0.0981\*\*\* | -0.0575\*\* | -0.0583\*\* | -0.0590\*\* |
|  |  | (0.0248) | (0.0261) | (0.0256) | (0.0276) |
| Trade Openness (log) |  | -0.0196\*\*\* | -0.0199\*\*\* | -0.0189\*\*\* | -0.0179\*\*\* |
|  |  | (0.00448) | (0.00437) | (0.00432) | (0.00450) |
| Foreign Direct Investment (log) |  | 0.000324 | 0.000455\*\* | 0.000471\*\* | 0.000436\*\* |
|  |  | (0.000200) | (0.000200) | (0.000192) | (0.000189) |
| Inflation | 0.247\*\*\* | 0.00480 | -0.0257 | -0.0336 | 0.000762 |
|  | (0.0710) | (0.0769) | (0.0775) | (0.0795) | (0.0846) |
| EITI |  |  | -0.0802\*\*\* | -0.0973\*\*\* | -0.103\*\*\* |
|  |  |  | (0.0177) | (0.0181) | (0.0208) |
| Democracy |  |  |  | 0.00175 | 0.00448 |
|  |  |  |  | (0.00335) | (0.00413) |
| Institutional Quality |  |  |  |  | -0.0323 |
|  |  |  |  |  | (0.0219) |
| Constant | 0.0314\*\*\* | 0.0220\*\*\* | 0.0214\*\*\* | 0.0211\*\*\* | 0.0214\*\*\* |
|  | (0.00117) | (0.000798) | (0.000777) | (0.000786) | (0.000821) |
| Observations | 380 | 400 | 400 | 380 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 733.3 | 911.3 | 921.4 | 878.3 | 824.4 |
| pseudo-R-squared | 0.0636 | 0.214 | 0.199 | 0.199 | 0.201 |
| Chi-squared | 32.84 | 140.6 | 169 | 202.5 | 205.8 |
| Chi-squared-pvalue | 3.48e-07 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

Table 9: Robustness: High mining grade

Dependent variable: High grade mining take

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
| Presidential election | -0.0193\*\* | -0.0182\*\* | -0.0155\*\* | -0.0139\* | -0.0160\*\* |
|  | (0.00898) | (0.00723) | (0.00709) | (0.00710) | (0.00718) |
| GDP per capita (log) |  | -0.0421 | -0.0529\* | -0.0460 | -0.0378 |
|  |  | (0.0285) | (0.0296) | (0.0303) | (0.0331) |
| Foreign Aid (log) |  | -0.0157\* | -0.0109 | -0.00570 | -0.000987 |
|  |  | (0.00821) | (0.00821) | (0.00822) | (0.00871) |
| Trade Openness (log) |  | -0.0150 | -0.0183 | -0.0277\*\* | -0.0216 |
|  |  | (0.0128) | (0.0129) | (0.0127) | (0.0135) |
| Foreign Direct Investment (log) |  | -0.000686 | -0.000126 | -0.000448 | 0.000292 |
|  |  | (0.00231) | (0.00226) | (0.00224) | (0.00227) |
| Inflation |  | -3.55e-05 | -3.44e-05 | -5.24e-05 | -1.46e-05 |
|  |  | (7.50e-05) | (7.36e-05) | (7.50e-05) | (7.33e-05) |
| EITI |  |  | 0.0224\* | 0.0391\*\*\* | 0.0380\*\*\* |
|  |  |  | (0.0121) | (0.0116) | (0.0121) |
| Democracy |  |  |  | 0.000565 | 0.00109 |
|  |  |  |  | (0.00138) | (0.00155) |
| Institutional Quality |  |  |  |  | -0.00236 |
|  |  |  |  |  | (0.00950) |
| **Wx** |  |  |  |  |  |
| AETR high grade | 0.0576\*\*\* | 0.0831\*\*\* | 0.0835\*\*\* | 0.0849\*\*\* | 0.0753\*\*\* |
|  | (0.0194) | (0.0155) | (0.0152) | (0.0152) | (0.0156) |
| Presidential election |  | 0.147\*\*\* | 0.302\*\*\* | 0.335\*\*\* | 0.420\*\*\* |
|  |  | (0.0481) | (0.0617) | (0.0611) | (0.0672) |
| GDP per capita (log) |  | 0.0211 | 0.000866 | 0.00507 | -0.0158 |
|  |  | (0.0195) | (0.0197) | (0.0199) | (0.0216) |
| Foreign Aid (log) |  | -0.0461\* | 0.000739 | -0.00518 | 0.00744 |
|  |  | (0.0274) | (0.0294) | (0.0288) | (0.0304) |
| Trade Openness (log) |  | -0.0207\*\*\* | -0.0209\*\*\* | -0.0197\*\*\* | -0.0160\*\*\* |
|  |  | (0.00510) | (0.00499) | (0.00496) | (0.00511) |
| Foreign Direct Investment (log) |  | 0.000425\* | 0.000552\*\* | 0.000604\*\*\* | 0.000590\*\*\* |
|  |  | (0.000228) | (0.000229) | (0.000220) | (0.000215) |
| Inflation | 0.0417 | -0.0854 | -0.115 | -0.123 | -0.104 |
|  | (0.0811) | (0.0828) | (0.0833) | (0.0857) | (0.0886) |
| EITI |  |  | -0.0859\*\*\* | -0.0930\*\*\* | -0.126\*\*\* |
|  |  |  | (0.0202) | (0.0207) | (0.0237) |
| Democracy |  |  |  | -0.00222 | 0.00684 |
|  |  |  |  | (0.00384) | (0.00468) |
| Institutional Quality |  |  |  |  | -0.0887\*\*\* |
|  |  |  |  |  | (0.0242) |
| Constant | 0.0355\*\*\* | 0.0251\*\*\* | 0.0245\*\*\* | 0.0242\*\*\* | 0.0244\*\*\* |
|  | (0.00132) | (0.000910) | (0.000889) | (0.000905) | (0.000936) |
| Observations | 380 | 400 | 400 | 380 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 690.7 | 861.3 | 870.1 | 827.8 | 779.8 |
| pseudo-R-squared | 0.0336 | 0.116 | 0.117 | 0.117 | 0.120 |
| Chi-squared | 13.23 | 70.45 | 91.98 | 116.5 | 130.8 |
| Chi-squared-pvalue | 0.00416 | 6.64e-10 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1

# Conclusion

This paper investigates the effect of elections on the Average Effective Tax Rate (AETR) of the mining sector, defined as the share of gold rents accruing to the state at a given gold price, in Africa. We work on a sample of 20 gold-producing countries in Africa defined by the FERDI database over the period 2000-2020, using fixed-effect spatial autoregressive model. The advantage of this model is that it takes into account the spillover effects of the taxation of mining rents, which are not taken into account in previous studies ([Adebayo et al.](#_bookmark29), [2021](#_bookmark29); [Laporte et al.](#_bookmark71), [2022](#_bookmark71); [Amedanou and Laporte](#_bookmark32), [2024](#_bookmark32)), even though it is known that states behave mimetically when revising mining codes ([Campbell](#_bookmark44), [2010](#_bookmark44); [Besada and Martin](#_bookmark35), [2015](#_bookmark35); [Ambe-Uva](#_bookmark31), [2017](#_bookmark31)).

The results are threefold. (i) We find that presidential elections negatively affect the AETR. This result can be explained by the increased risk during election periods in Africa. However, the effects on neighboring countries are positive, implying positive externalities on neighboring countries. This result is only observed for presidential elections, not parliamentary ones. (ii) We find that the negative impact of elections is conditional on the level of democracy, transparency and quality of institutions. In democratic countries, the effect of elections on the AETR is positive. Transparency, in particular membership of the EITI, and the quality of institutions attenuated the negative effect of institutions. This result can be explained by the fact that election years represent a risk of instability for non-democratic countries. (iii) These results are conditional on the quality of a certain type of institution. These results are robust to a number of sensitivity tests, as well as to changes in the spatial matrix. We find that the institutions that matter for improving the government’s share of rent-sharing are corruption control, government efficiency and accountability. Indeed, good governance of the mining sector implies informed citizens who hold their rulers to account, as well as the control of corruption. In addition, the administrative capacity of government is important for the sharing of rents. This paper stresses the need to take account of spillover effects in work on the sharing of mining rents.

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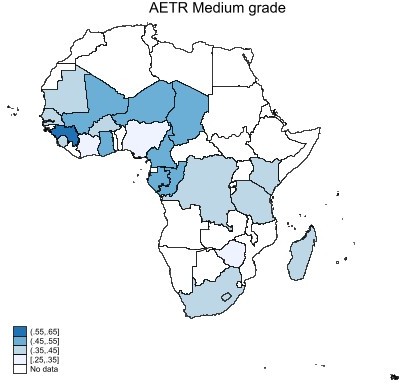
Appendix

**Country list:** Burkina Faso; Cameroon; Congo, Democratic Republic; Congo, Re- public; Cˆote d’Ivoire; Gabon; Ghana; Guinea; Kenya; Madagascar; Mali; Mauritania; Niger; Nigeria; Senegal; Sierra Leonne; South Africa; Tanzania; Tchad and Zimbabwe.

Table A1: Robustness: Conditional effect with inverse distance matrix

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (4) | (5) | (7) | (8) |
| Direct | Wx | Direct | Wx | Direct | Wx |
| presidential | -0.0406\*\*\* | 0.192\*\*\* | -0.0475\*\* | 0.180\*\*\* | -0.0214\*\* | 0.183\*\*\* |
|  | (0.0122) | (0.0418) | (0.0217) | (0.0419) | (0.00969) | (0.0424) |
| Polity2 score | -0.00122 | -0.00646 | -0.000173 | -0.00808 | -4.59e-05 | -0.00754 |
|  | (0.00259) | (0.0185) | (0.00256) | (0.0187) | (0.00257) | (0.0187) |
| lngdp | -0.0655 | -0.271\* | -0.0722 | -0.267\* | -0.0675 | -0.257\* |
|  | (0.0436) | (0.152) | (0.0439) | (0.153) | (0.0442) | (0.153) |
| lnaid | -0.0220\*\* | -0.165\*\*\* | -0.0218\*\* | -0.170\*\*\* | -0.0204\*\* | -0.159\*\*\* |
|  | (0.0101) | (0.0584) | (0.0102) | (0.0591) | (0.0102) | (0.0589) |
| lntrade | -0.0391\*\* | -0.237\*\*\* | -0.0393\*\* | -0.247\*\*\* | -0.0390\*\* | -0.246\*\*\* |
|  | (0.0189) | (0.0818) | (0.0191) | (0.0823) | (0.0191) | (0.0824) |
| lnfdi | -0.00328 | -0.0387\*\*\* | -0.00321 | -0.0367\*\*\* | -0.00329 | -0.0368\*\*\* |
|  | (0.00311) | (0.00992) | (0.00313) | (0.00995) | (0.00314) | (0.00999) |
| Inflation %) | -2.84e-05 | -0.000459 | -7.21e-06 | -0.000596 | -2.47e-05 | -0.000481 |
|  | (9.15e-05) | (0.000715) | (9.26e-05) | (0.000725) | (9.25e-05) | (0.000722) |
| EITI | 0.0616\*\*\* | -0.0766 | 0.0531\*\*\* | -0.0765 | 0.0623\*\*\* | -0.0758 |
|  | (0.0170) | (0.0672) | (0.0182) | (0.0677) | (0.0172) | (0.0681) |
| Scores for component 1 | 0.0162 | 0.242\*\*\* | 0.0170 | 0.253\*\*\* | 0.0149 | 0.248\*\*\* |
|  | (0.0128) | (0.0595) | (0.0129) | (0.0601) | (0.0129) | (0.0600) |
| AETR low grade |  | 0.326\*\*\* |  | 0.313\*\*\* |  | 0.317\*\*\* |
|  |  | (0.0910) |  | (0.0920) |  | (0.0918) |
| c.presidential#c.Polity2score | 0.00558\*\* |  |  |  |  |  |
|  | (0.00222) |  |  |  |  |  |
| 1.EITI#c.presidential |  |  | 0.0324 |  |  |  |
|  |  |  | (0.0244) |  |  |  |
| c.presidential#c.institutions |  |  |  |  | 0.00607 |  |
|  |  |  |  |  | (0.00976) |  |
| Constant | 0.0315\*\*\* |  | 0.0317\*\*\* |  | 0.0317\*\*\* |  |
|  | (0.00121) |  | (0.00122) |  | (0.00122) |  |
| Observations | 360 | 360 | 360 | 360 | 360 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 692 | 692 | 689.8 | 689.8 | 689.1 | 689.1 |
| pseudo-R-squared | 0.0858 | 0.0858 | 0.0857 | 0.0857 | 0.0857 | 0.0857 |
| Chi-squared | 676.7 | 676.7 | 662.5 | 662.5 | 658.7 | 658.7 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses. \*\*\* p*<*0.01, \*\* p*<*0.05, \* p*<*0.1



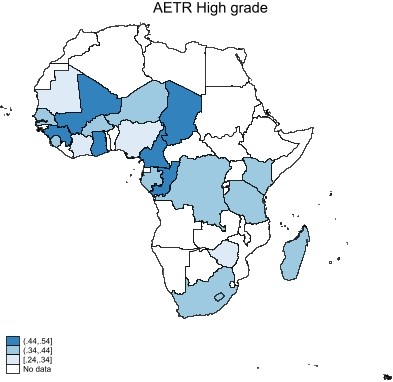


Figure A1: Spatial display of Average effective tax rate

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Table A2: Robustness: Type of institutions with inverse distance matrix

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | | (3) | | (4) | | (5) | | (6) | | |
| Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx |
| Presidential election | -0.0287\*\*\* | 0.0800\*\* | -0.0301\*\*\* | 0.0993\*\*\* | -0.0328\*\*\* | 0.0866\*\* | -0.0329\*\*\* | 0.0800\*\* | -0.0307\*\*\* | 0.0901\*\* | -0.0217\*\* | 0.179\*\*\* |
|  | (0.00917) | (0.0349) | (0.00925) | (0.0355) | (0.00914) | (0.0350) | (0.00927) | (0.0358) | (0.00929) | (0.0356) | (0.00968) | (0.0419) |
| GDP per capita (log) | -0.0779\* | -0.401\*\* | -0.0677 | -0.403\*\* | -0.0332 | -0.0348 | -0.0565 | -0.292\* | -0.0736 | -0.380\*\* | -0.0702 | -0.252\* |
|  | (0.0428) | (0.162) | (0.0425) | (0.160) | (0.0419) | (0.158) | (0.0454) | (0.162) | (0.0449) | (0.165) | (0.0440) | (0.153) |
| Foreign Aid (log) | -0.0152 | -0.179\*\*\* | -0.0111 | -0.150\*\* | -0.0216\*\* | -0.127\*\* | -0.0127 | -0.154\*\* | -0.0190\* | -0.185\*\*\* | -0.0204\*\* | -0.161\*\*\* |
|  | (0.00991) | (0.0587) | (0.00995) | (0.0592) | (0.0102) | (0.0591) | (0.0101) | (0.0604) | (0.0104) | (0.0604) | (0.0102) | (0.0589) |
| Trade Openness (log) | -0.00593 | -0.317\*\*\* | -0.0158 | -0.313\*\*\* | -0.0451\*\* | -0.314\*\*\* | -0.0241 | -0.355\*\*\* | -0.0116 | -0.231\*\*\* | -0.0384\*\* | -0.248\*\*\* |
|  | (0.0190) | (0.0819) | (0.0184) | (0.0819) | (0.0198) | (0.0897) | (0.0200) | (0.112) | (0.0190) | (0.0822) | (0.0191) | (0.0825) |
| Foreign Direct Investment (log) | -0.00102 | -0.0196\*\* | -0.00206 | -0.0189\*\* | -0.000130 | -0.0179\*\* | -0.000506 | -0.0130 | -0.000920 | -0.0205\*\* | -0.00322 | -0.0364\*\*\* |
|  | (0.00306) | (0.00900) | (0.00307) | (0.00896) | (0.00307) | (0.00888) | (0.00319) | (0.00959) | (0.00311) | (0.00909) | (0.00314) | (0.00997) |
| Inflation | 6.28e-05 | 0.000158 | 9.15e-05 | 0.000238 | 4.71e-05 | 0.000872 | 5.48e-05 | 0.000429 | 6.23e-05 | 0.000314 | -2.05e-05 | -0.000483 |
|  | (9.11e-05) | (0.000720) | (9.15e-05) | (0.000699) | (9.10e-05) | (0.000704) | (9.20e-05) | (0.000695) | (9.15e-05) | (0.000701) | (9.23e-05) | (0.000722) |
| EITI | 0.0617\*\*\* | -0.123\* | 0.0761\*\*\* | -0.0886 | 0.0601\*\*\* | -0.0976 | 0.0525\*\*\* | -0.142\*\* | 0.0625\*\*\* | -0.115\* | 0.0615\*\*\* | -0.0800 |
|  | (0.0171) | (0.0649) | (0.0180) | (0.0692) | (0.0172) | (0.0683) | (0.0173) | (0.0666) | (0.0178) | (0.0673) | (0.0171) | (0.0678) |
| Democracy | 0.00388\* | 0.0428\*\*\* | 0.00449\*\* | 0.0391\*\*\* | 0.00336 | 0.0193 | 0.00484\*\* | 0.0468\*\*\* | 0.00210 | 0.0240 | 5.66e-05 | -0.00669 |
|  | (0.00221) | (0.0149) | (0.00222) | (0.0149) | (0.00229) | (0.0160) | (0.00227) | (0.0153) | (0.00241) | (0.0167) | (0.00256) | (0.0187) |
| AETR low grade |  | 0.444\*\*\* |  | 0.453\*\*\* |  | 0.475\*\*\* |  | 0.522\*\*\* |  | 0.464\*\*\* |  | 0.318\*\*\* |
|  |  | (0.0780) |  | (0.0747) |  | (0.0725) |  | (0.0669) |  | (0.0744) |  | (0.0919) |
| Control of Corruption | 0.0940\*\*\* | 0.106 |  |  |  |  |  |  |  |  |  |  |
|  | (0.0207) | (0.104) |  |  |  |  |  |  |  |  |  |  |
| Government Effectiveness |  |  | 0.0984\*\*\* | 0.333\*\* |  |  |  |  |  |  |  |  |
|  |  |  | (0.0243) | (0.156) |  |  |  |  |  |  |  |  |
| Political Stability |  |  |  |  | -0.0152\* | 0.184\*\*\* |  |  |  |  |  |  |
|  |  |  |  |  | (0.00819) | (0.0508) |  |  |  |  |  |  |
| Regulatory Quality |  |  |  |  |  |  | 0.0295 | 0.181 |  |  |  |  |
|  |  |  |  |  |  |  | (0.0227) | (0.141) |  |  |  |  |
| Rule of Law: Estimate |  |  |  |  |  |  |  |  | 0.0513\*\* | 0.337\*\* |  |  |
|  |  |  |  |  |  |  |  |  | (0.0227) | (0.144) |  |  |
| Voice and Accountability |  |  |  |  |  |  |  |  |  |  | 0.0256 | 0.411\*\*\* |
|  |  |  |  |  |  |  |  |  |  |  | (0.0213) | (0.0994) |
| Constant | 0.0315\*\*\* |  | 0.0316\*\*\* |  | 0.0316\*\*\* |  | 0.0322\*\*\* |  | 0.0320\*\*\* |  | 0.0318\*\*\* |  |
|  | (0.00121) |  | (0.00122) |  | (0.00122) |  | (0.00124) |  | (0.00124) |  | (0.00122) |  |
| Observations | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 690.3 | 690.3 | 688.6 | 688.6 | 687.9 | 687.9 | 681.1 | 681.1 | 683.6 | 683.6 | 688.9 | 688.9 |
| pseudo-R-squared | 0.0876 | 0.0876 | 0.0875 | 0.0875 | 0.0825 | 0.0825 | 0.0873 | 0.0873 | 0.0877 | 0.0877 | 0.0861 | 0.0861 |
| Chi-squared | 675.5 | 675.5 | 666.5 | 666.5 | 665 | 665 | 632.1 | 632.1 | 638.2 | 638.2 | 657.6 | 657.6 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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Table A3: Robustness: Type of institutions with medium grade

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | | (3) | | (4) | | | (5) | (6) | | |
|  | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx |
| Presidential election | -0.0104\* | 0.0828\*\*\* | -0.0133\*\* | 0.0853\*\*\* | -0.0128\*\* | 0.0868\*\*\* | -0.0134\*\* | 0.0845\*\*\* | -0.0125\*\* | 0.0866\*\*\* | -0.0129\*\* | 0.0823\*\*\* |
|  | (0.00626) | (0.0134) | (0.00627) | (0.0135) | (0.00633) | (0.0136) | (0.00629) | (0.0135) | (0.00634) | (0.0137) | (0.00638) | (0.0139) |
| GDP per capita (log) | -0.0588\*\* | 0.215\*\*\* | -0.0382 | 0.336\*\*\* | -0.0342 | 0.288\*\*\* | -0.0238 | 0.346\*\*\* | -0.0394 | 0.306\*\*\* | -0.0492\* | 0.315\*\*\* |
|  | (0.0284) | (0.0626) | (0.0285) | (0.0607) | (0.0286) | (0.0588) | (0.0291) | (0.0582) | (0.0302) | (0.0573) | (0.0288) | (0.0590) |
| Foreign Aid (log) | -0.00940 | -0.0185 | -0.00707 | -0.0295 | -0.00683 | -0.0245 | -0.00791 | -0.0241 | -0.00625 | -0.0246 | -0.00440 | -0.0326\* |
|  | (0.00748) | (0.0180) | (0.00752) | (0.0186) | (0.00762) | (0.0192) | (0.00755) | (0.0182) | (0.00781) | (0.0187) | (0.00766) | (0.0190) |
| Trade Openness (log) | -0.0381\*\*\* | -0.0739\*\*\* | -0.0330\*\*\* | -0.0623\*\* | -0.0407\*\*\* | -0.0514\* | -0.0301\*\* | -0.0221 | -0.0389\*\*\* | -0.0627\*\* | -0.0362\*\*\* | -0.0590\*\* |
|  | (0.0122) | (0.0271) | (0.0119) | (0.0271) | (0.0119) | (0.0276) | (0.0125) | (0.0309) | (0.0122) | (0.0274) | (0.0119) | (0.0276) |
| Foreign Direct Investment (log) | -9.39e-05 | -0.0190\*\*\* | -0.00105 | -0.0166\*\*\* | -0.000590 | -0.0185\*\*\* | -0.00122 | -0.0195\*\*\* | -0.000780 | -0.0184\*\*\* | -0.000474 | -0.0179\*\*\* |
|  | (0.00197) | (0.00435) | (0.00198) | (0.00446) | (0.00200) | (0.00447) | (0.00201) | (0.00439) | (0.00200) | (0.00448) | (0.00200) | (0.00450) |
| Inflation | -4.44e-05 | 0.000419\*\* | -1.47e-05 | 0.000458\*\* | -4.05e-05 | 0.000440\*\* | -1.98e-05 | 0.000548\*\*\* | -2.83e-05 | 0.000458\*\* | -1.58e-05 | 0.000436\*\* |
|  | (6.41e-05) | (0.000185) | (6.42e-05) | (0.000188) | (6.46e-05) | (0.000190) | (6.42e-05) | (0.000188) | (6.47e-05) | (0.000190) | (6.44e-05) | (0.000189) |
| EITI | 0.0491\*\*\* | -0.0814\*\*\* | 0.0426\*\*\* | -0.115\*\*\* | 0.0409\*\*\* | -0.106\*\*\* | 0.0367\*\*\* | -0.108\*\*\* | 0.0402\*\*\* | -0.101\*\*\* | 0.0383\*\*\* | -0.103\*\*\* |
|  | (0.0108) | (0.0193) | (0.0116) | (0.0205) | (0.0107) | (0.0208) | (0.0107) | (0.0191) | (0.0107) | (0.0203) | (0.0106) | (0.0208) |
| Democracy | 0.000379 | -0.000154 | 0.000947 | 0.00146 | 0.00106 | 0.00186 | 0.000915 | -0.000605 | 0.000690 | 0.00223 | 0.000271 | 0.00448 |
|  | (0.00125) | (0.00346) | (0.00126) | (0.00345) | (0.00128) | (0.00371) | (0.00126) | (0.00359) | (0.00132) | (0.00375) | (0.00137) | (0.00413) |
| AETR medium grade |  | -0.0999 |  | -0.0134 |  | -0.0389 |  | -0.0596 |  | -0.0318 |  | 0.000762 |
|  |  | (0.0891) |  | (0.0821) |  | (0.0821) |  | (0.0824) |  | (0.0830) |  | (0.0846) |
| Control of Corruption | 0.0529\*\*\* | 0.0812\* |  |  |  |  |  |  |  |  |  |  |
|  | (0.0147) | (0.0465) |  |  |  |  |  |  |  |  |  |  |
| Government Effectiveness |  |  | 0.0195 | -0.119\*\* |  |  |  |  |  |  |  |  |
|  |  |  | (0.0173) | (0.0555) |  |  |  |  |  |  |  |  |
| Political Stability |  |  |  |  | -0.00750 | -0.00755 |  |  |  |  |  |  |
|  |  |  |  |  | (0.00564) | (0.0151) |  |  |  |  |  |  |
| Regulatory Quality |  |  |  |  |  |  | -0.0143 | -0.112\*\* |  |  |  |  |
|  |  |  |  |  |  |  | (0.0132) | (0.0494) |  |  |  |  |
| Rule of Law: Estimate |  |  |  |  |  |  |  |  | 0.00470 | -0.0210 |  |  |
|  |  |  |  |  |  |  |  |  | (0.0141) | (0.0441) |  |  |
| Voice and Accountability |  |  |  |  |  |  |  |  |  |  | 0.0217 | -0.0534 |
|  |  |  |  |  |  |  |  |  |  |  | (0.0137) | (0.0363) |
| Constant | 0.0212\*\*\* |  | 0.0213\*\*\* |  | 0.0215\*\*\* |  | 0.0214\*\*\* |  | 0.0216\*\*\* |  | 0.0214\*\*\* |  |
|  | (0.000812) |  | (0.000818) |  | (0.000826) |  | (0.000821) |  | (0.000827) |  | (0.000821) |  |
| Observations | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 828.2 | 828.2 | 825.8 | 825.8 | 822.6 | 822.6 | 824.7 | 824.7 | 821.9 | 821.9 | 824.4 | 824.4 |
| pseudo-R-squared | 0.215 | 0.215 | 0.201 | 0.201 | 0.198 | 0.198 | 0.198 | 0.198 | 0.200 | 0.200 | 0.200 | 0.200 |
| Chi-squared | 218.6 | 218.6 | 210.3 | 210.3 | 200.2 | 200.2 | 206.8 | 206.8 | 197.9 | 197.9 | 205.8 | 205.8 |
| Chi-squared-pvalue | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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Table A4: Robustness: Type of institutions with high grade

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | | (3) | | (4) | | | (5) | (6) | | |
|  | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx | Direct | Wx |
| Presidential election | -0.0127\* | 0.0823\*\*\* | -0.0144\*\* | 0.0846\*\*\* | -0.0136\* | 0.0859\*\*\* | -0.0146\*\* | 0.0837\*\*\* | -0.0138\* | 0.0858\*\*\* | -0.0160\*\* | 0.0753\*\*\* |
|  | (0.00724) | (0.0156) | (0.00715) | (0.0153) | (0.00721) | (0.0155) | (0.00725) | (0.0156) | (0.00728) | (0.0157) | (0.00718) | (0.0156) |
| GDP per capita (log) | -0.0561\* | 0.281\*\*\* | -0.0294 | 0.428\*\*\* | -0.0328 | 0.293\*\*\* | -0.0320 | 0.369\*\*\* | -0.0425 | 0.340\*\*\* | -0.0378 | 0.420\*\*\* |
|  | (0.0332) | (0.0730) | (0.0328) | (0.0689) | (0.0330) | (0.0659) | (0.0338) | (0.0659) | (0.0349) | (0.0650) | (0.0331) | (0.0672) |
| Foreign Aid (log) | -0.00664 | 0.00779 | -0.00525 | -0.00985 | -0.00355 | -0.00565 | -0.00564 | 0.00408 | -0.00420 | 0.00313 | -0.000987 | -0.0158 |
|  | (0.00871) | (0.0211) | (0.00861) | (0.0213) | (0.00873) | (0.0220) | (0.00874) | (0.0212) | (0.00899) | (0.0217) | (0.00871) | (0.0216) |
| Trade Openness (log) | -0.0267\* | -0.0168 | -0.0212 | -0.000787 | -0.0287\*\* | 0.00827 | -0.0224 | 0.0243 | -0.0296\*\* | -0.00910 | -0.0216 | 0.00744 |
|  | (0.0141) | (0.0311) | (0.0136) | (0.0304) | (0.0136) | (0.0309) | (0.0145) | (0.0353) | (0.0140) | (0.0310) | (0.0135) | (0.0304) |
| Foreign Direct Investment (log) | 0.000223 | -0.0195\*\*\* | -0.000675 | -0.0160\*\*\* | -0.000115 | -0.0181\*\*\* | -0.000654 | -0.0201\*\*\* | -0.000321 | -0.0192\*\*\* | 0.000292 | -0.0160\*\*\* |
|  | (0.00230) | (0.00507) | (0.00227) | (0.00510) | (0.00229) | (0.00511) | (0.00232) | (0.00508) | (0.00231) | (0.00515) | (0.00227) | (0.00511) |
| Inflation | -4.33e-05 | 0.000540\*\* | -3.07e-05 | 0.000494\*\* | -6.00e-05 | 0.000491\*\* | -3.06e-05 | 0.000631\*\*\* | -3.70e-05 | 0.000557\*\* | -1.46e-05 | 0.000590\*\*\* |
|  | (7.47e-05) | (0.000216) | (7.35e-05) | (0.000215) | (7.40e-05) | (0.000218) | (7.43e-05) | (0.000218) | (7.46e-05) | (0.000219) | (7.33e-05) | (0.000215) |
| EITI | 0.0479\*\*\* | -0.0824\*\*\* | 0.0340\*\* | -0.126\*\*\* | 0.0422\*\*\* | -0.116\*\*\* | 0.0395\*\*\* | -0.100\*\*\* | 0.0419\*\*\* | -0.0959\*\*\* | 0.0380\*\*\* | -0.126\*\*\* |
|  | (0.0126) | (0.0225) | (0.0133) | (0.0234) | (0.0122) | (0.0238) | (0.0123) | (0.0220) | (0.0124) | (0.0234) | (0.0121) | (0.0237) |
| Democracy | 6.08e-05 | -0.00340 | 0.000608 | -0.00171 | 0.000806 | -0.000158 | 0.000456 | -0.00422 | 0.000281 | -0.00170 | 0.00109 | 0.00684 |
|  | (0.00146) | (0.00405) | (0.00144) | (0.00395) | (0.00146) | (0.00425) | (0.00146) | (0.00416) | (0.00152) | (0.00433) | (0.00155) | (0.00468) |
| AETR high grade |  | -0.135 |  | -0.132 |  | -0.150\* |  | -0.133 |  | -0.119 |  | -0.104 |
|  |  | (0.0918) |  | (0.0886) |  | (0.0888) |  | (0.0886) |  | (0.0891) |  | (0.0886) |
| Control of Corruption | 0.0389\*\* | 0.0334 |  |  |  |  |  |  |  |  |  |  |
|  | (0.0170) | (0.0517) |  |  |  |  |  |  |  |  |  |  |
| Government Effectiveness |  |  | -0.0122 | -0.220\*\*\* |  |  |  |  |  |  |  |  |
|  |  |  | (0.0200) | (0.0635) |  |  |  |  |  |  |  |  |
| Political Stability |  |  |  |  | -0.0100 | -0.0322\* |  |  |  |  |  |  |
|  |  |  |  |  | (0.00647) | (0.0174) |  |  |  |  |  |  |
| Regulatory Quality |  |  |  |  |  |  | -0.00977 | -0.0900 |  |  |  |  |
|  |  |  |  |  |  |  | (0.0152) | (0.0570) |  |  |  |  |
| Rule of Law: Estimate |  |  |  |  |  |  |  |  | 0.00323 | -0.0224 |  |  |
|  |  |  |  |  |  |  |  |  | (0.0163) | (0.0506) |  |  |
| Voice and Accountability |  |  |  |  |  |  |  |  |  |  | -0.00391 | -0.147\*\*\* |
|  |  |  |  |  |  |  |  |  |  |  | (0.0157) | (0.0400) |
| Constant | 0.0247\*\*\* |  | 0.0244\*\*\* |  | 0.0246\*\*\* |  | 0.0248\*\*\* |  | 0.0249\*\*\* |  | 0.0244\*\*\* |  |
|  | (0.000948) |  | (0.000938) |  | (0.000947) |  | (0.000951) |  | (0.000954) |  | (0.000936) |  |
| Observations | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 |
| Number of countries | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Log Likelihood | 775.7 | 775.7 | 779.2 | 779.2 | 776 | 776 | 774.5 | 774.5 | 773.3 | 773.3 | 779.8 | 779.8 |
| pseudo-R-squared | 0.121 | 0.121 | 0.120 | 0.120 | 0.119 | 0.119 | 0.117 | 0.117 | 0.118 | 0.118 | 0.119 | 0.119 |
| Chi-squared | 119.8 | 119.8 | 129.3 | 129.3 | 120.5 | 120.5 | 116.6 | 116.6 | 113.2 | 113.2 | 130.8 | 130.8 |
| Chi-squared-pvalue | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Table A5: Simple panel fixed effects regression

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
| FE Model | FE Model | FE Model | FE Model | FE Model |
| Presidential election | -0.00916 | 0.00343 | 0.00193 | -0.00911 | -0.00486 |
|  | (0.0240) | (0.0208) | (0.0201) | (0.0203) | (0.0204) |
| GDP per capita (log) |  | -0.557\*\*\* | -0.399\*\*\* | -0.319\*\*\* | -0.372\*\*\* |
|  |  | (0.0636) | (0.0705) | (0.0833) | (0.0866) |
| Foreign Aid (log) |  | -0.0280 | -0.0368\*\* | -0.0211 | -0.0266 |
|  |  | (0.0172) | (0.0167) | (0.0178) | (0.0180) |
| Trade Openness (log) |  | -0.154\*\*\* | -0.104\*\*\* | -0.150\*\*\* | -0.137\*\*\* |
|  |  | (0.0355) | (0.0361) | (0.0388) | (0.0396) |
| Foreign Direct Investment (log) |  | -0.0132\* | -0.0122\* | -0.0127\* | -0.0114 |
|  |  | (0.00730) | (0.00706) | (0.00728) | (0.00732) |
| Inflation |  | -0.000308 | -0.000406 | -0.000308 | -0.000362 |
|  |  | (0.000353) | (0.000342) | (0.000434) | (0.000434) |
| EITI |  |  | -0.0947\*\*\* | -0.0838\*\*\* | -0.0810\*\*\* |
|  |  |  | (0.0206) | (0.0212) | (0.0214) |
| Democracy |  |  |  | -0.00738\*\* | -0.0125\*\*\* |
|  |  |  |  | (0.00367) | (0.00409) |
| Institutional Quality |  |  |  |  | 0.0690\*\* |
|  |  |  |  |  | (0.0267) |
| Constant | 0.612\*\*\* | 5.176\*\*\* | 3.932\*\*\* | 3.559\*\*\* | 3.892\*\*\* |
|  | (0.00828) | (0.481) | (0.538) | (0.616) | (0.636) |
| Observations | 335 | 322 | 322 | 294 | 288 |
| R-squared | 0.000 | 0.289 | 0.337 | 0.343 | 0.347 |
| Number of countries | 20 | 20 | 20 | 20 | 20 |

Standard errors in parentheses. \*\*\* *p <* 0*.*01, \*\* *p <* 0*.*05, \* *p <* 0*.*1

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