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Election cycles in natural resource rents: Empirical evidence

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ABSTRACT

We examine whether governments' natural resource rents are affected by upcoming elections and if so, whether the incumbent uses these additional rents for re-election purposes. Estimates of a dynamic panel model for about 60 countries for 1975–2011 suggest that elections increase natural resource rents. The incumbent uses these rents for expanding public spending and reducing taxes before elections. However, these electoral cycle effects are statistically significant only in young democracies. Our results also suggest that election effects are stronger in countries with limited access to free media, limited political checks and balances, and a presidential system.

1. Introduction

Voters generally prefer politicians who deliver greater material wellbeing and better economic performance (Franzese, 2002; Paldam, 2004). Therefore, incumbents have powerful incentives to affect voters' behaviour by using fiscal policy before elections (Nordhaus, 1975; Rogoff and Sibert, 1988; Shi and Svensson, 2006). Political budget cycle (PBC) research focuses on how and when the incumbent uses fiscal policy for re-election purposes. Several recent studies suggest that political budget cycles exist under certain conditions (see the survey by de Haan and Klomp, 2013). However, there is also some evidence suggesting that voters punish politicians who create budget deficits (e.g. Brender and Drazen, 2008; Arvate et al., 2009). Pelzman (1992) was among the first to argue against the view of opportunistic manipulation of fiscal policy for electoral purposes, showing that in the US voters punish politicians who let government spending increase, no matter whether this increase is financed by taxes or borrowing.

To avoid that voters will punish them for budget deficits caused by election-induced fiscal policy manipulation, incumbents may look for alternative ways to finance a fiscal expansion in an election year. One possibility is natural resource rents. According to Huntington (1991), tax payments are generally perceived as a cost that people have to pay out of their earnings and for which they will hold the government accountable. In contrast, governments' rents from natural resources are generally not perceived as income foregone. Thus, the exploitation of natural resources creates a soft budget constraint for the government (McGuirk, 2013; Bornhorst et al., 2009).

We examine whether governments' natural resource rents are affected by upcoming elections,[1] and if so, how the incumbent uses these additional rents for re-election purposes. That is, do governments increase (taxes on) the extraction of natural resources in order to finance pre-election expansionary fiscal policies? And if so, are these additional rents used to decrease taxes and/or increase public spending to improve the incumbents' chances to be re-elected? And if taxes are reduced and/or government spending increased during election years, are the additional natural resource rents sufficient to cover this election-induced fiscal manipulation? Finally, we examine whether cross-country differences in the use of natural resource rents for electoral purposes are related to differences in political institutions, such as the age of democracy and the availability of information. Recent studies suggest that PBCs occur predominantly in new democracies (Brender and Drazen, 2005) and/or in countries where information is scant and politicians try to take advantage of the resulting uncertainty (Shi and

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[1] This issue has received limited attention in the literature. Exceptions are Burgess et al. (2011) and Rodrigues-Filho et al. (2015) who examined election cycles in lodging.

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Svensson, 2006). We examine whether these and other differences in political institutions (like presidential versus parliamentary systems and proportional versus majoritarian electoral systems) condition the occurrence of PBCs in natural resource rents.

We estimate a dynamic panel model using data for about 60 democratic and resource-abundant countries between 1975 and 2011. Our data on resource rents come from the *Changing Wealth of Nations* dataset reported by the World Bank (2011). After extensive testing, we conclude that (1) natural resource rents are subject to election cycles; (2) additional resource rents in election years are used to finance both tax cuts and higher public spending; (3) the additional natural resource rents are not sufficient to fully cover lower taxes and higher spending in election years. However, it turns out that the existence of election cycles in natural resource rents is conditional on certain factors. Most importantly, the electoral cycle in natural resource rents and the rents' effect on the budget in election years are statistically significant only in countries with a short democratic history. This result is similar to the findings of Brender and Drazen (2005). Our results also suggest that election effects are stronger in countries with limited access to free media, limited political checks and balances, and a presidential system.

The remainder of the paper is structured as follows. Section 2 reviews previous research and discusses in more detail how our paper contributes to the literature on political budget cycles and research on the natural resource curse. Section 3 describes the data and methodology used. Section 4 presents our main results, while Section 5 contains a sensitivity analysis. The final section offers the conclusions.

2. Theoretical framework

In this study we combine two strands of political economy. The first one is on the existence of political budget cycles.[2] The PBC literature focuses on election cycles in public spending, tax revenues and budget deficits. Older theoretical PBC models emphasize the incumbent's economic policy manipulation to secure re-election (Nordhaus, 1975). Assuming that the electorate is backward looking and evaluates the government on the basis of its past track record, these models imply that governments, regardless of ideological orientation, adopt expansionary fiscal policies in the late year(s) of their term in office in order to stimulate the economy. More recent political budget cycle models emphasize the role of temporary information asymmetries regarding the politicians' competence in explaining electoral cycles in fiscal policy. In these models, signalling is the driving force behind political budget cycles (Rogoff and Sibert, 1988; Shi and Svensson, 2006). For instance, in the moral hazard model of political competition of Shi and Svensson (2006), politicians may behave opportunistically even if most voters know the government's policy, but some voters are uninformed. The empirical implications of these models are similar to those of the older models, i.e. the incumbent has an incentive to use fiscal policy for re-election purposes.

An important question though, is "why would voters fall for it?" In other words, why would rational voters support an incumbent that suddenly appears to do wonders in an election year, after perhaps performing less impressively throughout his term in office? Two, not mutually, exclusive answers have been put forward. The first relates to the age of democracy. According to Brender and Drazen (2005, p. 1289-90), "in economies in which the electorate has a lot of experience with elections, and where the collection and reporting of the relevant data to evaluate economic policy are common, voters would be unlikely to 'fall' for the trick of making the economy look good right before elections. In contrast, fiscal manipulation may work when voters lack the necessary information to draw such inferences, as well as the ability to process that information correctly. This would reflect a lack of experience with an electoral system, of the availability of data, and of media experienced in finding, disseminating and analyzing the relevant data. This is more likely to characterize a new democracy." In their survey of the PBC literature, de Haan and Klomp (2013) conclude that empirical evidence suggests that PBCs are indeed more likely in young democracies, even though PBCs are not confined to these countries only.[3]

The second argument why PBCs may occur in some countries but not in others is based on the availability of information. If information is scant, politicians try to take advantage of the resulting uncertainty (Brender, 2003; Shi and Svensson, 2006). According to Shi and Svensson (2006), the more voters that (ex ante) fail to distinguish pre-electoral manipulations from incumbent competence, the higher is the return for the incumbent to boost spending prior to an election. Free media access will increase the number of informed voters.[4] Similarly, Besley and Burgess (2001) and Vergne (2009) argue that free media can discipline politicians to be more responsive to voters' demands. For instance, when voters are better aware that fiscal policy is used for re-election purposes, they may not reward the incumbent or even punish him. On the other hand, it may be argued that if the government has control over the media, it may not need to resort to (costly) budget cycles to signal competence and manipulate the electorate. Still, several papers find empirical evidence that election-induced fiscal policies are more prevalent in countries where voters have limited access to free media than in countries where voters have good access to free media (see the review of de Haan and Klomp, 2013).

The second strand of literature on which this paper builds deals with the political economy of natural resources. Although the revenues from natural resources may make countries better off, many resource-rich countries failed to use these revenues for sustained growth. One explanation is the so-called Dutch disease argument that a natural resource windfall can lead to a decline in income through an appreciation of the real exchange rate (Sachs and Warner, 2001). More recently, several studies have pointed out that natural resources can have further adverse effects through the rent seeking behaviour of the incumbent (Tornell and Lane, 1999; Baland and Francois, 2000; Torvik, 2002; Robinson and Torvik, 2005; Robinson et al., 2006, Caselli and Cunningham, 2009; Brollo et al., 2010; Cabrales and Hauk, 2011).[5] Broadly speaking, an increase in natural resource revenues has two effects on the incumbent's incentives. First, higher natural resource rents increase the value for politicians to stay in power, and hence, the return on activities that shore up political control like political budget cycles. Second, higher natural resource rents increase the likelihood that the incumbent will be challenged. To stay in office, the incumbent will spend more resources on activities that secure his position. This can be done in unproductive ways, such as repression or buying off potential opponents, or in productive ways, such as reducing the level of

[2] This part draws on de Haan and Klomp (2013).

[3] Several recent studies also report evidence for PBCs in industrial countries as well (Mink and de Haan, 2006; Tujula and Wolswijk, 2007; Efthyvoulou, 2012). The fact that there are political budget cycles in industrial countries does not imply that the likelihood that such cycles occur is the same in developing and industrial countries. For their large sample of countries Shi and Svensson (2006) and Streb et al. (2009) find that political budget cycles are large in developing countries but small or non-existent in industrial countries.

[4] In the model of Shi and Svensson (2006, p. 1376–77) a part of the electorate is uninformed "in that they do not have access to a free flow of information and only observe the policy instruments that directly influence their utility…. This is a reasonable assumption since the government can, through clever accounting techniques, obstruct voters' ability to assess its borrowing needs. Access to free media may help voters to overcome this problem and provide them with a good estimate of [the amount of borrowing]. However, this requires both resources (ownership of radios and television sets, newspapers, etc.) and skills to process information."

[5] Deacon (2011) provides an extensive survey of the literature on the political economy of the natural resource curse. Several studies suggest that the existence of natural resources jeopardizes democratic developments in a country (see, e.g., Bulte et al., 2005; Morrison, 2007; Bhattacharyya and Hodler, 2010; Van der Ploeg, 2011). The present paper does not deal with this issue.

distortionary taxation (Ascher, 1999; Robinson et al., 2006; Bueno de Mesquita and Smith, 2010).

The incumbent of a country which is rich in natural resources not only faces a strong incentive to remain in power, natural resource rents also enhance the possibilities for the incumbent to use fiscal policy for that purpose. In many countries more than 80% of the revenues from the exploitation of natural resources go straight into the coffers of the national government (Deacon, 2011). If rights to exploit natural resources are given to the private sector, governments can only benefit from higher natural resource taxation, export tariffs or extraction fees (Burness, 1976; Boadway and Flatters, 1993; Heaps and Helliwell, 1985). Natural resource rents offer the government an avenue to maintain reasonable levels of public services or to reduce taxes during the campaign without exposing the fiscal cost. As natural resource rents are "hidden" from the public eye, especially when the natural resources are extracted by government-owned enterprises, they offer an alternative mechanism for non-transparency that facilitates PBCs.[6]

Apart from a country's (given) endowment of natural resources, the level of natural resource rents in a particular country is also affected by the costs of production of natural resources, competition across suppliers and global demand (Collier and Hoeffler, 2005, 2009). Higher raw commodity prices, as reflected in the terms of trade (for which we control in our empirical analysis) will lead to higher natural resource rents.[7] We consider commodity prices as exogenous in the short run. Also how natural resources are exploited (i.e. government versus private sector exploitation) will affect the level of natural resource rents. In our empirical analysis we control for this. However, as it takes time to change the way natural resources are exploited, we also consider this factor as exogenous in our analysis of election effects.[8]

Finally, the government may decide to increase natural resource rents before an election occurs by increasing exploitation (or raising taxes, tariffs and fees on exploitation in case exploitation is done by the private sector). When natural resource rents are higher, the government's budget identity requires that (1) government spending goes up, (2) tax revenues go down, or (3) public savings go up. This always holds, irrespective of elections. As we are interested in the impact of elections on natural resource rents, we first examine whether natural resource rents go up in election years. If so, we examine whether natural revenues are "spent" on higher government spending or tax cuts.[9] If the additional resource rents are not entirely "spent", by definition they lead to higher public savings, i.e. lower deficits. In case the additional natural resource rents are not sufficient to cover increased government spending and decreased tax revenues during election years, the government's budget deficit increases.

Recent PBC studies suggest that the impact of elections on fiscal policy may be conditioned by certain political characteristics of the country concerned (de Haan and Klomp, 2013). Apart from the age of democracy and the availability of information as discussed above, three other institutional differences have been suggested. First, several authors argue that there are major differences between parliamentary and presidential political systems (Persson and Tabellini, 2000, 2003; Grossman and Helpman, 2008). Presidential systems are characterized by separate and direct elections for both the executive and the legislature. In parliamentary systems, the executive is indirectly formed through the legislature. In the latter systems bargaining between different legislative coalitions is disciplined by the threat of a government crisis. As a crisis would result in the loss of valuable agenda-setting powers for the government coalition, party discipline and stable legislative coalitions are promoted. As a result, parliamentary governments have higher overall spending and taxation levels compared to presidential regimes. In presidential systems the executive cannot be brought down by the legislature, but it is directly accountable to the voters. Thus, legislators have weaker incentives to stick together and to vote according to party or coalition lines. Moreover, agenda-setting power is generally more dispersed among different committees and there are other checks and balances between the executive and the legislature, like proposal and veto rights of several players. Therefore, in a presidential regime, the president is better able to target particular constituencies especially if they are well organized. Applying this theory to natural resource rents, Andersen and Aslaksen (2008) find that presidential democratic countries suffer from a resource curse whereas parliamentary democratic countries do not. They relate this to a tendency of presidential regimes to target powerful minorities at the expense of broad spending programs. In our empirical analysis we will examine whether election-induced fiscal policies financed through natural resource rents are more prevalent in countries with a presidential political system than in countries with a parliamentary political system.

Second, the incentives of politicians in majoritarian and proportional electoral systems differ. In a majoritarian system an electoral district is generally small and the politician who wins the majority of the votes represents this district in parliament. Such a system gives politicians a strong incentive to target policies towards a particular constituency, while proportional elections induce politicians to seek support from larger groups in the electorate via broad spending programs (Persson and Tabellini, 2000; Milesi-Ferretti et al., 2002). In our empirical analysis we will examine whether election-induced fiscal policies financed through natural resource rents are more prevalent in countries with a proportional electoral system than in countries with a majoritarian electoral system.

Finally, checks and balances in the political system shape the incumbent's behaviour. The model of Streb and Torrens (2012) implies that lack of checks and balances raises the likelihood of rent seeking using fiscal policy. Checks and balances in the political system may also restrain the incumbent's use of natural resource rents. Humphreys and Sandhu (2007) demonstrate that the positive relationship between oil rents and public expenditures is conditioned by the presence of checks and balances in the political system.[10] In our empirical analysis we will examine whether election-induced fiscal policies financed through natural resource rents are less prevalent in countries with strong political checks and balances than in countries without strong checks and balances.

3. Data and methodology

3.1. Data

Data on natural resource rents come from the *Changing Wealth of Nations* dataset of the World Bank (2011). This dataset was initiated by Collier and Hoeffler (2009), who define natural resource rents as the difference between the unit price of resources and their unit cost of extraction, multiplied by the volume of resources extracted. We scale nominal natural resource rents by nominal GDP. The dataset provides information for about 215 countries in the period 1960 to 2012. Following the World Bank (2011), we have classified the natural

[6] We thank one of the referees for this suggestion.

[7] In addition, higher prices may make it more attractive for the government to increase the exploitation of natural resources and to invest more in extraction.

[8] Using our indicator of government ownership (see Section 3), it turns out that the current level of government ownership has a correlation of 0.8 (0.7) with government ownership lagged five (ten) years, suggesting a reasonably high degree of persistence in the way natural resources are extracted.

[9] Although most PBC studies reporting evidence in support of electoral cycles focus on government spending and/or the budget deficit, some studies have examined election-induced manipulation of government revenues. Some studies report a negative effect of elections on tax revenues (Besley and Case, 1995; Persson and Tabellini, 2003). In contrast, some older studies find no support for election effects in tax revenues (Hicks, 1984; Frohlich and Oppenheimer, 1990; Schuknecht, 2000).

[10] These resource rents may also reduce electoral competition. Using regional data from Indonesia, Burgess et al. (2011) find that higher oil and gas revenues lead to fewer candidates running in the election, and instead lead to the district head representing a larger coalition of parties. However, the authors do not find any impact on the probability that the incumbent will be re-elected.

resource rents into five broad categories: (1) forest rents; (2) oil rents; (3) coal rents; (4) metals and mineral rents including rents coming from phosphate, bauxite, copper, iron, lead, nickel, tin, zinc, gold and silver; and (5) natural gas rents.[11] The natural resource rents in the countries included in our dataset differ widely. Average natural resource rents range from more than 50% of GDP for Iraq, Kuwait and Turkmenistan to less than one per cent of GDP for Belgium and Lebanon.

One caveat is that the World Bank data refer to rents accruing both to the private and the public sector. However, in most countries the government receives most rents. The Extractive Industries Transparency Initiative dataset reports the amount of natural resource rents flowing into the public coffers. It turns out that for country-years in both databases the correlation is around 0.8, as shown in Fig. 1, suggesting that the natural resource rents data provided by the World Bank are a reasonably proxy for our purposes.[12]

To examine the impact of elections, we use an election variable suggested by Franzese (2000) that takes the timing of an election in the course of a year into account. Compared to using a dummy that is one in election years and zero otherwise, which is common in this type of research, this proxy reduces measurement error. It is calculated as $M/12$ in an election year and $(12 - M)/12$ in a pre-election year, where M is the month of the election. In all other years its value is set to zero. The election data is taken from electionresources.org and various issues of the *Political Handbook of the World*. We only include elections if the government has sufficient time to change its fiscal policies; other elections are considered non-election years. When there are, for instance, elections shortly after the fall of a cabinet, the incumbent may have little opportunity to change fiscal policy or face capacity constraints in extracting additional resources. An election is therefore only included if it is held on the fixed date (year) specified by the constitution, or if it occurs in the last year of a constitutionally fixed term for the legislature. Also when an election is announced more than one year in advance, it is taken up in the analysis.

As a first test, we compare the ratio of natural resource rents to GDP in election and non-election years. The results suggest that, on average, natural resource rents as share of GDP are about 2 percentage points higher in election years compared to non-election years. According to a Chi-squared test, this difference is significant at the one per cent level.

Next, we examine the relationship between natural resource rents and tax revenues and total government revenues, respectively. Fig. 2 shows that natural resource rents (as percentage of GDP) and total government revenues (also as percentage of GDP) are positively correlated, while Fig. 3 shows that there is a negative correlation between natural resource rents and total tax revenues (both expressed as percentage of GDP). Thus, Fig. 3 suggests that tax revenues and natural resource rents are substitutes (McGuirk, 2013; Bornhorst et al., 2009). In contrast, we find no evidence that government spending and natural resource rents (both expressed as percentage of GDP) are significantly related (see Fig. 4).

3.2. Methodology

We estimate a simultaneous equation model using a large unbalanced cross-country time-series dataset, comprising about 60 countries for 1975 to 2011. As the PBC theory is based on the assumption that elections take place in a democratic way, we only include country-years with a Polity IV democracy score of at least six.[13] The model

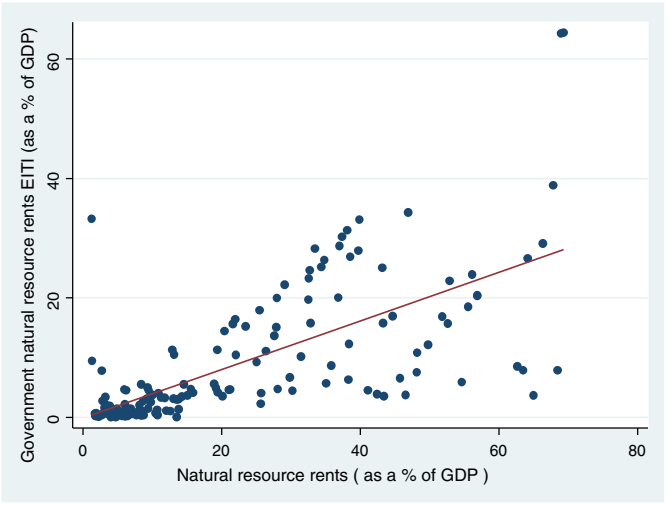

Fig. 1. Comparison of World Bank and EITI natural resource rents data. The graph illustrates the link between natural resource rents (as % of GDP) reported by the World Bank (x-axis) and government natural resource rents (as % of GDP) reported by EITI (y-axis) using country-year observations. The correlation coefficient is about 0.84 and statistically significant at the five-percent level. The red line shows the bivariate OLS-regression.

consists of the following equations:

$$natrent_{it} = \varpi_i + \delta_t + \theta \text{natrent}_{it-k} + \psi^n \mathbf{z}^n_{it-j} + \varphi \text{cycle}_{it} + \upsilon_{it} \quad (1)$$

$$govrev_{it} = \alpha_i + \chi_t + \gamma \text{govrev}_{it-k} + \beta^k \mathbf{x}^k_{it-j} + \mu_1 natrent_{it} + \mu_2 cycle_{it} + \mu_3 (natrent_{it} \times cycle_{it}) + \varepsilon_{it} \quad (2)$$

$$govexp_{it} = \pi_i + \rho_t + \phi \text{govexp}_{it\text{-}k} + \sigma^m \mathbf{w}^m_{it-j} + \tau_1 natrent_{it} + \tau_2 cycle_{it} + \tau_3 (natrent_{it} \times cycle_{it}) + \xi_{it} \quad (3)$$

where $natrent_{it}$ denotes the natural resource rents (as percentage of GDP) in country i at time t, while $govrev_{it}$ and $govexp_{it}$ are respectively government revenues (excluding the natural resource rents received) and government expenditures (both taken as percentage of GDP). The variable *cycle* is our election variable outlined above. The parameters

Fig. 2. Natural resource rents and government revenues. The graph illustrates the link between total government revenues (as % of GDP) on the x-axis and the natural resource rents (as % of GDP) on the y-axis between 1975 and 2010 using country-year observations. The correlation coefficient is about 0.13 and statistically significant at the five-percent level. The red line shows the bivariate OLS-regression.

[11] The availability of data differs over the various natural resources considered.

[12] As the time period and countries covered in the EITI database is rather limited, leaving us with observations for less than 20 countries for, on average, about four years, we prefer using the World Bank data in our analysis.

[13] Table A1 in the Appendix lists the countries included in our sample.

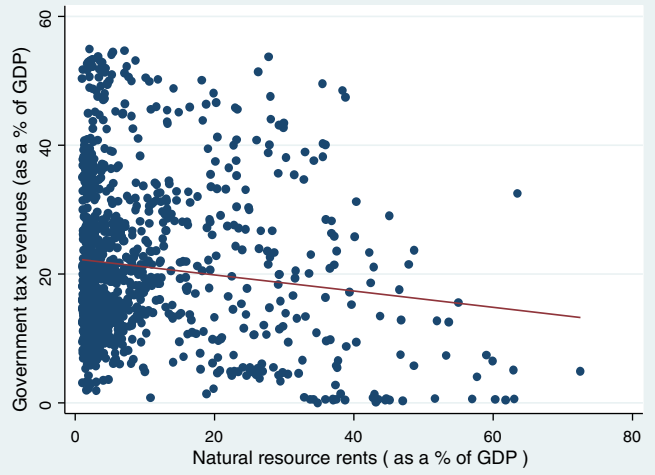

Fig. 3. Natural resource rents and tax revenues. The graph shows the link between tax revenues (as % of GDP) on the x-axis and natural resource rents (as % of GDP) on the y-axis between 1975 and 2010 using country-year observations. The correlation coefficient is about −0.09 and statistically significant at the five-percent level. The red line shows the bivariate OLS-regression.

ϖ_i, α_i and π_i are country-specific intercepts to control for time-invariant characteristics such as geographical factors. By using country-specific intercepts, we place the emphasis on the identification of the within country variation. In addition, the time fixed effects δ_t, χ_t and ρ_t capture unobservable year characteristics that are country invariant, such as international price movements or global economic crises, that may affect the demand and/or supply of natural resources. The vectors $\mathbf{z}_{it\text{-}j}$, $\mathbf{x}_{it\text{-}j}$, and $\mathbf{w}_{it\text{-}j}$ contain control variables, where j indicates the time lag. The superscripts n, k, and m of the vectors indicate the number of control variables.

In Eq. (1) we test whether natural resource rents are higher during an election year ($\varphi > 0$). In Eqs. (2) and (3) the level of natural resource rents is included in line with the discussion in Section 2. The estimated

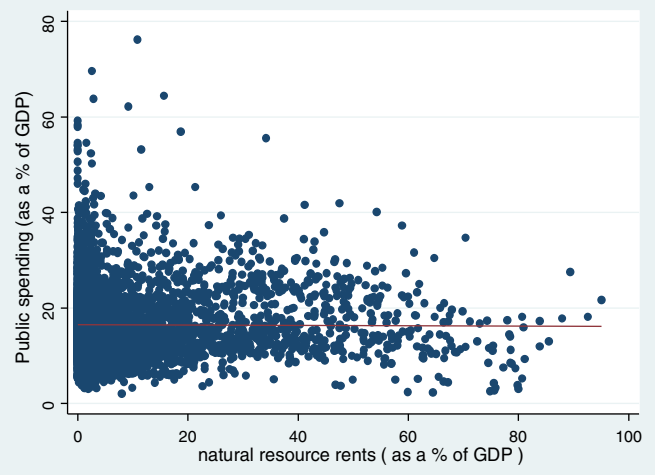

Fig. 4. Natural resource rents and public spending. The graph shows the link between the public spending (as % of GDP) on the x-axis and natural resource rents (as % of GDP) on the y-axis between 1975 and 2010 using country-year observations. The correlation coefficient is about −0.03 but statistically insignificant at the ten-percent level. The red line shows the bivariate OLS-regression.

parameters μ_1 and τ_1 show to what extent governments use natural resource rents to finance current government spending and tax cuts.[14] By implication of the budget identity, the rents not used for these purposes are saved. The literature on the natural resource curse suggests that governments tend to overspend and under-save natural resource revenues (Velasco, 2000).

In Eq. (2) we estimate the impact of elections on government revenues. To explore whether natural resource rents are more intensively used in an election year to finance a tax cut, we calculate the following marginal effect:

$$\frac{\partial govrev}{\partial natrent} = \mu_1 + \mu_3 cycle_{it}.$$

This derivative shows whether the substitution of taxes by natural resource rents is higher in an election year than in a non-election year. Eq. (3) is used in a similar fashion to examine whether the financing of public spending is affected by elections. In more detail, to interpret the coefficients, we compute the following marginal effect:

$$\frac{\partial gov\,\exp}{\partial natrent} = \tau_1 + \tau_3 cycle_{it}.$$

This derivative shows whether the extent to which government spending is financed by natural resource rents is higher in an election year than in a non-election year.

As the equations include the lagged endogenous variable, we estimate Eqs. (1) to (3) using the Generalized Method of Moments (GMM) estimator. This estimator does not require information on the exact distribution of the disturbances but is based upon the assumption that the disturbances in the equations are uncorrelated with a set of instrumental variables. In our estimations, the set of instrumental variables of each equation includes all exogenous right-hand side variables of both equations (including country and time dummies). The GMM estimator selects parameters in such a way that the correlations between the instruments and disturbances are as close to zero as possible, as defined by a criterion function. By choosing the weighting matrix in the criterion function appropriately, GMM can be made robust to heteroscedasticity and/or autocorrelation of unknown form. We determine the optimal number of lags for each series using Schwarz's Bayesian Information Criterion (SBC).

In selecting control variables we draw on previous studies. The variables included in vector $\mathbf{z^n}$ are based on studies on the political economy of natural resources, while controls included in $\mathbf{x^k}$ and $\mathbf{w^m}$ are derived from the political budget cycle literature. Table A2 in the Appendix offers a description of all variables used, provides their sources and shows in which vector they are included.

In the $\mathbf{z^n}$ vector we include variables that may explain cross-country differences in natural resource rents. First, we include several variables related to the ability of governments to benefit from natural resources. As pointed out in Section 2, it is easier for the incumbent to increase the volume of natural resources when the government has the property rights of these resources. As there is no direct measure for ownership of natural resources, we use the sub-index 'government enterprises and investments' taken from the economic freedom index of the Fraser Institute (Gwartney et al., 2015). We have rescaled the index measure making it run from 0 to 10, where a higher value indicates more government ownership.[15]

The ability of the government to take discretionary measures also depends on the number of veto players in the political system. As

[14] In non-election years the variable *cycle* is zero, so that the interaction term of *cycle* and $natrent_{it}$ is also zero in Eqs. (2) and (3).

[15] The correlation between the amount of natural resource rents received by the government taken from EITI and the Fraser measure for government ownership is larger than 0.4 and statistically significant. This indicates that governments that have more control over production within a country capture more rents.

suggested in Section 2, fewer checks and balances in the political system makes it easier for the incumbent to increase natural resource rents. We therefore include the political constraints index developed by Henisz (2004) measuring the number of veto players.

Furthermore, the revenues from the export of natural resources depend on several factors related to international competitiveness. To control for these factors we include the annual change in the terms of trade. Additionally, we include the volume of exports (as share of GDP) to control for the fact that to benefit from the natural resources countries need a well-developed export sector.[16] We also include real GDP per capita to control for differences in economic development. High-income countries may have better physical capital, knowledge and technologies at their disposal to extract natural resources (Collier and Hoeffler, 2009).

Finally, the political ideology of government may matter. For instance, there is evidence suggesting that left wing governments care more about the environmental quality than right wing governments (Neumayer, 2003, 2004; List and Sturm, 2004). Extraction of certain resources, such as oil, may cause serious harm to the environmental quality (Onwuka, 2006). To proxy partisan influences, we use an ideology index proposed by Potrafke (2011). This index places governments on a left–right scale with values between 1 and 5. It takes the value 1 (5) if the share of governing right wing (left wing) parties in terms of the number of ministers in government and seats in parliament is larger than 2/3, and 2 (4) if it is between 1/3 and 2/3. The index is 3 if the share of centre parties is 50%, or if the left and right wing parties form a coalition government that is not dominated by one side or the other. To construct our partisan measure we use information on the ideological position of parties in government provided by the World Bank Database of Political Institutions (Beck et al., 2001).

The variables in the vectors $\mathbf{x}^{\mathbf{k}}$ and $\mathbf{w}^{\mathbf{m}}$ capture differences in government revenues and spending across countries. Here we briefly discuss these variables. Real GDP per capita is included to control for the level of economic development of a country as this could influence voters' preferences for public goods as well as the size of the tax base. We also add total population as an additional measure of the tax base. Likewise, the size of the tax base may be related to the economic structure of a country. It is, for instance, hard to collect taxes in rural areas and this is particularly important for developing countries as they rely extensively on the agricultural sector and often have an inefficient tax collection system (Ehrhart, 2013). To take this into account we include the share of agriculture in GDP and the urbanization rate.[17] The growth rate of real GDP is included to capture the influence of the business cycle on government revenues and expenditures.

Also demographic factors may affect public finances. A higher share of elderly people or juveniles will lead to a lower average income and hence lower tax revenues, while government spending increases due to higher social security and public health expenditures (Brender and Drazen, 2005). To capture demographics, we include the age-dependency ratio, i.e. the ratio of the number of elderly and juveniles to the number of people of working age. Also inflation may reduce government receipts through the so-called Olivera-Tanzi effect. Moreover, the level of imports affects government revenues as indirect taxes in developing countries largely consist of taxes on imports of goods and services (Ehrhart, 2013). Furthermore, some studies suggest that foreign aid received increases public revenues and spending (Clist and Morrissey, 2011).

Many democratic countries are governed by multi-party cabinets. Coalition governments may follow different policies than single party governments. For instance, government expenditures are expected to be increasing with the number of parties in the coalition due to the so-called common pool problem (Perotti and Kontopoulos, 2002). We include a coalition dummy taking the value one when the cabinet consists of multiple political parties. Furthermore, we add a partisan variable to control for differences between right and left wing governments in fiscal policy. There is evidence suggesting that tax and spending policies differ among right and left wing governments (Hallerberg and Clark, 2000).

Finally, we include a dummy variable that is one when a country is a member of a monetary union such as the European Economic and Monetary Union (EMU), West African Economic and Monetary union or the East African Community at time *t*. Most monetary unions restrain national fiscal policies. An example is the Stability and Growth Pact within the EMU.[18]

4. Empirical results

4.1. The impact of elections

We start by including our election indicator in a model that also includes all control variables suggested in Section 3.2. The number of countries included is 64. In view of the unequal distribution of the availability of data across countries, we clustered the Huber-White standard errors at the country level. To obtain consistent and robust standard errors we use jack-knife estimation with 1000 replicators.[19]

Column (1) in Table 1 reports the results for electoral cycles in natural resource rents, government revenues, and public spending using the GMM method. The consistency of the GMM estimator depends on the validity of the instruments. To address this issue we consider the Sargan–Hansen statistic of over-identifying restrictions, which tests the overall validity of the instruments. The Sargan–Hansen test statistic provides no evidence of misspecification. The results reported in the top panel of Table 1 suggest that the natural rents received by the government are subject to an election cycle. We find that in an election year natural resource rents (as share of GDP) increase by 7%.[20] This result also holds if no controls are included (column 1 of Table A3 in the appendix).

In the middle part of Table 1 we explore whether the additional revenues are used to finance an election-induced tax cut. The results in column (1) suggest that government revenues are reduced in an election year. To compensate for the missing tax revenues, the government benefits from the natural rents as shown by the significance of the interaction term. The graph on the left-hand side in Fig. 5 shows the marginal effect of natural resource rents on government revenues in election and non-election years. It suggests that governments have about 0.1 percentage point higher natural rents in an election year than in a non-election year.

We also find evidence for higher government expenditures in an election year; this increase is partly financed through higher natural resource rents as shown by the significance of the interaction term. However, compared to the impact of natural resource rents on government revenues in an election year, the effect is significantly weaker. The graph on the right-hand side in Fig. 5 suggests that governments have about 0.03 percentage points more natural rents to finance expenditures in election years than in non-election years.

Combining these findings, our results suggest that the reduction of taxes and the increase in public spending in an election year is only partly compensated for by additional natural resources. Based on the regressions presented in column (1) of Table 1, our results suggest that, on

[16] As a robustness check we also used exports excluding natural resource rents as most of these natural resources are used for export. However, the main results for the export variable and the election indicator do not change.

[17] The correlation between the agricultural share and the urbanization rate is about −0.55, suggesting that multicolinearity is not problematic.

[18] We experimented with an alternative specification using a dummy variable for EMU only. The results obtained are very similar to those reported.

[19] This is especially important since data on the natural rents as reported by the World Bank are partly based on estimations using data provided by several sources, including the OPEC, International Energy Agency World Resources Institute, BP and IPE. Using the jack-knife procedure reduces the error-in-error problem.

[20] The average ratio of natural resource rents to GDP is about 5% in a non-election year. Thus in an election year the ratio increases by $0.4 / 5.4 * 100 = 7\%$.

Table 1
Political budget cycles.

Conditioning factor:	None		Democratic history		Media access		Political system		Electoral rules		Constraints	
	(1)		(2)		(3)		(4)		(5)		(6)	
Natural resource rents regression (Eq. 1)												
Elections	0.391	**	0.335	**	0.369	**	0.311	**	0.474	**	0.435	**
	(0.180)		(0.129)		(0.127)		(0.113)		(0.111)		(0.175)	
Elections × conditioning factor			−0.300	**	−0.186	*	0.173	*	0.229	*	−0.103	*
			(0.093)		(0.097)		(0.093)		(0.131)		(0.056)	
Government revenues regression (Eq. 2)												
Natural resource rents	−0.289	*	−0.315	**	−0.294	**	−0.348	**	−0.358	**	−0.339	**
	(0.170)		(0.152)		(0.137)		(0.089)		(0.123)		(0.093)	
Elections	−0.362	*	−0.310	*	−0.251	*	−0.264	*	−0.366	*	−0.329	*
	(0.200)		(0.158)		(0.145)		(0.158)		(0.199)		(0.189)	
Elections × natural resource rents	−0.126	**	−0.065	**	−0.076	**	−0.084	**	−0.077	**	−0.085	**
	(0.050)		(0.025)		(0.037)		(0.024)		(0.029)		(0.031)	
Natural resource rents × conditioning factor			0.266	**	0.167	*	−0.105	*	−0.054	*	0.047	**
			(0.086)		(0.094)		(0.061)		(0.028)		(0.020)	
Elections × conditioning factor			0.107		0.071		−0.056	*	−0.087	**	0.182	*
			(0.152)		(0.062)		(0.031)		(0.029)		(0.102)	
Elections × natural resource rents × conditioning factor			0.035	**	0.020	*	−0.055	*	−0.041	*	0.019	*
			(0.009)		(0.011)		(0.031)		(0.021)		(0.011)	
Government spending regression (Eq. 3)												
Natural resource rents	0.032		0.021		0.031		0.027		0.033		0.036	
	(0.020)		(0.017)		(0.021)		(0.022)		(0.032)		(0.030)	
Elections	0.283	**	0.246	**	0.207	**	0.292	**	0.167	*	0.296	*
	(0.100)		(0.107)		(0.079)		(0.117)		(0.100)		(0.121)	
Elections × natural resource rents	0.026	*	0.028	*	0.023	**	0.031	**	0.030	*	0.031	*
	(0.014)		(0.015)		(0.011)		(0.013)		(0.016)		(0.017)	
Natural resource rents × conditioning factor			−0.006	**	−0.008	*	0.015	*	−0.009	*	−0.007	*
			(0.002)		(0.005)		(0.009)		(0.006)		(0.004)	
Elections × conditioning factor			−0.112	**	−0.113	*	0.100	*	0.002	*	−0.161	*
			(0.029)		(0.063)		(0.059)		(0.001)		(0.087)	
Elections × natural resource rents × conditioning factor			−0.015	**	−0.006	*	0.018	*	0.001	*	−0.019	*
			(0.006)		(0.003)		(0.010)		(0.001)		(0.010)	
Country fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Controls	Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	1163		1163		528		1163		1157		1162	
Number of countries	67		67		54		67		67		67	
Estimation method	GMM		GMM		GMM		GMM		GMM		GMM	
Sargan–Hansen statistic p-value	0.61		0.53		0.25		0.62		0.57		0.53	
Natural resource rents regression												
Conditioning factor = 0 | election year			0.335	**	0.369	**	0.311	*	0.474	*	0.435	**
			(0.135)		(0.134)		(0.167)		(0.257)		(0.166)	
Conditioning factor = 1 | election year			0.035		0.183	*	0.484	**	0.703	**	0.332	*
			(0.052)		(0.107)		(0.130)		(0.263)		(0.174)	
Government revenues regression												
Conditioning factor = 0												
Non-election year			−0.315	**	−0.294	**	−0.348	*	−0.358	*	−0.339	**
			(0.103)		(0.120)		(0.183)		(0.208)		(0.114)	
Election year			−0.380	**	−0.370	**	−0.433	*	−0.436	*	−0.424	**
			(0.189)		(0.159)		(0.234)		(0.229)		(0.193)	
Conditioning factor = 1												
Non-election year			−0.050		−0.127		−0.453	**	−0.412	**	−0.292	*
			(0.058)		(0.169)		(0.141)		(0.132)		(0.163)	
Election year			−0.079		−0.182	*	−0.592	**	−0.530	**	−0.358	*
			(0.112)		(0.107)		(0.155)		(0.224)		(0.208)	
Government spending regression												
Conditioning factor = 0												
Non-election year			0.021	*	0.031	*	0.027	*	0.033	**	0.036	*
			(0.013)		(0.019)		(0.015)		(0.014)		(0.021)	
Election year			0.049	**	0.054	**	0.058	*	0.063	**	0.067	*
			(0.022)		(0.018)		(0.030)		(0.028)		(0.037)	
Conditioning factor = 1												
Non-election year			0.016		0.023		0.041	*	0.024	*	0.029	
			(0.014)		(0.024)		(0.025)		(0.012)		(0.022)	
Election year			0.029		0.040		0.090	*	0.055	*	0.041	*
			(0.031)		(0.059)		(0.055)		(0.029)		(0.023)	

Notes: The regressions include the control variables outlined in Section 3.2 (not shown; full model results available on request). We include government ownership, checks and balances, change in terms of trade, exports, real GDP per capita in Eq. (1); real GDP per capita, agriculture, urbanization rate, total population, growth rate of GDP, age-dependency ratio, inflation, imports, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (2) and real GDP per capita, total population, growth rate of GDP, age-dependency ratio, inflation, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (3). Robust standard errors are shown in parentheses. */** indicates significance at 10 and 5%, respectively. The sample size in column (3) is reduced due to limited data availability for media-access. In column (2) the conditioning factor is a dummy which is one for established democracies. In column (3) the conditioning factor is a dummy which is one for high information access. In column (4) the conditioning factor is a dummy which is one for presidential regimes. In column (5) the conditioning factor is a dummy which is one for majoritarian electoral systems. In column (6) the conditioning factor is a dummy which is one for countries with a high level of checks and balances in the political system.

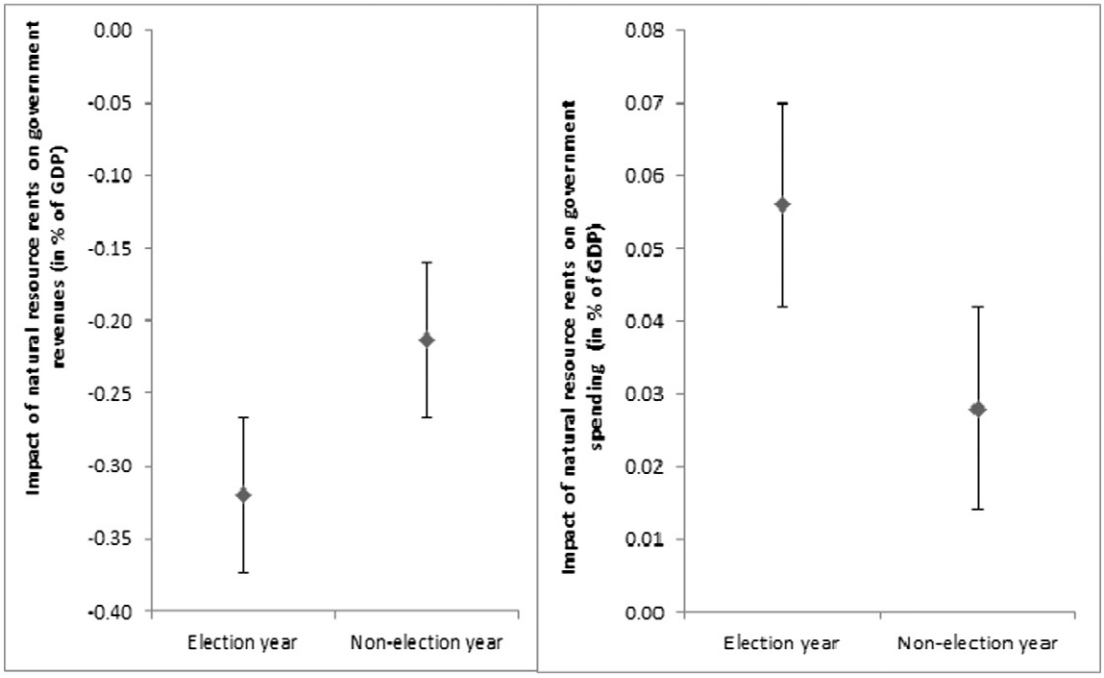

Fig. 5. Marginal effects of elections on government revenues and spending The panels in this figure show the marginal effect of natural resource rents on governments revenues (left-hand side) and government spending (right-hand side) in election and non-election years. The squares show the point estimates, while the solid lines show the 90% confidence intervals. The marginal effects are based on the regressions shown in column (1) of Table 1.

average, a country receives 0.4% of GDP as additional natural resource rents in an election year, while the combined effect of lower taxes and higher public spending is about 1.4% of GDP.[21] Thus, a major part of the fiscal expansion in an election year is financed through higher budget deficits. This is in line with several previous studies reporting that budget deficits increase in election years (see the literature review of de Haan and Klomp, 2013). Below we will examine whether this result is driven by countries with limited experiences with democracy, as suggested by Brender and Drazen (2005), or by countries with limited access to information, as suggested by Shi and Svensson (2006).

But first we check the robustness of our results to alternative system estimation methods like Two-Stage Least Squares (2SLS), Three-Stage Least Squares (3SLS) and Seemingly Unrelated Regressions (SUR). The results obtained when using these alternative estimation methods are reported in columns (2)–(4) of Table A3 in the Appendix. They are very similar to the GMM results. Thus, regardless of the estimation method there is clear empirical support for our hypothesis that governments use natural resource rents to finance a fiscal expansion when elections are upcoming.[22]

4.2. Conditional effects

The results found so far suggest that, on average, governments have higher natural resource rents in an election year and that these revenues are used to lower taxes and increase public spending. As the additional natural resource rents are not sufficient to cover lower taxes and higher spending, government budget deficits increase in election years. Still, as pointed out in Section 2, several political system characteristics may lead to cross-country differences in these patterns.

To examine these differences in more detail, we estimate the following model[23]:

$$natrent_{it} = \varpi_i + \delta_t + \theta \text{natrent}_{it-k} + \psi^n z^n_{it-j} + \varphi_1 cycle_{it} + \varphi_2 mechanism_{it} + \varphi_2 (cycle_{it} \times mechanism_{it}) + \upsilon_{it} \quad (4)$$

$$govrev_{it} = \alpha_i + \chi_t + \gamma \text{govrev}_{it-k} + \beta^k x^k_{it-j} + \mu_1 natrent_{it} + \mu_2 cycle_{it} + \mu_3 mechanism_{it} + \mu_4 (natrent_{it} \times cycle_{it}) + \mu_5 (cycle_{it} \times mechanism_{it}) + \mu_6 (natrent_{it} \times mechanism_{it}) + \mu_7 (cycle_{it} \times natrent_{it} \times mechanism_{it}) + \varepsilon_{it} \quad (5)$$

$$govexp_{it} = \pi_i + \rho_t + \phi \text{govexp}_{it-k} + \sigma^m w^m_{it-j} + \tau_1 natrent_{it} + \tau_2 cycle_{it} + \tau_3 mechanism_{it} + \tau_4 (natrent_{it} \times cycle_{it}) + \tau_5 (cycle_{it} \times mechanism_{it}) + \tau_6 (natrent_{it} \times mechanism_{it}) + \tau_7 (cycle_{it} \times natrent_{it} \times mechanism_{it}) + \xi_{it} \quad (3)$$

where *mechanism* is a vector containing various conditioning political system characteristics as discussed in Section 2, which are represented by dummies. The other variables have the same meaning as in Eqs. (1)–(3). Columns (2)–(6) in Table 1 report the regression results.

First, according to Brender and Drazen (2005) election cycles only occur in countries with limited experience with democratic elections. In order to test this hypothesis, we create a dummy which is one if a country has been a democracy for more than 20 years on a row since 1945 (established democracy). The length of 20 year is about equal to 5 election terms. We count each country-year with a Polity IV score larger or equal to six as a democratic year.[24] The summary of the results in the bottom part of column (2) in Table 1 using the linear combinations of estimators indicates that electoral cycles in natural resource rents

[21] Calculated based on the coefficients reported in column (1) of Table 1. The coefficient of the election variable in the natural resource rents regression indicates that the additional revenues are about 0.4% of GDP in an election year. As the average rents-to-GDP ratio is about 5.4%, we find that government revenues drop by 1.0% of GDP ($0.362 + 0.126 * 5.4$) in an election year, while government spending increases by 0.4% of GDP ($0.283 + 0.026 * 5.4$) in an election year. Thus, the combined spending and revenues effect is 1.4% of GDP.

[22] As another robustness test, we re-estimated the model removing outlier observations. An observation is an outlier if the rents-to-GDP variable is outside the interquantile criterion: $x < Q(25) - 3IQR$ or $x > Q(75) + 3IQR$, where Q is the quantile and IQR the interquantile range given by 75th percentile–25th percentile. The results show the same pattern as in the main regressions (results are available upon request).

[23] Alternatively, a threshold regression as suggested by Hansen (2000) and Aurangzeb and Stengos (2012) could be used. If the splits are based on an exogenous group classification instead of a dynamic threshold, the results of this alternative strategy point in the same direction as the results reported in the main text; they are available upon request.

[24] We have also used a cut-off point of a Polity IV score of four. This yields very similar results (available on request).

Table 2
Democracy and media access.

Conditioning factor:	Resource scarce		Ownership		Resource scarce		Ownership	
	New democracies				Low media access			
	(1)		(2)		(3)		(4)	
Natural resource rents regression (Eq. 1)								
Elections	0.571	**	0.268	**	0.134	**	0.138	**
	(0.149)		(0.068)		(0.060)		(0.063)	
Elections × conditioning factor	0.296	**	0.101	*	0.039	*	0.045	
	(0.107)		(0.053)		(0.021)		(0.038)	
Government revenues regression (Eq. 2)								
Natural resource rents	−0.270	**	−0.312	**	−0.319	**	−0.381	**
	(0.070)		(0.139)		(0.094)		(0.138)	
Elections	−0.382	*	−0.449	*	−0.494	*	−0.628	*
	(0.220)		(0.232)		(0.271)		(0.331)	
Elections × natural resource rents	−0.162	**	−0.202	**	−0.178	**	−0.135	**
	(0.048)		(0.062)		(0.065)		(0.047)	
Natural resource rents × conditioning factor	−0.218	**	−0.103	**	−0.265	**	−0.226	**
	(0.098)		(0.034)		(0.092)		(0.066)	
Elections × conditioning factor	−0.187		−0.172		−0.074		−0.203	
	(0.336)		(0.237)		(0.079)		(0.152)	
Elections × natural res. rents × conditioning factor	−0.123	**	−0.076	**	−0.055	**	−0.108	**
	(0.044)		(0.022)		(0.028)		(0.035)	
Government spending regression (Eq. 3)								
Natural resource rents	0.061	*	0.080	*	0.048	*	0.060	*
	(0.034)		(0.048)		(0.025)		(0.034)	
Elections	0.444	**	0.439	**	0.471	**	0.350	**
	(0.192)		(0.144)		(0.227)		(0.144)	
Elections × natural resource rents	0.061	*	0.051	*	0.050	*	0.043	*
	(0.034)		(0.027)		(0.029)		(0.023)	
Natural resource rents × conditioning factor	0.021	**	0.059	**	0.031	**	0.051	**
	(0.006)		(0.017)		(0.013)		(0.016)	
Elections × conditioning factor	0.192		0.052		0.131		0.045	
	(0.148)		(0.063)		(0.154)		(0.054)	
Elections × natural resource rents × conditioning factor	0.026	**	0.036	**	0.026	**	0.016	**
	(0.007)		(0.017)		(0.008)		(0.004)	
Country fixed effects	Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes	
Controls in natural resource rents regression	Yes		Yes		Yes		Yes	
Number of observations	1143		1163		523		428	
Number of countries	65		67		53		54	
Estimation method	GMM		GMM		GMM		GMM	
Sargan–Hansen statistic p-value	0.60		0.45		0.17		0.17	

Note: The regressions include the control variables outlined in Section 3.2 (not shown; full model results available on request). We include government ownership, checks and balances, change in terms of trade, exports, and real GDP per capita in Eq. (1); real GDP per capita, agriculture, urbanization rate, total population, growth rate of GDP, age-dependency ratio, inflation, imports, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (2) and real GDP per capita, total population, growth rate of GDP, age-dependency ratio, inflation, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (3). Robust standard errors are shown in parentheses. */** indicates significance at 10 and 5%, respectively.

only occur in countries with a short democratic history. In more detail, the election variable is statistically significant in the natural resource rents regression. However, this election effect is not significant in established democracies since the interaction term between our election indicator and a dummy for a long democratic history is also statistically significant but with opposite sign. A similar picture emerges from the regressions for government spending and revenues in which the interaction term between our election indicator and natural resource rents runs in the opposite direction as the three way interaction making the election effect in spending and revenue disappear for established democracies. This finding is in line with the results reported by Brender and Drazen (2005).

To test whether the presence of a PBC in natural resource rents is conditional on access to information by voters we use a dummy variable based on access to free media. We start by calculating the average number of radios, televisions, newspapers and internet connections per capita taken from the World Development Indicators. Similar to Shi and Svensson (2006), we multiply this average with the "freedom of the press" indicator taken from the Freedom House.[25] Based on this product, we construct a dummy which takes the value one if the variable on access to free media is above the mean (high information access). The results in column (3) in Table 1 suggest that electoral cycles in natural resource rents are more pronounced in (but not confined to) countries with high access to free media, thereby (partly) confirming the findings of Shi and Svensson (2006).

Columns (4) and (5) in Table 1 show the results for the political and electoral system in place. If the president has no legislative powers in the realm of fiscal policy and the government is accountable to parliament through a confidence requirement, we classify the country concerned as a parliamentary regime.[26] Our political system dummy is one for presidential regimes and zero for parliamentary regimes. The results in column (4) suggest that election-induced cycles occur in both systems. Still, the election impact is the largest in presidential systems. The results in column (5) do not suggest large differences in election effects in government spending and government revenues across countries with different electoral systems. Here the dummy for the electoral system is one for countries with a majoritarian electoral system.

Finally, we test whether in countries with weaker checks and balances the incumbent is in a better position to use natural resource rents for re-

[25] This indicator is based on freedom in print and broadcasting.

[26] Thus, France and Finland are classified as parliamentary countries even though they have a directly elected president, since the government controls fiscal policy and the government can be brought down by a legislative vote of no confidence.

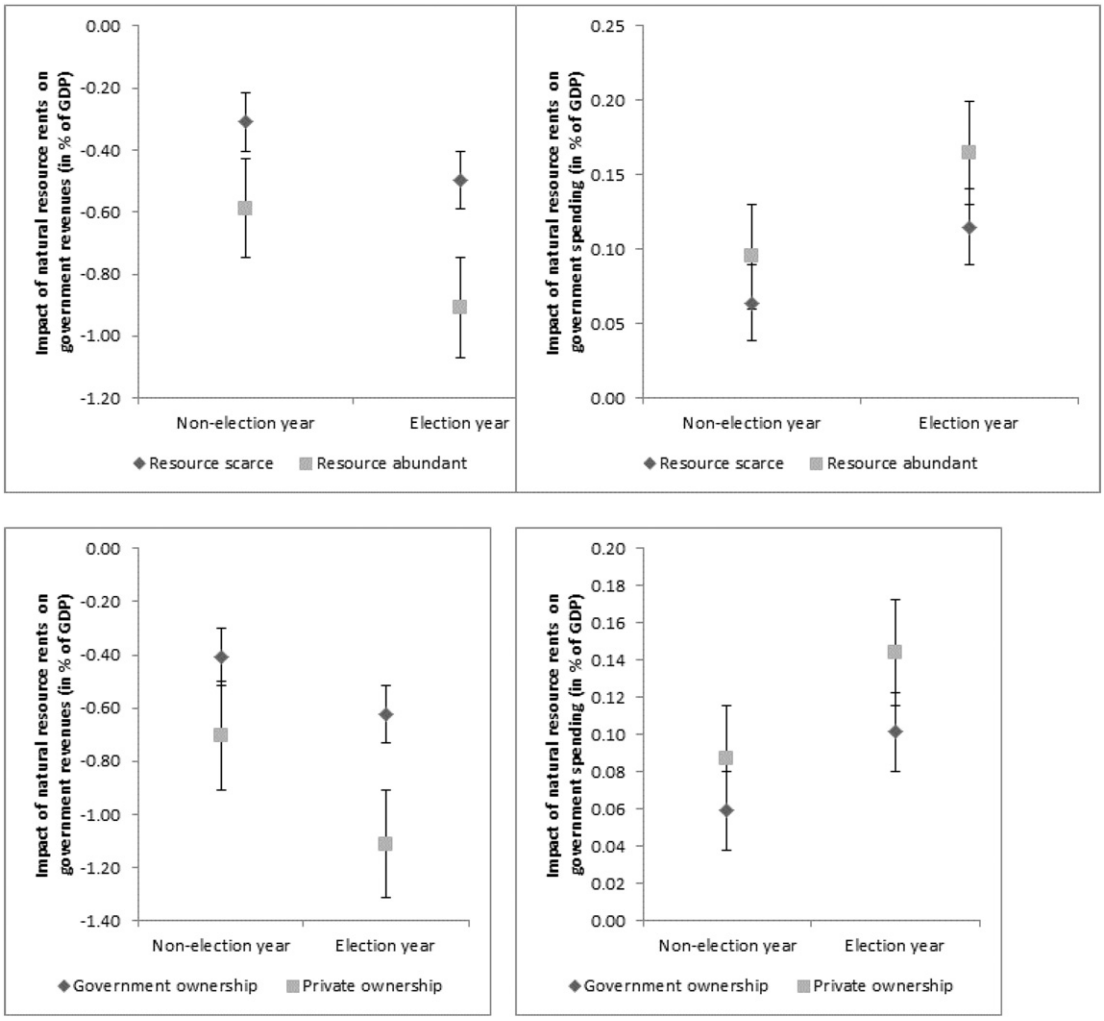

Fig. 6. Marginal effect of elections and natural resource rents on government revenues and spending in new democracies: Resource endowment and government ownership. The graphs show the marginal effect of natural resource rents on governments revenues (upper part) and government spending (lower part) in election and non-election years for young democracies that are resource scarce or abundant (left hand-side panel) and private vs. government ownership (right hand-side panel). The rectangulars and squares show the point estimates, while the solid lines show the 90% confidence intervals. The marginal effects are based on the regressions shown in columns (1)–(2) of Table 2.

election purposes. To test this hypothesis we employ the update of the POLCON index from Henisz (2004) and create a dummy which is one for countries with a score for this index above the median (high checks and balances) and zero otherwise. The results in column (6) in Table 1 suggest that electoral-induced fiscal policy financed by natural resource rents is more prevalent in countries with fewer checks and balances. To be specific, political leaders that are less constrained use natural resource rents more to reduce taxes and to increase government spending in an election year, where the effect on taxes is larger than that on spending.

Our findings are broadly in line with the two main explanations provided in the literature for cross-country differences in PBCs as outlined in the introduction. As a next step, we further disaggregate our analysis and zoom in on differences between countries that are young democracies and countries where voters only have limited information, respectively. More specifically, we first examine whether our results differ between resource-abundant and resource-scarce young democracies.[27] Even if two countries are both a young democracy, differences with respect to the availability of natural resources may cause differences in the occurrence of PBCs. As pointed out in Section 2, the presence of natural resources affects both the incentives and the possibilities for the incumbent to create PBCs in natural resource rents. We compute a dummy taking the value one for countries with a large natural resources endowment based on the data on natural wealth reported by the World Bank. As this data is only available for 1995, 2000 and 2005 we compute a country median over this time period. Based on this median, we create a dummy variable indicating whether a country is above (1) or below (0) this median level of natural resources. The results in column (1) in Table 2 show that young democracies with higher endowments are more often subject to an election cycle that is financed through natural resource rents. As it is hard to interpret the economic significance based on these outcomes, the graphs in Fig. 6 summarize the main findings graphically in a similar fashion as in Fig. 5. In particular, the graph in the upper-left part of Fig. 6 suggests that taxes are substituted more for natural resource rents in an election year than in non-election years, especially when a country has a higher resource endowment. This impact is even stronger on the expenditure side as can be observed from the graph at the lower-left part of Fig. 6.

Next, we turn to ownership of natural resources. As pointed out in Section 2, government exploitation of natural resources makes it easier for the incumbent to create PBCs in natural resource rents. To explore whether it may be easier for governments in young democracies to use natural resource rents for re-election purposes if they own the natural resources, we create a dummy variable based on the degree of

[27] By adding additional interactions to the specification of column (2) of Table 1. We report only the results on the new democracies by linearly interpreting the coefficients. In established democracies there are no significant differences based on the degree of government ownership or resource abundance (detailed results are available upon request).

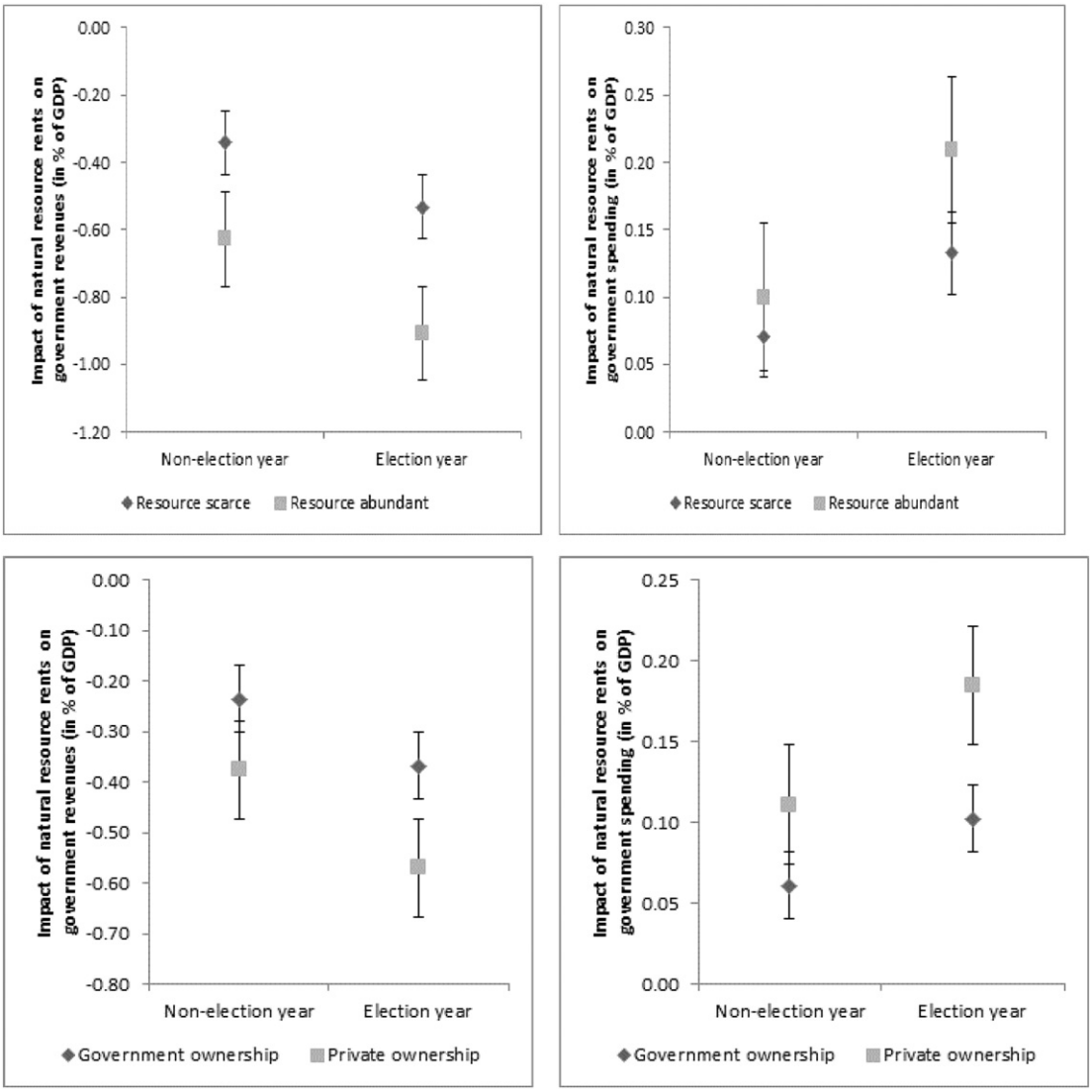

Fig. 7. Marginal effect of elections and natural resource rents on government revenues and spending in low media access democracies: Resource endowment and government ownership. The graphs show the marginal effect of natural resource rents on governments revenues (upper part) and government spending (lower part) in election and non-election years for countries with low media access that are resource scarce or abundant (left panel) and private vs. government ownership (right panel). The rectangulars and squares show the point estimates, while the solid lines show the 90% confidence intervals. The marginal effects are based on the regressions shown in columns (3)–(4) of Table 2.

government ownership in the economy using data from the Fraser Institute. When this index is above 5, which is about the median,[28] the country concerned is classified as having government ownership; otherwise it is classified as having private ownership. The results shown in column (2) in Table 2 and the lower part of Fig. 6 suggest that under government ownership, the election cycle in natural resource rents is significant. In an election year governments in these countries have about 0.2 percentage points higher natural resource rents than governments in countries with private sector ownership. This finding is in line with the view that government exploitation of natural resources enables the government to 'hide' information. Most of these additional resources are used to lower taxes rather than increase public spending in an election year.

Next, we examine whether differences in resource endowments and ownership of natural resources causes differences in PBCs in the group of countries with limited voter access to information. The results are shown in columns (3) and (4) of Table 2 and in Fig. 7. Our findings indicate that governments in countries where voters have limited information and that are characterized by resource abundance and government ownership have the strongest electoral cycle effects. In these countries governments try to manipulate both taxes and expenditures before the elections.

5. Sensitivity analysis[29]

It is possible that the incumbent uses different types of natural resources differently (Sachs and Warner, 2001).[30] Boschini et al. (2007)

[28] Based on all country-years included in the Fraser Index.

[29] The number of observations between the different specifications tested in this section differs significantly. This is mainly due to two reasons. First, the availability of data on the rent variables compared to the availability of the endowment data. We have far less observations on the latter variables. Second, as already mentioned above, the data on media-access is missing for about two-thirds of our observations.

[30] Several empirical studies suggest that the resource curse is conditional on the type of resources a country has. Fuels, notably petroleum resources, are strongly and consistently related to dysfunctional behaviour such as corruption and reduced growth (Leite and Weidmann, 1999; Sala-i-Martin and Subramanian, 2013; Petermann et al., 2007). Ores and metals also appear to lead to a resource curse, and certain high-value commodities, such as diamonds and gold, have a particularly negative effect (Boschini et al., 2007; Petermann et al., 2007). Agricultural commodities, on the other hand, do not have a negative effect on corruption or growth (Leite and Weidmann, 1999; Sala-i-Martin and Subramanian, 2013).

Table 3
Natural resource rents.

	Natural gas rents		Oil rents		Mineral and metal rents		Forest rents		Coal rents	
	(1)		(2)		(3)		(4)		(5)	
Natural resource rents regression (Eq. 1)										
Elections	0.443	**	0.950	**	0.282		0.309		0.501	*
	(0.090)		(0.129)		(0.086)		(0.114)		(0.101)	
Elections × democratic history	−0.212	**	−0.455	**	−0.194		−0.130		−0.270	*
	(0.070)		(0.152)		(0.233)		(0.165)		(0.161)	
Government revenues regression (Eq. 2)										
Natural resource rents	−0.186	*	−0.414	*	−0.084		−0.129		−0.240	*
	(0.102)		(0.223)		(0.118)		(0.150)		(0.137)	
Elections	−0.442	*	−0.287	*	−0.300	*	−0.441	*	−0.432	*
	(0.250)		(0.160)		(0.174)		(0.243)		(0.245)	
Elections × natural resource rents	−0.134	**	−0.239	**	−0.080		−0.060		−0.147	**
	(0.050)		(0.071)		(0.143)		(0.045)		(0.044)	
Natural resource rents × democratic history	0.100	**	0.105	**	0.038	**	0.032	**	0.160	**
	(0.028)		(0.039)		(0.019)		(0.013)		(0.066)	
Elections × democratic history	0.158	**	0.166	**	0.077	**	0.297	**	0.043	**
	(0.040)		(0.083)		(0.037)		(0.079)		(0.022)	
Elections × natural resource rents × democratic history	0.017	**	0.070	**	0.016	**	0.015	**	0.050	**
	(0.005)		(0.019)		(0.008)		(0.004)		(0.018)	
Government spending regression (Eq. 3)										
Natural resource rents	0.027	*	0.034	*	0.009		0.011		0.028	*
	(0.015)		(0.018)		(0.011)		(0.009)		(0.016)	
Elections	0.376	**	0.248	**	0.285	**	0.360	**	0.328	**
	(0.184)		(0.085)		(0.084)		(0.153)		(0.133)	
Elections × natural resource rents	0.031	*	0.047	**	0.016		0.019		0.032	**
	(0.017)		(0.016)		(0.029)		(0.015)		(0.010)	
Natural resource rents × democratic history	−0.014	**	−0.023	**	−0.002	**	−0.002	**	−0.014	**
	(0.006)		(0.008)		(0.001)		(0.001)		(0.004)	
Elections × democratic history	−0.224	**	−0.133	**	−0.048	**	−0.219	**	−0.218	**
	(0.070)		(0.051)		(0.014)		(0.099)		(0.066)	
Elections × natural resource rents × democratic history	−0.013	**	−0.028	**	−0.006	**	−0.007	**	−0.004	**
	(0.005)		(0.009)		(0.002)		(0.002)		(0.001)	
Country fixed effects	Yes		Yes		Yes		Yes		Yes	
Time fixed effects	Yes		Yes		Yes		Yes		Yes	
Controls in natural resource rents regression	Yes		Yes		Yes		Yes		Yes	
Number of observations	1168		1167		1168		1163		1168	
Number of countries	67		67		67		67		67	
Estimation method	GMM		GMM		GMM		GMM		GMM	
Sargan–Hansen statistic p-value	0.41		0.44		0.17		0.65		0.62	

Note: This table shows regressions for different types of natural resources. The regressions include the control variables outlined in Section 3.2 (not shown). We include government ownership, checks and balances, change in terms of trade, exports, and real GDP per capita in Eq. (1); real GDP per capita, agriculture, urbanization rate, total population, growth rate of GDP, age-dependency ratio, inflation, imports, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (2) and real GDP per capita, total population, growth rate of GDP, age-dependency ratio, inflation, foreign aid, coalition, monetary union, government ideology, and checks and balances in Eq. (3). Robust standard errors are shown in parentheses. */** indicates significance at 10 and 5%, respectively. The number of observations differs in each regression as countries have different natural resource endowments.

differentiate between more and less technically appropriable resources. Technically appropriable resources are defined as resources that are easily extracted, stored, transported, and sold, while the opposite applies to less technologically appropriate resources. Furthermore, the ease with which rents can be controlled or appropriated is an important factor. Isham et al. (2005) and Sala-i-Martin and Subramanian (2003) distinguish between point source resources, i.e. resources extracted from a narrow geographical or economic base (such as oil and minerals), and diffuse resources which are less concentrated (such as forestry products).

To examine whether election cycles differ across different types of natural resource rents, Table 3 shows the outcomes for five types of natural resources: oil, metal and mineral, coal, forest and natural gas. The results suggest that upcoming elections in particular affect rents from energy. These rents are then used to finance a fiscal expansion, confirming our previous results. For metal and mineral rents and forest rents we do not find evidence for an election effect. Possibly, the demand for these resources may be more elastic or it might be harder to increase extraction in a short period of time. Our results for forest rents are in contrast to the findings reported by Burgess et al. (2011) and Rodrigues-Filho et al. (2015). These studies suggest significant election cycles in logging using regional data (instead of national data as in our study) for respectively Indonesia and Brazil.

In Table 3 we also show the results for new democracies. For these countries we also do not find election effects in metal and mineral rents and forest rents. For the other natural resources considered we find that the rents in an election year are higher and used for both reducing taxation and expand the public spending.

A fiscal expansion in an election year may stimulate GDP growth (Alesina, 1997; Klomp and de Haan, 2013). Consequently, this will affect our dependent variables in the three equations that make up our system of equations and might cause a downward bias in our findings. To assess the robustness of our results we re-estimate our main model expressing our dependent variables in per capita terms or as a share of total exports since population growth and exports are not affected by upcoming elections.[31] Our findings (shown in columns (1) and (2) in Table 4) are nearly identical to the outcomes presented in column (1) in Table 1.

[31] As an additional sensitivity test, we subtracted the natural resource rents from the total exports as the largest part of these resources is exported. The results do not dramatically change and our main conclusions still hold.

Table 4
Robustness analyses using alternative indicators and samples.

	Share of export	Per capita	Depletion rate	Taxes	Non-taxes	Including endogenous elections	All countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Natural resource rents regression (Eq. 1)							
Elections	0.324 **	0.213 **	0.358 **	0.222 **	0.239 **	0.153 **	0.136 **
	(0.163)	(0.105)	(0.163)	(0.109)	(0.095)	(0.073)	(0.067)
Government revenues regression (Eq. 2)							
Natural resource rents	−0.189 **	−0.242 **	−0.422 **	−0.292 **	0.047 *	−0.156	−0.176 **
	(0.081)	(0.111)	(0.121)	(0.082)	(0.028)	(0.095)	(0.069)
Elections	−0.237 **	−0.235 *	−0.305 **	−0.278 **	0.107 **	−0.182 *	−0.144
	(0.115)	(0.135)	(0.092)	(0.110)	(0.021)	(0.100)	(0.102)
Elections × natural resource rents	−0.203 **	−0.204 **	−0.275 **	−0.197 **	−0.113 *	−0.073 **	−0.084 **
	(0.077)	(0.103)	(0.135)	(0.090)	(0.065)	(0.031)	(0.031)
Government spending regression (Eq. 3)							
Natural resource rents	0.038	0.065	0.143	0.051	0.067	0.024	0.017
	(0.028)	(0.185)	(0.097)	(0.037)	(0.062)	(0.093)	(0.074)
Elections	0.333 **	0.189 **	0.393 *	0.240 *	0.273 *	0.209 **	0.189 **
	(0.078)	(0.074)	(0.217)	(0.140)	(0.149)	(0.087)	(0.075)
Elections × natural resource rents	0.034 *	0.037 *	0.077 **	0.031 *	0.040	0.015 *	0.015
	(0.018)	(0.019)	(0.033)	(0.018)	(0.024)	(0.008)	(0.010)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1163	1163	664	658	540	1163	1877
Number of countries	67	67	64	66	58	67	111
Estimation method	GMM	GMM	GMM	GMM	GMM	GMM	GMM
Hansen J-test p-value	0.42	0.54	0.37	0.55	0.41	0.21	0.34

Note: The regressions include the control variables outlined in Section 3.2 (not shown). We include government ownership, checks and balances, change in terms of trade, exports, and real GDP per capita in Eq. (1); real GDP per capita, agriculture, urbanization rate, total population, growth rate of GDP, age-dependency ratio, inflation, imports, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (2) and real GDP per capita, total population, growth rate of GDP, age-dependency ratio, inflation, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (3). Robust standard errors are shown in parentheses. */** indicates significance at 10 and 5%, respectively.

Table 5
Regressions using natural resource endowments.

	Total	Natural gas rents	Oil rents	Metals and mineral rents	Forest rents	Coal rents
	(1)	(2)	(3)	(4)	(5)	(6)
Natural resource rents regression (Eq. 1)						
Elections	0.318 **	0.280 **	0.655 **	0.085 **	0.009	0.252 **
	(0.079)	(0.058)	(0.147)	(0.043)	(0.011)	(0.108)
Government revenues regression (Eq. 2)						
Natural resource endowment	−0.023 **	−0.023 **	−0.067 **	−0.003	−0.021	−0.032 **
	(0.011)	(0.010)	(0.020)	(0.009)	(0.087)	(0.000)
Elections	−0.291 **	−0.417 **	−0.462 **	−0.256 **	−0.194 **	−0.147 **
	(0.091)	(0.138)	(0.096)	(0.068)	(0.048)	(0.050)
Elections × natural resource endowment	−0.013 **	−0.015 **	−0.072 **	0.003 **	0.006	−0.023 **
	(0.000)	(0.000)	(0.010)	(0.000)	(0.021)	(0.000)
Government spending regression (Eq. 3)						
Natural resource endowment	0.003	0.011 **	0.004 **	0.011	0.005	0.010
	(0.030)	(0.000)	(0.000)	(0.099)	(0.177)	(0.010)
Elections	0.304 **	0.336 **	0.290 **	0.289 **	0.307 **	0.308 **
	(0.098)	(0.094)	(0.068)	(0.087)	(0.078)	(0.093)
Elections × natural resource endowment	0.003 **	0.003 **	0.005 **	0.000	0.001	0.004 **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.011)	(0.000)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	664	664	664	664	664	664
Number of countries	64	64	64	64	64	64
Estimation method	GMM	GMM	GMM	GMM	GMM	GMM
Sargan–Hansen statistic p-value	0.607	0.527	0.480	0.571	0.529	0.634

Note: The regressions include the control variables outlined in Section 3.2 (not shown). We include government ownership, checks and balances, change in terms of trade, exports, and real GDP per capita in Eq. (1); real GDP per capita, agriculture, urbanization rate, total population, growth rate of GDP, age-dependency ratio, inflation, imports, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (2) and real GDP per capita, total population, growth rate of GDP, age-dependency ratio, inflation, foreign aid, coalition government, monetary union, government ideology, and checks and balances in Eq. (3). Robust standard errors are shown in parentheses. */** indicates significance at 10 and 5%, respectively.

In addition, in column (3) in Table 4 we use the depletion rate instead of the resource rents as a share of GDP. To obtain the annual depletion rate for a country we divide its annual resource rents by its endowment. However, using this method reduces our data by about half due to missing observations for resource endowments. Still, the results point in the same direction as our main findings and indicate that natural resources are subject to an election cycle as the depletion rate increases in an election year.

The majority the total revenues received by the government consist of tax revenues, while the rest consists of non-tax revenues, such as grants or royalties. Natural resource rents are included in both categories. To examine how election cycles in natural resource rents affect the two sources of revenues, we re-estimate the main model and split the government revenues into tax revenues and non-tax revenues. The results in columns (4) and (5) of Table 4 indicates that tax revenues are more affected by elections and natural resources and their interaction then non-tax revenues.[32]

In our empirical strategy so far, we only included elections held on a fixed date or announced one year in advance. As politicians may anticipate endogenous elections in the near future, they may pursue policies that benefit them in these elections. We therefore also estimated the models including all elections. The results in column (6) of Table 4 indicate that the magnitude of the election effect is lower. This finding suggests that election cycles in fiscal policy mainly occur if there is still time to change fiscal policy and extract additional resources before the elections.

Next, we examine the consequences of restricting our sample to countries with a Polity IV score of six or higher. Due to this criterion autocratic countries with a large natural resource endowment are excluded. Some recent studies suggest that election cycles may not only occur in democratic countries, but also in autocracies as the incumbent under this type of regime has an incentive to buy political support at the end of his term in office from the elite on which his power rests (Hyde and O'Mahony, 2010; Ebeke and Olcer, 2013). To test whether our results are affected by our sample selection criterion, we re-estimate our main model from Table 1, including all countries for which data are available. The results in column (7) of Table 4 indicate that the pattern is similar to the one found above, although the magnitude of the election effect is slightly lower.

Finally, as indicated above, we have some data on the endowment base (as a share of GDP) of a country. We therefore re-estimated the models presented in Table 1 but replace the direct rents in the expenditure and revenues regression by the endowment of a country. Besides, we use this endowment and the interaction with elections as control variables in the rents regression to control for the fact that countries that have a larger endowment may use more of it, especially during election periods. As already mentioned above, this approach reduces our dataset dramatically. However, the results as shown in Table 5 are nearly identical to the ones using natural resource rents. In addition, we find, not surprisingly, that there is a close relationship between the actual rents and the endowment base.

6. Conclusions

When governments have natural resource rents they can tax their citizens less which is an advantage, as tax payments are generally perceived as a cost that people have to pay out of their earnings. Natural resource rents are likely to be perceived differently as voters do not own them. Thus, the exploitation of natural resources creates a soft budget constraint. Meanwhile, voters generally prefer candidates whom they expect to deliver greater material wellbeing and better aggregate economic performance. Incumbents therefore have powerful incentives to affect voters' behaviour by using fiscal policy, the more so if elections are at hand.

So natural resource rents enable politicians to tax voters less or to increase public spending without raising taxes. This may be attractive in case of upcoming elections. However, there is surprisingly limited evidence whether the incumbent uses natural resource rents for re-election purposes. The main contribution of our paper is to explore empirically whether, and if so, how natural resource rents are manipulated in a broad set of democratic countries during pre-election periods. That is, do incumbents increase natural resource rents in order to finance pre-election tax reductions or expenditure increases, thereby improving their re-election chances?

We use a dynamic panel model including about 60 resource abundant countries be-tween 1975 and 2010. After extensive testing, we conclude that (1) natural resource rents are subject to election cycles and (2) that additional resource rents are used to finance both tax cuts and higher public spending. Despite higher natural resource rents in election years the government budget deficit increases, as the additional natural resource rents are not sufficient to cover the lower taxes and higher government spending. However, the electoral cycle in natural resource rents and the rents' effect on the budget in election years are statistically significant only in countries with a short democratic history. This result is similar to the findings of Brender and Drazen (2005). Our results also suggest that election effects are stronger in countries with limited access to free media, limited political checks and balances, and a presidential system.

[32] As a further robustness test, we divided our natural resource rents measures and the government revenue and spending variables by last year's GDP since the current year's GDP may have been affected by the election cycle itself. However, the results do not significantly differ compared to the outcomes reported in Table 1 (detailed results are available upon request).

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Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jdeveco.2016.03.002.

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