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The heterogeneous effect of oil discoveries on democracy

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Abstract

This paper evaluates the existence of a resource curse on political regimes using the Synthetic Control Method. Focusing on 12 countries, we compare their democracy level with the weighted democracy level of countries that have not experienced oil shocks and have similar pre-event characteristics. We find that the exogenous variation in oil endowment does not have the same effect on all countries. In most cases, the event has a negative effect in the long run, but countries with a pre-existing high level of democracy are not negatively affected.

KEYWORDS

democracy, natural resources, oil discoveries, synthetic control method

JEL CLASSIFICATION

P16; C21; C23; O57

1 | INTRODUCTION

Starting from Auty (1993), the *resource curse* denotes the negative effect of natural capital endowments on social and economic outcomes observed in many resource-rich countries.[1] Although there is an extensive theoretical and empirical literature that evidences that negative impact, the existence of a resource curse is not unanimously supported.[2] In this regard, past findings on political regimes do not represent an exception.

[1]For comprehensive reviews on the resource curse and its causes and consequences, see van der Ploeg (2011) and Ross (2015).

[2]Much of the literature argues that natural resource abundance leads to lower economic growth rates (e.g., Gylfason, 2001), a higher level of corruption (e.g., Brollo, Nannicini, Perotti, & Tabellini, 2013), and civil conflicts (e.g., Collier & Hoeffler, 2004). However, these results have been contradicted more recently (e.g., Alexeev & Conrad, 2009; Cotet & Tsui, 2013; Haber & Menaldo, 2011).

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The lack of consensus on the existence of a resource curse may be due to the econometric techniques applied, the choice of natural resource indicators, or the neglected heterogeneity across countries. Indeed, many of the previous studies suffers from omitted variables and endogeneity of the variables capturing natural resource endowment. However, a growing number of papers tries to settle the controversy claiming that natural resources may be a curse or a blessing depending on the quality of institutions.

We contribute to this strand of the literature by providing empirical evidence for the heterogeneity in the effect of natural resources on political institutions and, more precisely, on the democracy level of oil-rich countries. As stated by Robinson, Torvik, and Verdier (2006: 451), "For every Venezuela and Nigeria, there is a Norway or a Botswana," thus, average effects presented in previous studies may hide substantial differences in the response of natural resources. Following Tsui (2011), we consider when oil discoveries reach the peak as an exogenous shock that may have heterogeneous effects on political regimes. The peak is defined as the point in time after which the rate of oilfield discoveries begins to decline.[3]

Our hypothesis is that, after the peak of oil discoveries, which indicates a potential decrease in resource endowment, incumbents may enforce higher entry barriers to exploit the remaining resources, thereby deteriorating the quality of political institutions. However, they may be constrained in pursuing this strategy by the existence of democratic institutions. Thus, countries that have a high level of democracy before the peak of oil discoveries may not be negatively affected by this event.

We find, indeed, that the relationship between oil discoveries and democracy is non-linear, and our insight is that it depends on the initial level of democracy itself. In countries like India and Colombia, which had reached high levels of democracy before experiencing the peak of oil discoveries, there are no significant changes after this event. All other countries, apart from Gabon where a period of political reforms took place after the peak of oil discoveries, were negatively affected by the variation in oil endowment. This effect is sizable, since, on average, the level of democracy in countries that experienced the peak of oil discoveries is 8% lower than the counterfactual outcome. Our findings are in line with the literature suggesting that the effect of natural resources depends on the quality of institutions (e.g., Mehlum, Moene, & Torvik, 2006; Robinson et al., 2006).

On the methodological side, we perform a data-driven analysis that compares the actual outcomes of each resource-rich country with the counterfactual in the absence of a natural resource shock, rather than calculate the average effect of natural resources across countries. More specifically, we apply the synthetic control method (SCM), developed by Abadie and Gardeazabal (2003) and extended in Abadie, Diamond, and Hainmueller (2010). The SCM has some notable advantages. First, it is ideally suited to investigate the heterogeneous response to rare events, which is the main objective of this paper. Moreover, with this method, we can trace the path of our outcome variable over time, thereby providing an evaluation of the dynamics of the effect after the shock. Then, it improves on other econometric methods for impact evaluation by controlling for both observed and time-varying unobserved effects. Finally, the SCM has the added advantage of transparency, since it explicitly shows the relative contribution of each country to estimate the counterfactual outcome, as well as rigor, given that the set of potential controls are appropriately restricted to make the underlying country comparisons more reasonable.

[3]As in Tsui (2011), we argue that the timing and size of oil discovery are possibly more exogenous than oil production or exports. Moreover, the peak of discoveries suffers less from endogeneity issues than the initial discovery of oil, as it depends more on geological factors than on exploration. Nevertheless, we tackle endogeneity concerns in section 4. Moreover, we test the effect of the first discovery in section 6.

The paper is organized as follows: section 2 reviews the literature on natural resources and political regimes; section 3 presents the methodology; in section 4 data and some tests on exogeneity are introduced. Section 5 shows the results, whereas robustness checks are presented in Section 6. Section 7 concludes.

2 | NATURAL RESOURCES AND POLITICAL REGIMES

The impact of oil wealth on democracies is ambiguous. A number of studies claim that oil has pro-democratic effects in democracies, because it makes governments more stable (reducing the likelihood of a transition to autocracy) or improves democracy scores (Brückner, Ciccone, & Tesei, 2012; Smith, 2004; Tsui, 2011). A second group of studies finds no evidence that oil helps to stabilize democratic regimes (e.g., Andersen & Aslaksen, 2013; Naghavi and Bjorvatn, 2011) or not promote dictatorship over the long run (Haber & Menaldo, 2011). In contrast, Crespo Cuaresma, Oberhofer, and Raschky (2011) show that oil increases the duration of dictatorships, enhancing their stability.

The most common argument linking more oil to less democracy is the rentier effect: an abundant flow of oil revenues enables incumbents to reduce taxes and/or increase patronage and public goods, making it possible for them to buy off a larger set of potential challengers and reduce dissent (Ross, 2001). Moreover, higher non-tax revenues allow autocrats to reduce taxation and attenuate demands for greater accountability that would emerge from the imposition of heavier taxes or reduced subsidies (Brautigam, Fjeldstad, & Moore, 2008). In the rentier model, resource wealth does not affect the preferences of rulers, but it does influence their ability to act on these preferences. Robinson et al. (2006) and Caselli and Cunningham (2009) claim that higher resources increase the value leaders place on remaining in office because resource rents make incumbency more valuable, inducing a ruler to invest more in regime-preserving activities.[4]

A more recent strand of the literature suggests that the effect of oil on democratic stability is conditional: it may stabilize democracies that are wealthy and have strong institutions but foster the breakdown of accountability in poorer democracies or ones with weaker institutions (e.g., Ross, 2012). According to Robinson et al. (2006), politicians tend to over-extract natural resources because they overly discount the future, thereby increasing resource misallocation in the economy. Countries with institutions that promote accountability and competence tend to benefit from resource booms, as these institutions reduce the perverse political incentives that such booms create. Thus, the quality of institutions determines whether countries avoid the resource curse (Mehlum et al., 2006). Taken together, these results conflict with Sachs and Warner's (1999) claim that institutions are irrelevant for the resource curse.

Empirical evidence for the political resource curse has focused mainly on the use of panel data, and the quality of institutions has often been proxied by corruption. The link goes from resource availability to corruption and rent-seeking via protection, exclusive licences to exploit and export resources given by the political elite to oligarchs in order to capture wealth and political power. Resource dependence is indeed strongly associated with a worse corruption perception index, which in turn is associated with lower growth (Mauro, 1995), and natural resource wealth stimulates corruption among bureaucrats and politicians (Ades & Di Tella, 1999). According to Bhattacharyya and Hodler (2010), natural resources induce corruption in countries that have been in a non-democratic regime

[4]Caselli and Michaels (2013) argue that the reason why oil windfalls translate into little improvement in the provision of public goods or the population's living standards lies on a combination of patronage/rent sharing and embezzlement by top municipal officials.

for more than 60 per cent of the years since 1956. Along the same lines, Collier and Hoeffler (2009) claim that high natural resource rents and open democratic systems slow growth in the absence of sufficient checks and balances.

A new line of empirical research involves quasi-experimental studies. Vicente (2010) compares changes in perceived corruption in São Tomé, which announced a significant oil discovery in 1997–1999, with those in Cape Verde, with no oil. The two locations have a similar history, culture, and political institutions. He finds that corruption increased by almost 10 per cent after the announcement of the oil discovery and decreased slightly thereafter. In a regression-discontinuity study not explicitly related to natural resources, Brollo et al. (2013) find that windfall government revenues in Brazilian municipalities increase corruption and strengthen incumbency, but adversely affect the quality of politicians.

As far as the variables related to natural resources are concerned, a limited number of papers uses oil discoveries rather than oil endowment or production (Arezki, Ramey, & Sheng, 2017; Cotet & Tsui, 2013; Lei & Michaels, 2014; Tsui, 2011).[5] Tsui (2011) argues that oil production, the typical measure of natural resource abundance, is noisy. Owing to geological constraints, the production rate is non-monotonic over the lifecycle of an oilfield; therefore, production is not a good indicator of the remaining reserves and oil wealth (the capital value of future oil rent, and hence a stock variable). Moreover, production understates the oil wealth of swing producers who produce below their capacity. Oil exploration involves high risks: with the current technology, the success rate of exploration is still below 50 per cent, and historically has been much lower (Cotet & Tsui, 2013). It is therefore plausible to treat oil discoveries as positive oil shocks, the timing and size of which are more exogenous than oil production. Furthermore, the size of the deposit, quality, and other cost-determining characteristics are exogenous.[6]

Using an empirical strategy based on an instrumental variables approach, Tsui (2011) finds that larger oil discoveries cause slower transitions to democracy; however, there is no such effect in democratic countries.[7] This is positively correlated with oil quality and negatively correlated with exploration and extraction costs. Cotet and Tsui (2013) and Lei and Michaels (2014) explore the impact of oil discoveries and civil conflicts, finding opposite results. While Cotet and Tsui (2013) find little robust evidence that oil discoveries increase the likelihood of political violence, but they increase military spending in non-democratic countries, Lei and Michaels (2014) show that giant oilfield discoveries increase the incidence of internal armed conflicts by about 5–8 percent within 4–8 years of discovery. Moreover, they show that, controlling for country and time fixed effects, the timing of giant oilfield discoveries is plausibly exogenous, at least in the short-medium run. Finally, Arezki et al. (2017) examine the effect of news about oil and gas discoveries on macroeconomic variables, finding that the current account and saving

[5]There are considerable differences between their approaches. First, Tsui (2011) and Cotet and Tsui (2013) includes only oil discoveries, whereas Lei and Michaels (2014), and Arezki et al. (2017) also include natural gas and condensate. Second, the first two papers aggregate reserves from all discoveries within a country in a given peak year (that marks the peak of oil discoveries), whereas the others use only the largest individual discovery. According to Lei and Michaels (2014), the correlation between their indicator for giant oilfield discoveries and the indicator used by Cotet and Tsui (2013) is around 0.55.

[6]In contrast, there is empirical evidence that bad political conditions lead to less oil exploration and production (Bohn & Deacon, 2000; Cust & Harding, 2014; Ross, 2012). Hence, oil levels tend to be biased downward in countries with less democracy and more conflict, reducing the risk of positive bias.

[7]For comparability, as in Tsui (2011),we consider the year of the peak of oil discoveries for our before-and-after comparison but we take a fundamentally different approach. His method produces average effects of oil discoveries on the level of democracy, whereas ours gives the effect in each treated country. Therefore, his approach is more general but conceals differences across countries. Our methodology returns the country-specific effect at the cost of concentrating on a few cases. The approaches are complementary.

rate decline for the first 5 years after the announcements of giant oil discoveries and then rise sharply during the ensuing years; investment rises soon after the news arrives, whereas GDP starts to increase 5 years after; and employment rates fall slightly and remain low for a sustained period.

Summarizing, the previous literature fails to derive clear-cut effects of natural resources on political regimes, mainly because of the difficulty in the identification of relevant measures and suitable counterfactuals. Thus, although the existing large number of studies concerning the resource curse, different empirical strategies are crucial. The next section presents our approach. To the best of our knowledge, only Mideksa (2013) and Smith (2015) apply the SCM in the analysis of the resource curse. However, both consider the impact of resource discoveries on GDP per capita and do not evaluate the political consequences of natural resource shocks.

3 | THE SYNTHETIC CONTROL APPROACH

The SCM provides quantitative inference in small-sample comparative studies by estimating the counterfactual situation of one or more aggregate entity in the absence of an event or intervention (Abadie & Gardeazabal, 2003; Abadie et al., 2010). The missing counterfactual outcome is given by the weighted outcome of all potential comparison units that best reproduces the characteristics of the case under examination (Abadie, Diamond, & Hainmueller, 2015). In our case, we compare the level of democracy in countries with a peak of oil discoveries with the weighted democracy level of countries where the peak of oil discoveries has not been reached but with similar pre-event characteristics.

To frame the SCM in the context of this study, assume that there is a balanced panel of $I + 1$ countries indexed by i and observed over T years. Among these, country $i = 1$ (treated unit) reaches the peak of oil discoveries at time $T_0 < T$; the remaining I countries are not affected by giant oil discoveries (donor pool). The effect of the event is given by:

$$\alpha_{1t} = Y_{1t} - Y_{1t}^N \tag{1}$$

where $t > T_0$, Y_{1_t} is the observed outcome of country $i = 1$ for a postevent period t, and Y_{1t}^N is the unobservable potential outcome of country $i = 1$, that is, the democracy level that would have been observed in the absence of the event. The SCM estimates Y_{1t}^N by defining a weighted average of the donor pool (synthetic control). The estimator of α_1 at time t is given by the difference between the outcome of the treated unit and the outcome of the synthetic control at that period:

$$\hat{\alpha}_{1t} = Y_{1t} - \sum_{i=2}^{I+1} w_i^* Y_{it} \tag{2}$$

The weights w_i^* are chosen such that the characteristics (*predictors*) of the treated unit are best reproduced by the characteristics of the synthetic control. More formally, let X_{1k} be the pre-event value of the kth democracy predictor for the treated unit, and let X_{0k} be a $(1 \times I)$ vector of the pre-event values of the same variable k^{th} for the units in the donor pool. Then, the vector $\boldsymbol{W}^*$ containing the weights assigned to each control unit is chosen in order to minimize the following sum:

$$\sum_{k=1}^{K} v_k \left(X_{1k} - X_{0k} W\right)^2 \tag{3}$$

subject to $w_i \geq 0$ and $\sum_{i=2}^{I} w_i = 1$ to prevent extrapolation outside the support of the data (Abadie et al., 2015). Here, v_k is a weight that reflects the predictive power of variable k. In the following analysis,

we choose the positive semidefinite and diagonal matrix $\boldsymbol{V}$ using the data-driven procedure implemented by Abadie and Gardeazabal (2003) and Abadie et al. (2010): $\boldsymbol{V}$ minimizes the mean squared prediction error (MSPE) of the outcome variable in the pre-event period. MSPE measures the expected squared distance between the outcome of the treated unit and the outcome of the synthetic control in the pre-event period.[8] Thus, the lower the MSPE, the more the synthetic control resembles the characteristic of the treated unit. To achieve lower MSPE, we implement the nested optimization procedure that searches all $\boldsymbol{V}$ matrices and sets of W weights for the best fitting convex combination of the units in the donor pool. Moreover, to ensure that the global minimum in the parameter space has been found, the nested optimization is run using three different starting points of $\boldsymbol{V}$: the regression-based V, the equal V weights, and a third procedure that uses the Stata maximum likelihood search. This procedure is implemented by the Stata module synth (Abadie, Diamond, & Hainmueller, 2011).

This data-driven procedure reduces discretion in the choice of the comparison units and has the advantage of transparency by making the relative contribution of each unit in the donor pool to the counterfactual outcome explicit. In addition, the SCM allows the unobserved variables affecting the outcome to change over time. Indeed, when there is a large number of pre-event periods, only those units that are similar in both observed and unobserved characteristics should produce similar paths for the outcome under scrutiny. Therefore, if the trajectories of the democracy level of the treated unit and the synthetic control are alike over numerous years prior to the peak in oil discoveries, a divergence in the outcome variable in the following years should be interpreted as produced by the peak itself.

These conclusions cannot be validated by the traditional modes of statistical inference because of the small-sample nature of the data. However, Abadie et al. (2010) provide an alternative model of inference defined as *placebo studies* based on the premise that the impact of the event under analysis would be undermined if an estimated effect of similar or greater magnitude were obtained in cases where the intervention did not take place. In particular, placebo studies apply the SCM to every country in the pool of potential controls. This aims to assess whether the estimated effect for the treated country is large compared to the effect in a country chosen at random. In this study, *in-space placebo tests* are used to compare the estimated treatment effect for each country that reaches the peak of oil discoveries with all the (fake) treatment effects of the control countries, obtained from experiments where each control country is assumed to be affected by the same event in the same year as the treated country. If the estimated effect in that country is larger than most of the effects obtained by the (fake) experiments, it can safely be concluded that the baseline results are not driven by chance. This means that if the path of the postevent level of democracy in our case studies falls well outside the distribution of placebo effects, we attribute that effect to the peak of oil discoveries.

4 | DEMOCRACY, PREDICTORS, AND EVENT PERIODS

We measure the level of democracy using the *polity2* indicator from the Polity IV dataset (Marshall, Gurr, & Jaggers, 2014), which provides a 21-point scale ranging from −10 (hereditary monarchy) to +10 (consolidated democracy). To scale down the variance, we transform the variable to lie between 0 and 1, with one corresponding to the highest level of democracy.

The set of predictors includes factors the literature identifies as determinants of democracy. We take into account the relationship between political regimes and economic factors including the log of

[8] $\text{MSPE} = \frac{1}{T_0} \sum_{t<T_0} \left(Y_{1t} - \sum_{i=2}^{I+1} w_i^* Y_{it} \right)^2$.

TABLE 1 Variable definitions, sources, and descriptive statistics

Variable	Description	Source	Mean	*SD*	Min.	Max.
Democracy	Transformed revised combined Polity IV score (*Polity2*) ranging from 0 (hereditary monarchy) to 1 (consolidated democracy)	Polity IV Project, Center for Systemic Peace (Marshall et al., 2014)	0.560	0.359	0	1
Gdp	Log $RGDP^e$ per capita (at chained purchasing power parity in million, 2005 USD prices)	Penn World Table 8.1 (Feenstra, Inklaar, & Timmer, 2015)	8.055	1.160	5.219	11.325
Human capital	Index of human capital per person, based on years of schooling (Barro & Lee, 2013) and returns to education (Psacharopoulos 1994)	Penn World Table 8.1 (Feenstra et al., 2015)	2.007	0.627	1.018	3.535
Total rents	Total natural resources rents (percentage of GDP)	World Development Indicators (World Bank 2015)	6.637	10.277	0	83.432
Mining	Value added by sectors of economic activity, annual, 1970–2013: mining and utilities (percentage of GDP)	United Nations Conference on Trade and Development (UNCTAD)	6.607	8.547	0	72.123
Manufacturing	Value added by sectors of economic activity, annual, 1970–2013: manufacturing (percentage of GDP)	UNCTAD (2015)	15.666	7.534	0.032	50.180
Primary	Value added by kind of economic activity, annual, 1970–2013: agriculture, hunting, forestry, fishing (percentage of GDP)	UNCTAD (2015)	21.050	15.869	0.034	80.510
Openness	Sum of import and exports over GDP (at constant national 2005 prices)	Penn World Table 8.1 (Feenstra et al., 2015)	0.691	0.482	0.039	4.605
Hostility	Hostility level of interstate dispute ranging from 0 (no dispute) to 5 (war)	Palmer, D'Orazio, Kenwick, and Lane (2015)	0.853	1.591	0	5

Abbreviations: GDP, gross domestic product; max., maximum; min., minimum; SD, standard deviation.

TABLE 2 Peak of oil discoveries: Case studies

Country	Peak of oil discoveries
Brazil	1975
Cameroon	1977
Chad	1977
Colombia	1992
Republic of Congo	1984
Gabon	1985
India	1974
Kazakhstan	2000
Malaysia	1973
Mexico	1977
Pakistan	1983
Sudan	1980
Thailand	1981
Tunisia	1971
Viet Nam	1975

Source: Campbell (2006).

GDP per capita (*Gdp*). We also include a set of additional variables related to economic development that may predict a country's democratic level (see Acemoglu & Robinson, 2006; Barro, 1999; Lipset, 1959): the index of human capital (*Human capital*); the sum of imports and exports over GDP (*Openness*); and the value added by the mining,[9] manufacturing, and primary sectors as a percentage of GDP (*Mining*, *Manufacturing*, *Primary*). In addition, we consider the hostility level of interstate disputes (*Hostility*), and the total amount of natural resource rents as a percentage of GDP (*Total rents*), to control for the possible effects of both conflicts and natural resource rents. Finally, we include the average level of democracy calculated in the 10 years preceding the event under scrutiny, to capture the quality of pre-existing institutions. Table 1 provides variable definitions, sources, and descriptive statistics.

Following Tsui (2011), we identify the year of the event exploiting the oil production and depletion dataset collected by Campbell (2006). This dataset contains information on the peak year of oil discoveries for the top 65 oil-producing countries. We consider that year as the period in which the event under scrutiny takes place.[10]

The predictors are averaged over a 10-year pre-event period, and the path of the outcome variable is analyzed until 2014.[11] Owing to data availability, we restrict our analysis to developing countries

[9]The value added by the mining sector is obtained subtracting manufacturing from the variable "*mining, manufacturing, utilities*" taken from the UNCTAD (United Nations Conference on Trade and Development) database. The noise of utilities in the measurement of the mining sector is small (Caruso, Costa, & Ricciuti, 2014).

[10]See Tsui (2011) for more information on how this dataset is compiled.

[11]We also considered longer pretreatment period (results available upon request). However, since the SCM requires no missing values in the outcome variable for the entire period of analysis, in some cases, the control group shrank so much that the loss in the goodness of pretreatment fit was too high to consider the comparison unit credible.

TABLE 3 Peak of oil discoveries and democracy predictors in 1970

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Democracy	0.006 (0.006)									0.006 (0.009)
Gdp		−0.030 (0.033)								0.117 (0.100)
Human capital			−0.150*** (0.056)							−0.300* (0.170)
Total rents				0.001 (0.006)						−0.009 (0.008)
Mining					0.000 (0.006)					0.001 (0.011)
Manufacturing						−0.002 (0.003)				−0.005 (0.008)
Primary							0.000 (0.002)			−0.004 (0.004)
Openness								−0.153* (0.078)		−0.210* (0.110)
Hostility									0.030 (0.027)	0.016 (0.032)

Note. The dependent variable is an indicator equal to 1 if the country has reached the peak of oil discoveries since 1970, and 0 otherwise. Covariates are measured in 1970. Robust standard errors are in parentheses.

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.

TABLE 4 Predictor balance and root mean squared prediction error (RMSPE)

	Brazil		Cameroon		Chad		Colombia		Republic of Congo	
	Treated	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**
Gdp	8.049	8.4944	7.177	7.1417	7.2651	7.2508	8.7313	9.1897	7.5368	7.5828
Human capital	1.4232	1.592	1.3113	1.3849	—	—	2.0165	2.1459	1.6676	1.4588
Total rents	3.0323	2.6249	4.0558	6.277	4.7574	4.7467	6.5952	1.3456	39.6464	21.1361
Mining	2.8171	4.8668	1.1772	1.1801	0.9221	0.9211	6.2837	4.9589	28.3415	19.2806
Manufacturing	29.2517	19.2786	14.7077	11.0342	12.3125	12.2889	18.1265	21.1753	9.006	9.8087
Primary	11.8768	25.9848	28.2898	44.3704	41.9175	41.8273	12.5547	7.5967	13.4641	16.3336
Openness	0.1084	0.2797	0.2701	0.2741	0.4984	0.4972	0.2025	0.2305	1.1114	1.1249
Hostility	0.4	3.0722	0.4	0.406	0.2	0.1984	1.2	1.2468	0.5	0.4995
Average prediscovery democracy	0.075	0.0759	0.125	0.1275	0.07	0.0728	0.905	0.9045	0.125	0.1255
RMSPE		0.001		0.0075		0.0336		0.0011		0.0149
Control group	Central African Republic (0.01), Democratic Republic of the Congo (0.153), Morocco (0.004), Portugal (0.833)		Benin (0.075), Nepal (0.368), Niger (0.049), Paraguay (0.301), Tanzania (0.156), Uruguay (0.051)		Bhutan (0.286), Ethiopia (0.007), Honduras (0.027), Malawi (0.169), Nepal (0.052), Paraguay (0.434), Portugal (0.023)		Nepal (0.007), Spain (0.884), Tanzania (0.048), Zambia (0.061)		Jordan (0.228), Liberia (0.669), Zambia (0.103)	

	Gabon		India		Kazakhstan		Malaysia		Mexico	
	Treated	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**
Gdp	9.2529	7.8397	7.0555	8.7746	8.7516	8.707	7.9092	7.9928	8.9048	8.0596
Human capital	1.5916	1.6271	1.2235	2.1355	2.7086	2.0678	1.6552	1.6977	1.6539	1.9875
Total rents	47.6473	12.6541	2.3167	2.2687	17.9386	9.3868	6.4202	6.4113	3.4808	3.4726
Mining	41.641	6.9815	2.1177	2.1686	12.411	2.1159	9.6815	9.9612	8.5099	8.4699
Manufacturing	6.0786	15.457	14.2285	26.663	11.9252	16.1891	14.6137	14.594	19.2236	22.4987
Primary	5.053	27.869	42.9452	13.2967	13.4158	21.0815	28.4807	15.8504	10.6091	23.6367
Openness	1.0162	1.3205	0.1135	0.2515	1.2174	1.9479	0.6859	0.5896	0.1206	0.21883

(Continues)

TABLE 4 (Continued)

	Gabon		India		Kazakhstan		Malaysia		Mexico	
	Treated	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**
Hostility	0.1	0.1008	4	0.3451	0.7777	0.1145	1.5	0.8885	0	0.5021
Average prediscovery democracy	0.05	0.0508	0.95	0.9499	0.3222	0.3222	0.85	0.8343	0.2	0.1995
RMSPE		0.0006		0.0005		0.0248		0.1645		0.0002
Control group	Mauritania (0.336), Singapore (0.001), Swaziland (0.664)		Costa Rica (0.429), Japan (0.517), Lao People's Democratic Republic (0.001), Nepal (0.051), Zambia (0.002)		Lao People's Democratic Republic (0.349), Liberia (0.095), Singapore (0.556)		Israel (0.005), Jamaica (0.609), Lao People's Democratic Republic (0.086), Philippines (0.178), Sierra Leone (0.123)		Democratic Republic of the Congo (0.067), Japan (0.083), Nepal (0.142), Poland (0.57), Togo (0.137)	
	Pakistan		**Sudan**		**Thailand**		**Tunisia**		**Viet Nam**	
	Treated	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**	**Treated**	**Synthetic**
Gdp	7.3419	7.0605	7.1523	7.239	7.784	8.2835	7.4187	7.4901	6.5455	7.5239
Human capital	1.3101	1.3536	1.1379	1.476	1.7059	1.7612	1.1994	1.417	1.7396	1.7476
Total rents	4.1942	1.9878	0.0002	2.0067	2.3062	2.5975	3.1603	3.2955	0	1.698
Mining	4.0955	4.5353	1.8927	2.1652	2.6695	6.4074	5.5189	1.9883	3.9516	5.9412
Manufacturing	10.4274	9.9514	8.8614	10.9812	19.7104	18.2913	8.7454	10.5516	16.0724	15.7245
Primary	34.4018	33.7556	38.163	38.1514	25.3727	15.7911	15.2158	28.2242	42.6285	34.6056
Openness	0.3474	0.3627	0.1021	0.482	0.4776	0.45991	0.6536	0.4287	0.6227	0.5732
Hostility	2.1	2.0756	1.5	1.5302	3.9	3.4765	0.7	2.2609	5	1.3198
Average prediscovery democracy	0.45	0.4424	0.175	0.1777	0.435	0.4314	0.055	0.0565	0.13	0.1355
RMSPE		0.3453		0.0466		0.1992		0.0142		0.0243
Control group	Bangladesh (0.093), Gambia (0.214), Lao People's Democratic Republic (0.402), Mali (0.068), Morocco (0.027), Zimbabwe (0.197)		Greece (0.014), Jordan (0.126), Mali (0.385), Tanzania (0.267), Uruguay (0.208)		Israel (0.382), Morocco (0.583), Zimbabwe (0.034)		Jordan (0.485), Mongolia (0.034), Nepal (0.257), Paraguay (0.224)		Bulgaria (0.355), Jordan (0.143), Malawi (0.035), Mali (0.297), Portugal (0.119), Singapore (0.05)	

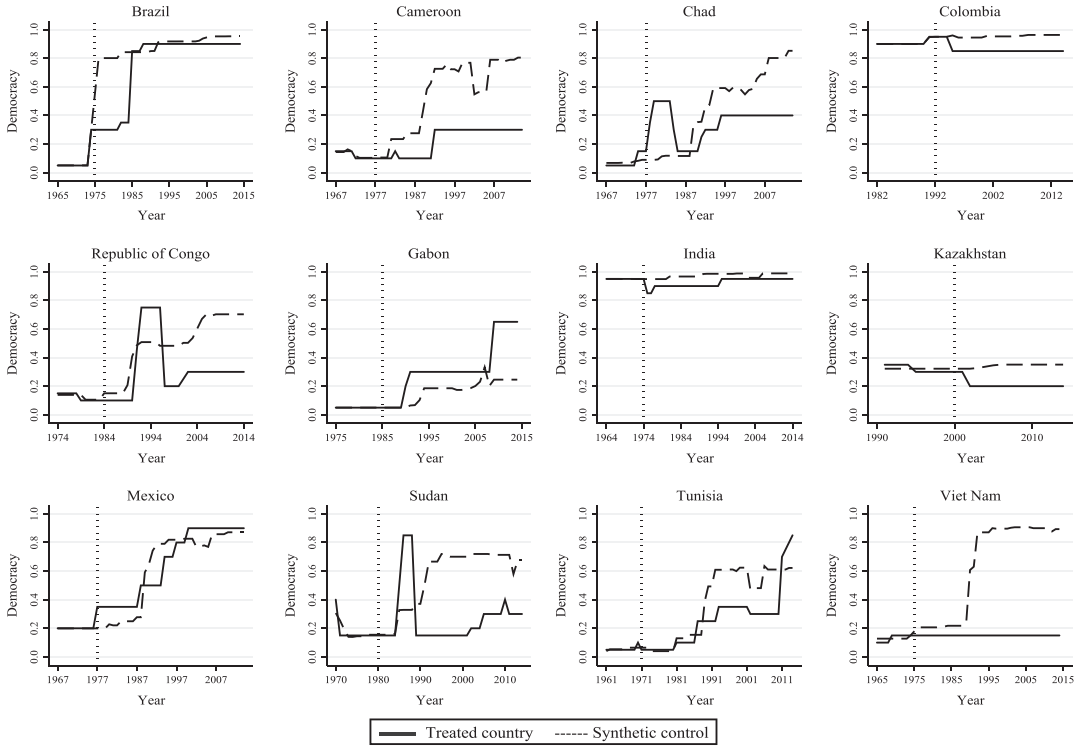


FIGURE 1 Path of democracy: Treated countries versus Synthetic controls

affected by the peak in the 1970s or later.[12] Table 2 shows the countries analyzed and the year in which they reached the peak of oil discoveries, whereas Table A1 in Appendix S1 lists those countries that are excluded. For each treated unit, the donor pool encompasses all the countries not affected by the event for which data are available.

One of the key assumptions in the SCM is that the event is exogenous and, thus, its effects are not anticipated. We test the validity of this assumption by checking whether the characteristics that predict the democracy level are also able to predict the peak of oil discoveries through cross-sectional linear regressions.[13] The dependent variable is equal to 1 if the country reached the peak of oil discoveries after 1970, and 0 otherwise. Predictors are measured at 1970. Table 3 shows the results. All the predictors are insignificant except for human capital and openness, whose coefficients are both negative and significant at the 1 and 10 percent level, respectively. These results may be driven by a non-linear relationship between oil discoveries and these variables. Indeed, when we add a squared of them, all the coefficients in the multivariate regression become insignificant.[14] Another possible explanation is that our sample does not include developed countries (such as the UK and Norway) rich in oil and with

[12]Angola, United Arab Emirates, Uzbekistan, and Yemen are excluded because of the lack of pre-event data. Moreover, data on *total rents*, *mining*, *manufacturing*, and *primary* are available from 1970. Hence, the time span over which they are averaged is different from the 10-year pre-event period for those countries that reached the peak in the 1970s: Brazil, Cameroon, Chad, India, Malaysia, Mexico, Tunisia, and Vietnam.

[13]Smith (2015) uses linear regressions to show that oil discoveries do not depend on the initial characteristics that may affect future growth.

[14]Results are available upon request.

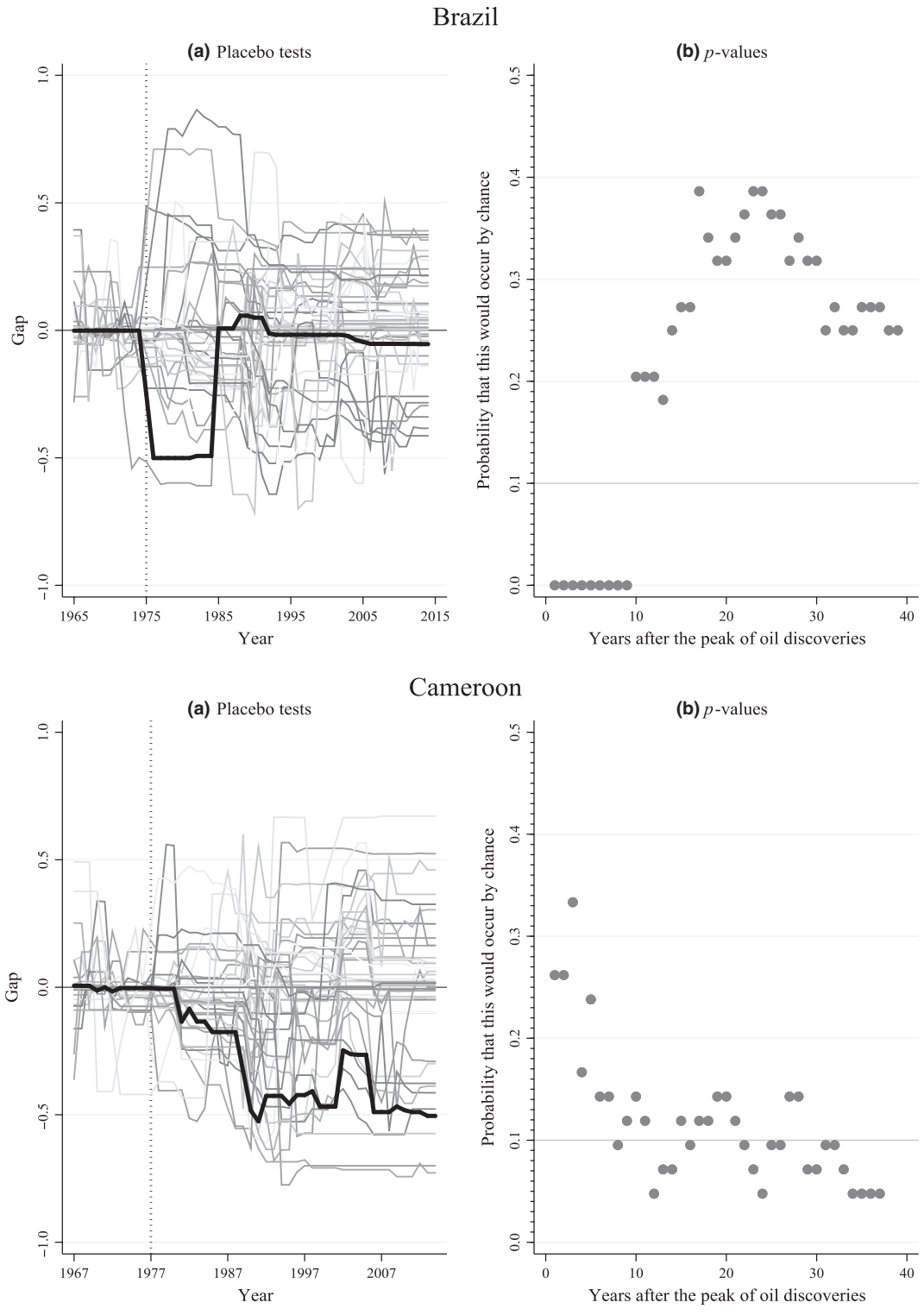


FIGURE 2 Placebo tests and *p*-values

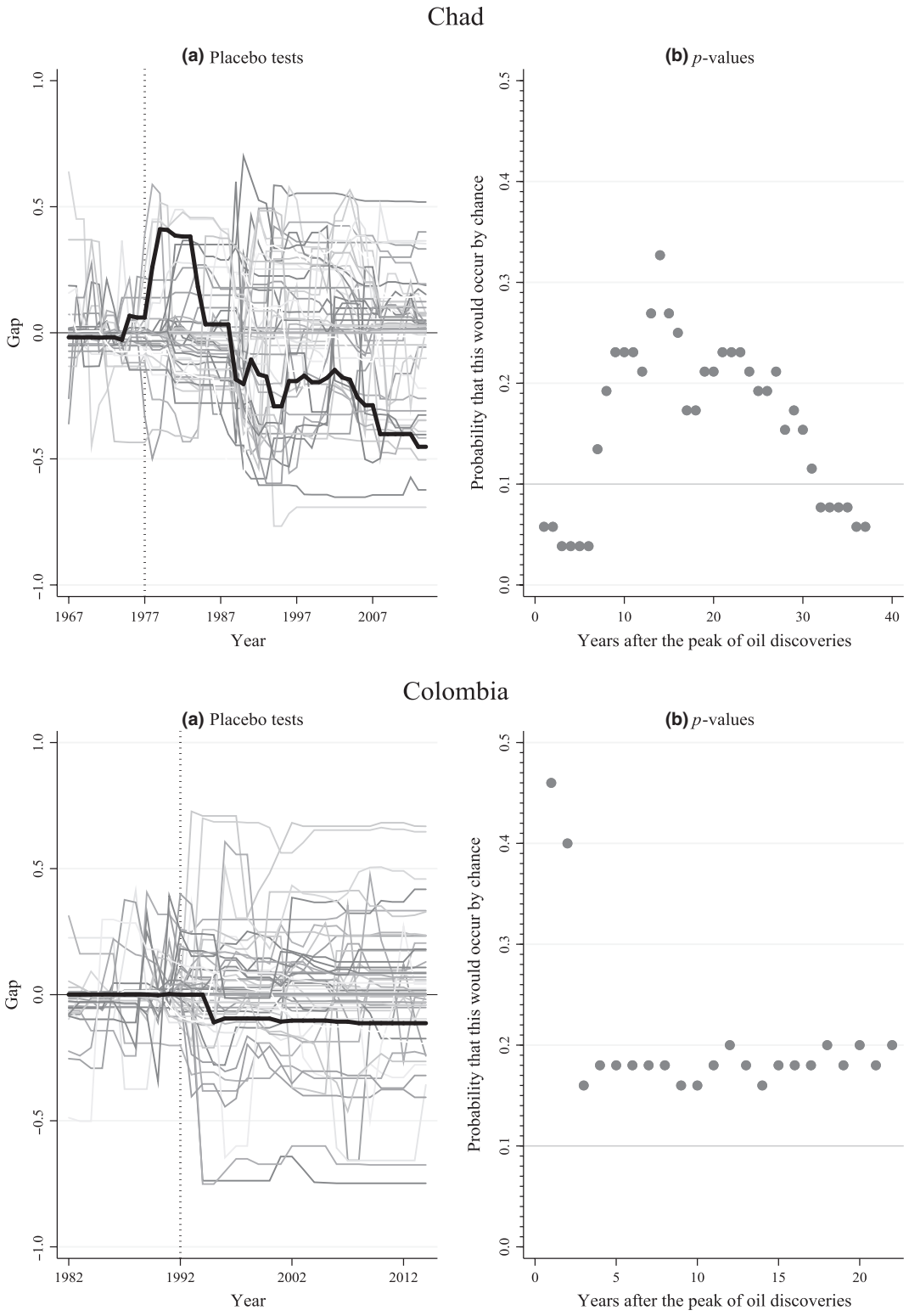
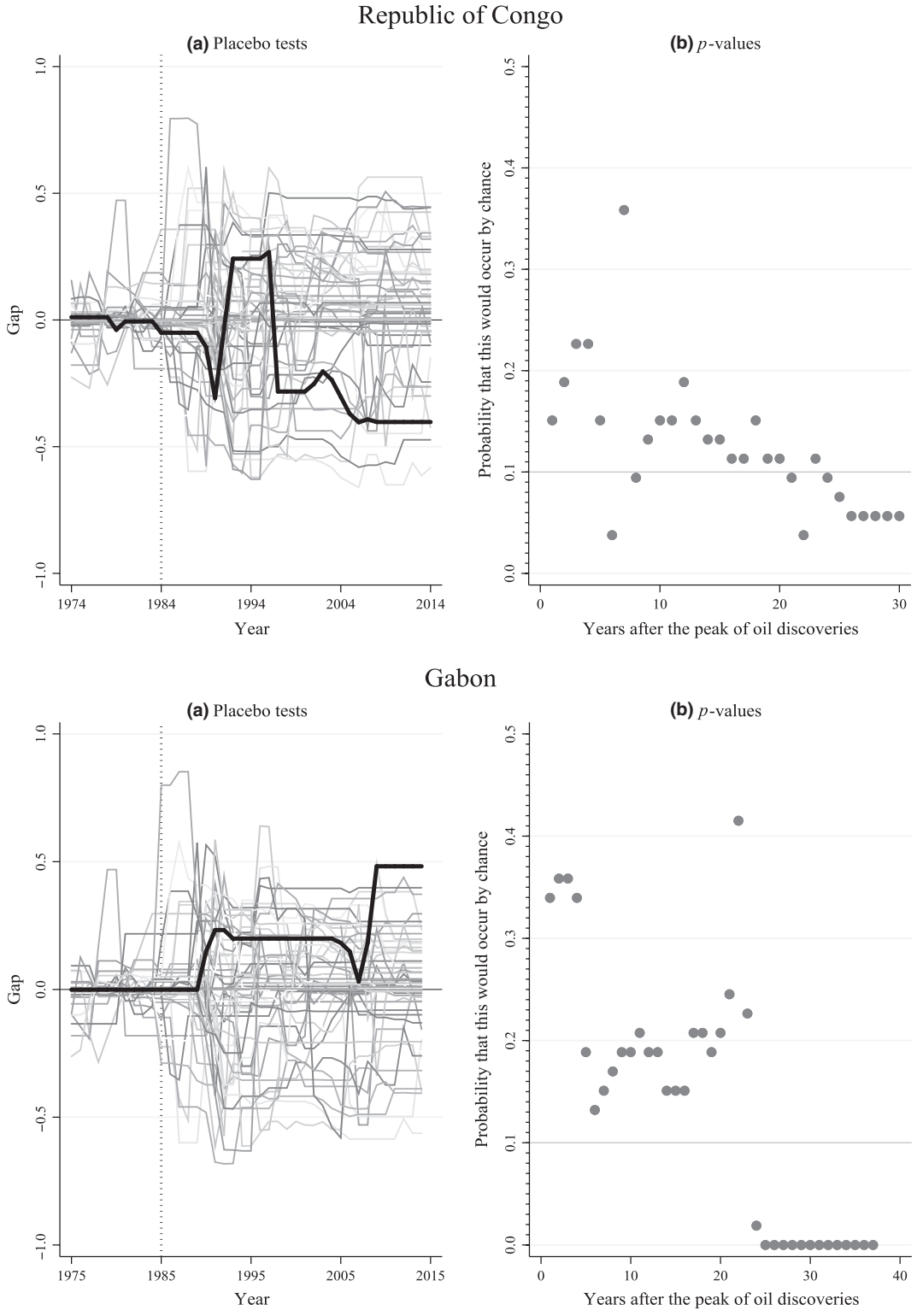


FIGURE 2 (Continued)



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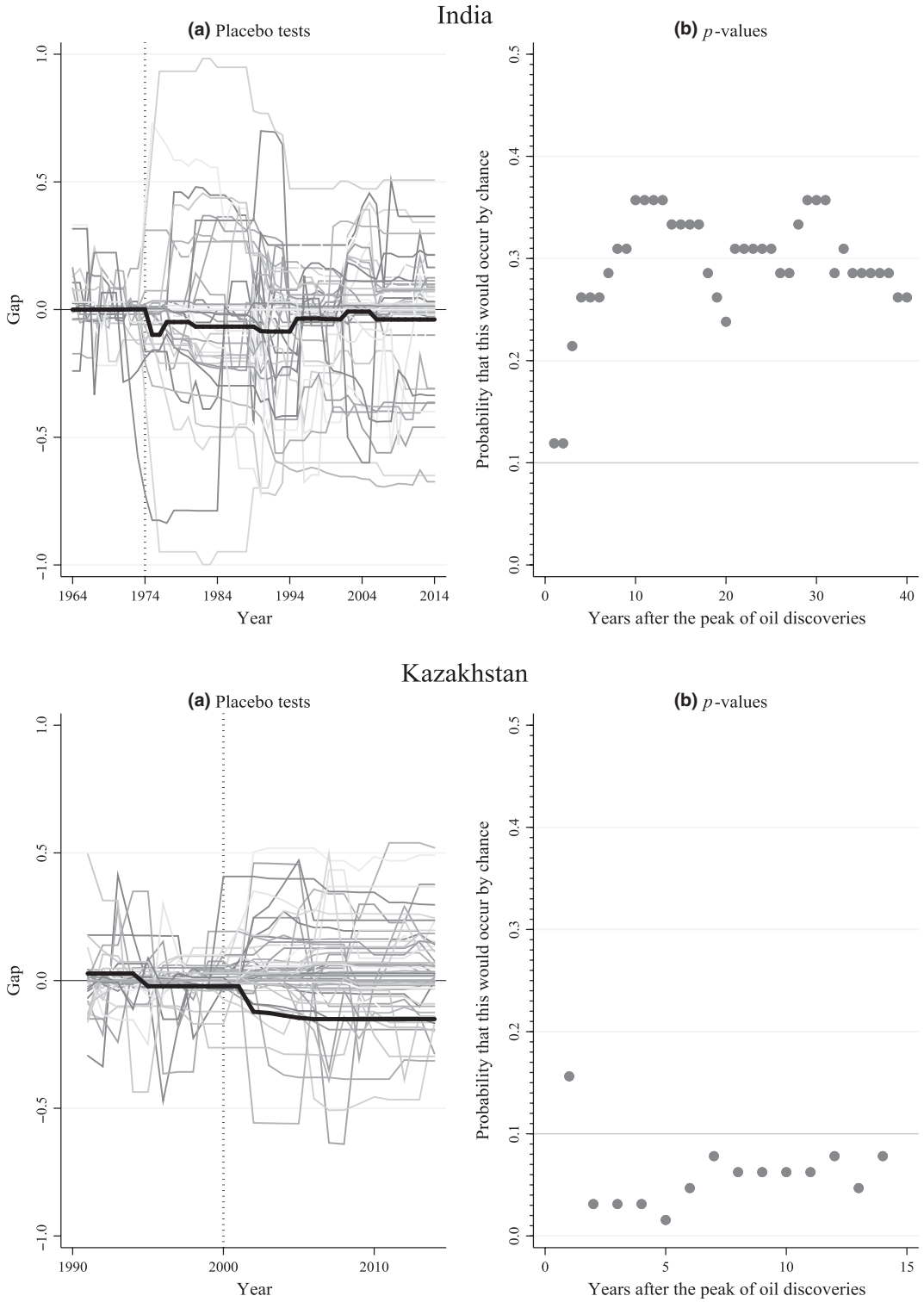

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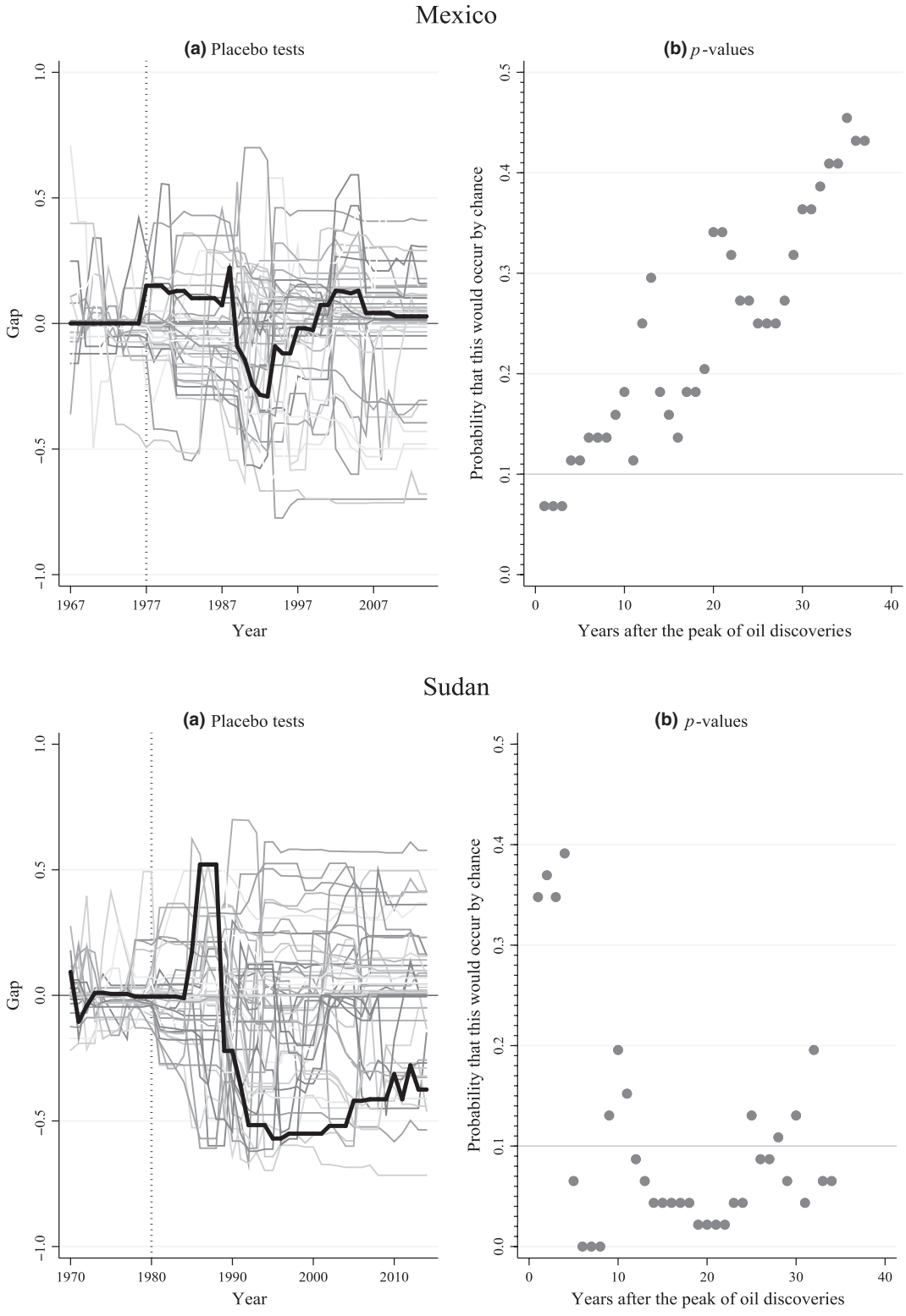

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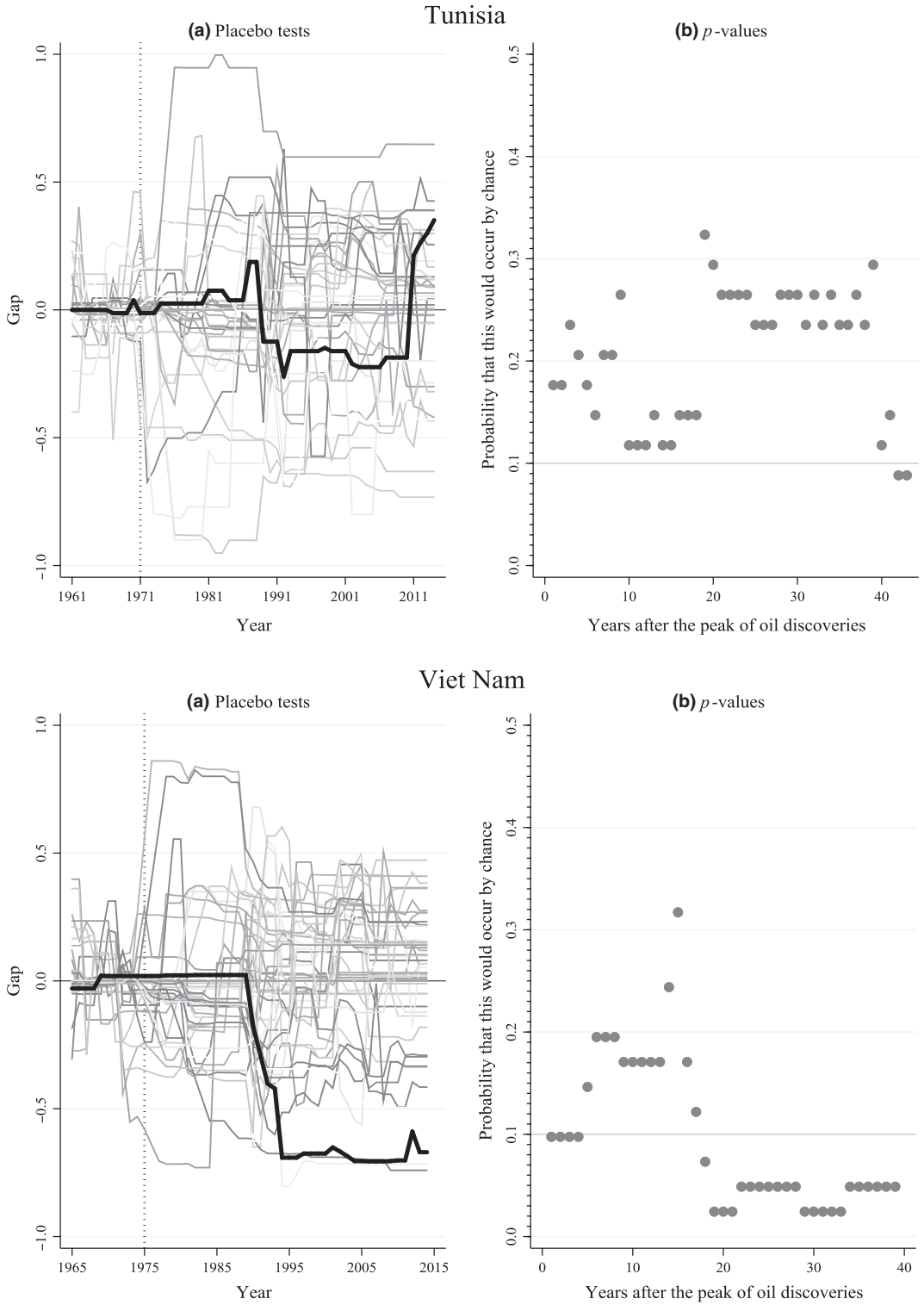

FIGURE 2 (Continued)

a high level of human capital. Nevertheless, this does not invalidate our analysis since the SCM enables countries that have pre-event characteristics dissimilar to the treated unit to be discarded. Moreover, even if the effects of the peak are anticipated, the SCM estimates a lower-bound of the true effect, given that part of it arises before the event, and provided that the synthetic and the actual outcome have the same pretreatment trend.

5 | RESULTS

As highlighted in the previous sections, the credibility of the SCM hinges on its ability to match the pre-event outcome of the treated country with that of the synthetic control. Table 4 reports, for each case study, the predictor balance, the root mean squared prediction error (RMSPE), and the weights assigned to the countries included in the synthetic control. Table A2 in Appendix S1 shows the pool of potential controls, for each treated country. The low values of the RMSPE confirm the strengths of the synthetic control estimator. However, the RMSPE is higher than 0.10 for Malaysia, Pakistan, and Thailand. Because such a magnitude is deemed too high for a good fit between the path of the outcome variable of the treated unit and its synthetic control, these countries are discarded in the following discussion. Graphs are provided in Figure A1 in Appendix S1.

Figure 1 provides a graphic illustration of the results by displaying the trajectories of the democracy level in each country and their synthetic counterparts, and Figure A2 in Appendix S1 shows the gap between the two.

The main finding is that the achievement of the peak of oil discoveries has heterogeneous effects on countries. Most of the case studies present a negative outcome gap in the long run. In particular, the level of democracy of Cameroon is slightly lower than the synthetic control after the peak of oil discoveries. This negative outcome gap increases considerably 5 years after the event.

The level of democracy in Chad jumps after the peak. However, this is because a civil war started in 1979, 2 years after the peak, ending in 1982, and classified with 0 by the Polity score (0.5 according to our transformed index). After this period, the country always presents a level of democracy lower than the synthetic control.[15] The democracy scores of the Republic of Congo and Sudan are slightly lower than those of their synthetic controls corresponding with the peak, but are higher for a short period after the event (five and 4 years, respectively). Nevertheless, in the long run, in both countries the level of democracy is lower than what would have been the case if no peak of oil discoveries had occurred. Viet Nam's democracy score is constant during the postevent period, where its counterfactual would have moved towards democracy. Kazakhstan has a negative outcome gap in the pre-event period, increasing 2 years after the event, albeit with a low magnitude.

For all these countries, the placebo tests and the implied *p*-values presented in Figure 2 confirm a significant negative effect of oil discoveries on democracy in the decades following the event. In contrast, oil discoveries affect the level of democracy in Brazil only in the short run. Indeed, after a drop in the level of democracy compared to the synthetic control, Brazil caught up with its counterpart. Figure 2 proves that the (negative) effect of the peak of oil discoveries is highly significant up to 10 years after the event.

[15]Postindependence Chad was plagued by geographical (north vs. south), ethnic (Sara vs. other ethnic groups) and religious (Muslims vs. non-Muslims) divides, which brought about two civil wars (1965–1979 and 1979–1982) and a string of coups. These conflicts pre-existed the oil discoveries that took place in the South in 1974 and 1977. While in principle we cannot exclude that they exacerbated the existing rivalries, none of the historical literature of we are aware mentioned it as a cause of conflict (Azevedo, 1998; Collins & Burns, 2013; Decalo, 1980; Thompson & Adloff, 1981).

Mexico and Tunisia do not show clear paths. In both, the peak of oil discoveries seems to halt the improvement in democracy that started on the eve of the event. However, the outcome gap is never significant, but in Mexico for 3 years after the peak.

In Colombia and India no effects can be devised. Indeed, although the average effect is negative, their postevent levels of democracy do not fall well outside the distribution of placebo effects. That is, the probability that the detected differences between these countries and their synthetic counterparts would occur by chance is higher than the traditional level of significance, confirming that the peak of oil discoveries has no effect on democracy in India and Colombia. Interestingly, these were the only two countries with a high level of democracy in the pre-event period (>0.9).

Finally, one striking case is Gabon, the only country in which the peak of oil discoveries would seem to have had a positive effect on democracy. However, this is misleading because, after the event under scrutiny, the political institutions of the country were impacted by another shock in the form of violent demonstrations and strikes in the 1990s, leading to political reforms including the transformation of the political system to a multiparty democracy (Collins & Burns, 2013). These events are not captured by the synthetic control, which resembles the characteristics of the treated unit only in the absence of further permanent shocks in the outcome.[16]

Table 5 reports the average *polity2* scores and the value of the counterfactual in the same standard 21-point scale. In the absence of the peak of oil discovery, Cameroon would have been categorized as a democracy with a polity score of six rather than an anocracy (−4 in the Polity dataset). The Republic of Congo and Sudan show a similar strong difference at the end of the period under analysis (7 and 8 points of the *polity2* scale, respectively), and would have obtained democratic characteristics achieving a score between five and six in the Polity scale. In a similar fashion Viet Nam, which does not show any change in its Polity level, would have improved over time, ending up in the democratic group. The pattern of Tunisia would have been similar, starting from a lower level, and ending as an anocracy. In contrast, Kazakhstan would not have democratized even in the absence of the peak of oil discoveries reaching a *polity2* score of −3.

Gabon has a score below 0 for most of the postpeak period, but it presents a positive difference with its counterpart in all the considered periods, with a maximum after 10 years from the peak, when its level of democracy is 200% higher than that of the synthetic. However, as already mentioned, this result is mainly driven by the changes in Gabon's constitution and cannot be ascribed to the variation in oil endowment. Chad, whose democracy score is 370% higher than its counterpart 5 years after the peak because of the codification of the polity score during civil wars, has been negatively affected in the long run, with a magnitude that ranges from 30% to 40%. Nevertheless, the country would have classified at most as an open anocracy in the absence of the peak of oil discoveries, thus this event did not make much difference for the political situation of the country.

After a 10-point drop of Brazil's democracy level, the country caught up with its counterpart 10 years after the peak of oil discoveries. This is a nearly unique pattern, similar only to Mexico, in which the negative effect is concentrated at the beginning of the period and vanishes over time. However, in most cases, the negative effect grows as time goes by.

[16]Following violent demonstrations and strikes by students and workers, President Bongo organized a conference with opposition groups in April 1990 that led to the creation of a Senate, decentralization of the budgetary process, freedom of assembly and press, and cancelation of the exit visa requirement. A transitional government including representatives of opposition parties was set up. A provisional constitution providing a basic bill of rights and an independent judiciary but retained strong executive powers for the president came into force in March 1991. During this process, in September 1990 two coup attempts were uncovered and aborted. In September–October 1990 the first multiparty National Assembly elections in almost 30 years took place, with the President's party obtaining a large majority. Following President Bongo's re-election in December 1993, opposition candidates refused to validate the election results, and after civil disturbances, an agreement was signed by the government and opposition factions to work toward a further political settlement, the Paris Accords of November 1994 (Mikhailitchenko, 2005).

TABLE 5 Average level of polity2 and counterfactual scores after the peak of oil discoveries

Country	t_5	t_{10}	t_{15}	t_{20}	t_{25}	t_{30}
Brazil	−4	−1.2	7.6	8	8	8
Synthetic Brazil	6.0172	6.6844	6.8816	8.0624	8.354	8.5648
Cameroon	−7.8	−8	−7.2	−4	−4	−4
Synthetic Cameroon	−6.8506	−4.8154	0.558	4.619	5.062	3.0846
Chad	−0.6	−5	−6	−3.2	−2	−2
Synthetic Chad	−7.9842	−7.6558	−3.4996	1.3578	1.69725	2.777
Colombia	7.8	7	7	7	7	—
Synthetic Colombia	8.9942	8.9744	9.0886	9.261	9.261	—
Republic of Congo	−8	1.2	−1.6	−4.6	−4	−4
Synthetic Congo	−6.765	−0.3294	−0.25	0.5118	3.84325	4.051
Gabon	−8.4	−4	−4	−4	−2.25	3
Synthetic Gabon	−8.984	−8.2496	−7.984	−7.9168	−6.472	−6.64
India	7.6	8	8	8	9	9
Synthetic India	8.976	9.2616	9.333	9.714	9.7125	9.4002
Kazakhstan	−5.6	−6	−6	—	—	—
Synthetic Kazakhstan	−3.384	−2.985	−2.985	—	—	—
Mexico	−3	−3	0	3.6	7	8
Synthetic Mexico	−5.7264	−4.902	2.1622	6.158	6.4925	6.1524
Sudan	−5.6	1.4	−7	−7	−6.25	−3.6
Synthetic Sudan	−6.185	−3.0838	2.8988	4.088	4.29975	4.2952
Tunisia	−9	−8.8	−8	−5	−3.5	−3
Synthetic Tunisia	−8.999	−8.8332	−7.103	−3.268	2.189	2.3324
Viet Nam	−7	−7	−7	−7	−7	−7
Synthetic Viet Nam	−5.348	−5.1956	−3.735	5.142	5.70025	6.1836

Note. Dashes (—) indicate no estimation is available.

Colombia and India share another distinctive pattern since they consistently score as democracies, but the former deteriorates, and the difference with the counterfactual grows over time, whereas the latter has a small U-shaped pattern in *polity2* with a counterfactual with a higher value starting from t_5. Nevertheless, in both cases the magnitude of the negative gaps is small and, as already stated, the placebo tests suggest that the difference between the actual and the synthetic outcome is not significant.

To sum up, countries that reached the peak of oil discoveries with a relatively high level of democracy are not affected by the decline in democracy itself, whereas existing autocratic regimes are strengthened. This is in line with some of the testable hypotheses derived by Caselli and Tesei (2016).

6 | ROBUSTNESS CHECKS

This section includes some robustness checks to test the sensitivity of our main results to changes, first, in the measurement of the democracy level, second, in the composition of the control group, and, finally, in the event under scrutiny.

First, we implement the SCM using the Polyarchy dataset compiled by Vanhanen (2014). This dataset provides an index of democracy given by the combination of its two most important dimensions: the degree of competition (competition) and the degree of participation (participation). The former is measured by the smaller parties' share of votes in parliamentary or presidential elections, and the latter is measured by the percentage of the population that voted in those elections. The combined index of democracy (democracy) is obtained by multiplying the two indicators and dividing the product by 100 (Vanhanen, 2000). We estimate the synthetic control using these three variables as outcomes. For each indicator, Table 6 sets out the differences between the actual scores and their counterfactuals calculated every 5 years after the peak of oil discoveries, whereas graphs and placebo tests are available upon request.

The trends in outcome gaps show that the results of the previous analysis are robust. In particular, the path of democracy gap almost perfectly replicates the path given by *polity2*.[17] This is not true of Kazakhstan, where the average effect is positive until 10 years after the peak of oil discoveries. However, this discrepancy could be explained by the fact that the synthetic control does not replicate the country in the pre-event period. Indeed, the RMSPE is equal to 2.107 for *democracy*. Colombia seems to have a significant, negative outcome gap, but only 14 years after the event. In addition, in this case, the RMSPE is high. This difference vanishes considering *participation* for which the RMSPE is lower.[18] Another exception is Mexico for which the effect of oil discoveries is negative and significant for both *democracy* and *competition*. The negative gap starts to decrease 5 years after the peak. Overall, the peak of oil discoveries, at the very least, delayed democratization in Mexico.

Second, we evaluate to what extent our results are driven by any particular control country. Following Abadie et al. (2015), we iteratively re-estimate the baseline model to construct the synthetic outcomes omitting in each iteration one of the countries that received a positive weight (leave-one-out synthetic control). As shown in Figure 3, this sensitivity test confirms that the results presented in the previous section are fairly robust to changes in the composition of the control group, although there are a few remarkable exceptions.[19] One of these is Brazil for which we obtain a shorter negative effect, when the Democratic Republic of Congo is excluded, or even a positive effect when Portugal is excluded. Omitting one of Mauritania, Singapore, or Swaziland from the control group, the level of democracy of Gabon would have been lower than that of the synthetic control, despite its political reforms. On the contrary, Mexico's outcome would have been usually above that of the synthetic control excluding the Democratic Republic of Congo. Finally, the (negative) effect on democracy in Tunisia would have been much higher if Jordan was not in the control group.

Finally, we assume that the countries in our sample are treated in the year of the first oil field discovery. As we state in the introduction, our intuition is that, after the peak of oil discoveries, incumbents may weaken political institutions in order to grab oil resources which are potentially decreasing. However, political actors may start reducing the level of democracy right after the first oil discovery, which constitutes news about future wealth increases. To check this hypothesis, we re-estimate the synthetic control considering the year of the first giant oil discovery as the start of the treatment period. Following Arezki et al. (2017), we use data from Horn (2014). Owing to data availability, we manage to conduct this exercise for six countries only, as shown in Figure 4. In Brazil, the level of

[17]The same cannot be said of participation. However, a low value of the root mean squared prediction error (RMSPE) was not obtained in most cases, as proven by the difference between the treated units and the synthetic controls at t_0.

[18]RMSPE is 1.001 for democracy, 5.287 for competition, and 0.395 for participation.

[19]It is worth saying that the leave-one-out procedure entails a lower fit between the treated and the synthetic unit in the pre-event period. Thus, the divergence from baseline results may be explained by the reduced ability of the algorithm to match the pre-event outcome of our case studies.

TABLE 6 Average differences between actual and synthetic Vanhanen's democracy indicators

Country indicator	t_0	t_5	t_{10}	t_{15}	t_{20}	t_{25}	t_{30}
Brazil							
Democracy	0.000	−13.411	−14.853	−5.648	0.372	0.733	5.229
Competition	0.000	−3.078	9.581	10.624	9.703	12.685	14.509
Participation	−0.981	−1.844	−26.276	−12.368	12.092	14.725	22.829
Cameroon							
Democracy	−3.845	−6.663	−6.940	−6.650	−2.884	−12.007	−8.878
Competition	−1.347	−1.085	−8.257	−3.058	1.598	−34.089	−4.605
Participation	0.208	7.971	7.513	2.398	2.122	−3.600	−3.104
Chad							
Democracy	−5.461	−5.143	−4.765	−6.730	−10.362	−3.604	−2.873
Competition	−6.767	−6.489	−5.470	−21.258	−33.352	−3.709	10.240
Participation	−26.900	−25.384	−28.366	−27.397	−5.514	10.169	3.514
Colombia							
Democracy	−1.562	−4.373	0.414	−4.502	−7.993	—	—
Competition	1.693	1.306	0.260	−7.927	−19.607	—	—
Participation	−2.266	−11.189	−2.618	−8.047	−8.668	—	—
Republic of Congo							
Democracy	0.000	−2.927	10.520	3.802	0.242	−6.790	−9.382
Competition	0.000	−14.193	28.280	9.802	−1.358	−26.439	−37.315
Participation	−0.421	−0.496	17.558	−21.666	−1.117	13.766	−0.909
Gabon							
Democracy	−3.091	0.206	9.740	4.961	3.946	−4.843	−17.275
Competition	−3.280	2.446	37.020	26.051	23.792	0.731	−41.767
Participation	0.010	0.146	−1.362	−22.330	−11.963	−16.832	−25.646

(Continues)

TABLE 6 (Continued)

Country indicator	t_0	t_5	t_{10}	t_{15}	t_{20}	t_{25}	t_{30}
India							
Democracy	−0.372	1.414	−0.171	−2.194	−4.754	−1.683	−4.023
Competition	3.114	4.609	1.768	−5.548	−4.287	1.367	−9.207
Participation	13.752	21.004	1.641	−4.640	6.472	11.376	12.496
Kazakhstan							
Democracy	4.658	3.418	−3.171	—	—	—	—
Competition	6.939	5.990	−10.113	—	—	—	—
Participation	1.511	−0.753	−3.049	—	—	—	—
Mexico							
Democracy	−19.508	−17.357	−11.245	−9.097	−6.149	−2.477	−2.231
Competition	−42.796	−38.662	−16.475	0.906	−0.624	5.809	10.322
Participation	−9.974	−5.826	−3.693	−12.637	3.498	1.506	−0.699
Sudan							
Democracy	−0.001	−12.316	−14.038	−13.647	−10.430	−14.149	−6.990
Competition	0.000	0.000	0.000	0.000	0.000	−0.800	7.240
Participation	1.144	2.190	0.509	−0.236	2.552	3.341	10.366
Tunisia							
Democracy	0.012	−0.190	1.121	−4.676	−0.679	−2.124	−13.120
Competition	−0.189	−0.593	13.474	−29.157	−9.099	−15.596	−25.757
Participation	0.110	−12.028	−31.423	−42.859	−20.544	−23.541	−44.198
Viet Nam							
Democracy	0.012	−0.190	1.121	−4.676	−0.679	−2.124	−13.120
Competition	−0.189	−0.593	13.474	−29.157	−9.099	−15.596	−25.757
Participation	0.110	−12.028	−31.423	−42.859	−20.544	−23.541	−44.198

Note. Dashes (—) indicate no estimation is available.

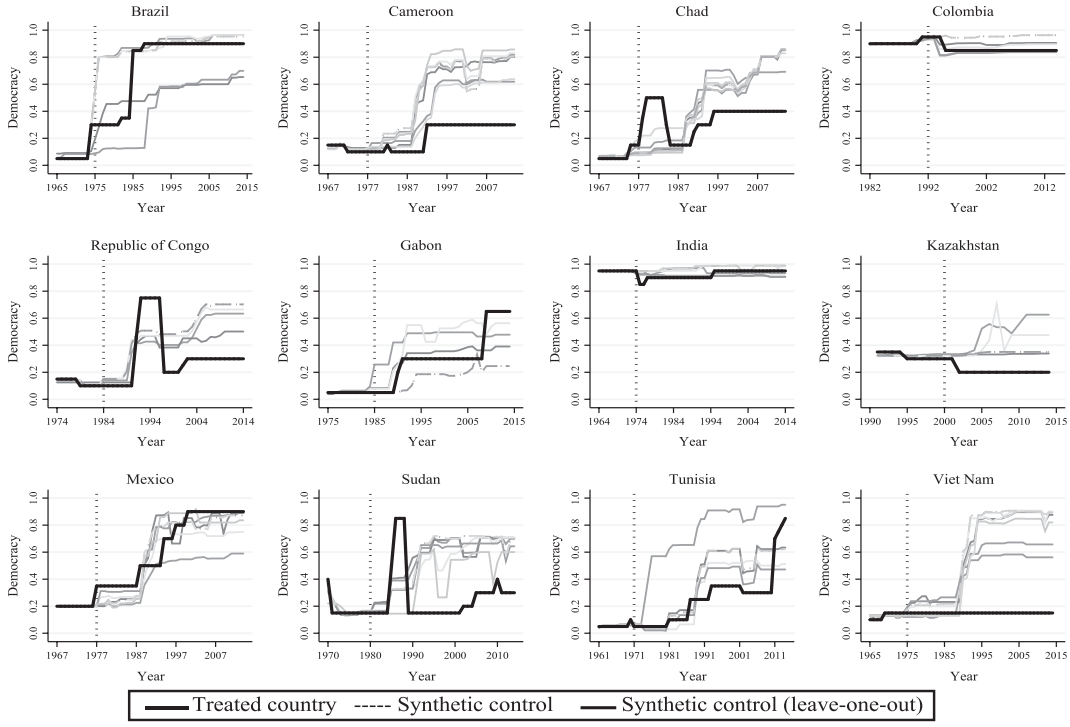

FIGURE 3 Leave-One-Out distribution of the synthetic controls

democracy starts decreasing 2 years before the first discovery, and it remains constant after this event up to the eve of the peak when it begins to increase. The peak of discoveries seems to arrest that improvement in the quality of political institutions, and it takes 10 years to reach the same level of democracy of the synthetic control, as shown in the previous analysis. The first discovery does not change the quality of political institutions in the Republic of Congo. Indeed, the outcome variable is constant for 9 years after the event, but the fact that its path of democracy does not match the synthetic control makes the comparison between the two not reliable. In India and Viet Nam, the counterparts exceed the actual outcomes after the peak of oil discoveries only, although the negative gap is not significant in the former case, as previously shown. Considering the first discovery does not alter our conclusions in the case of Sudan and Tunisia.[20]

7 | CONCLUSIONS

This paper undertakes a case-study analysis to evaluate the effect of a variation in oil endowment on political regimes. To identify a plausible exogenous shock, we exploit the timing of the peak of oil discoveries, that is the year after which the rate of oil discoveries starts to decrease. Relying on Tsui (2011), we argue that, by considering this event as the main variable related to the resource curse, we can address methodological concerns raised by previous studies. Furthermore, we uncover the heterogeneity of country conditions before and after a resource shock, and we provide an evaluation of the

[20]Note that in Sudan the year of the first discovery coincides with the peak year.

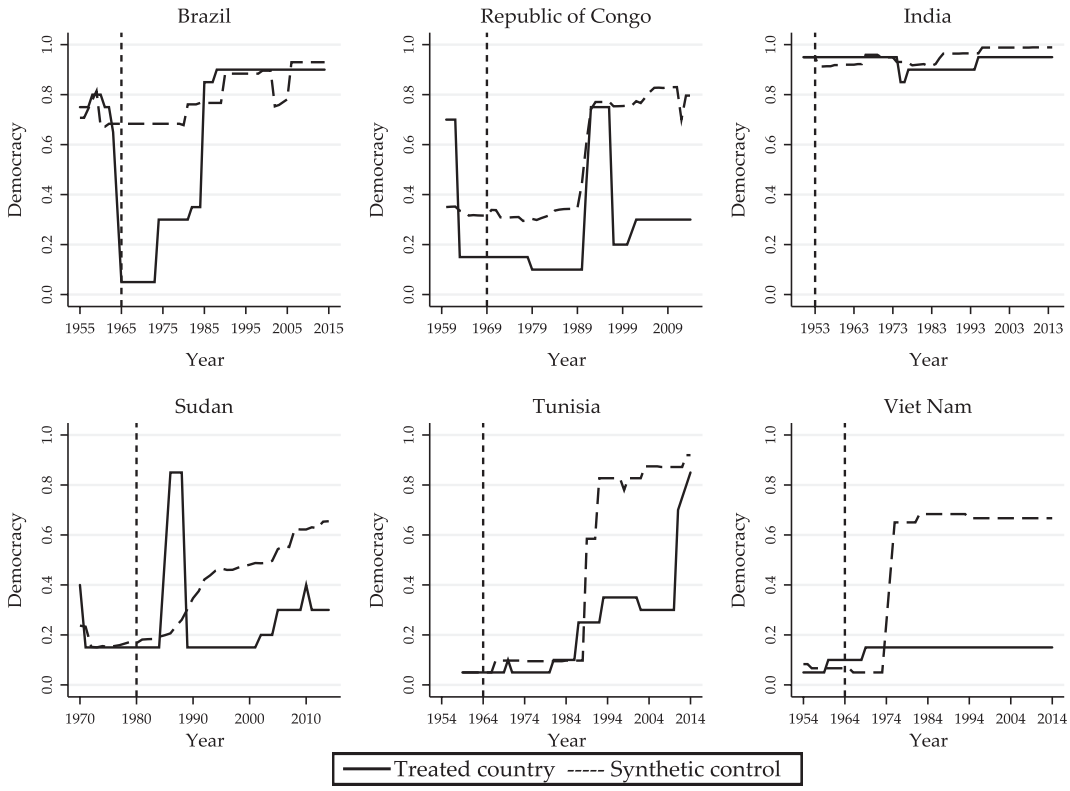

FIGURE 4 Path of democracy: Treated countries versus synthetic control—First oil discoveries

dynamics of the effect. To achieve these objectives, we use the SCM and estimate the democracy level that would have occurred in the absence of the peak of oil discoveries.

Overall, this paper confirms the idea that natural resources may be a curse or a blessing for a country, depending on the quality of its institutions (Mehlum et al., 2006; Robinson et al., 2006). In particular, the relationship between natural resources and democracy shows some non-linearities depending on the initial level of democracy itself. Indeed, only the democracy levels of India and Colombia, that have *polity2* scores above eight before the peak of discoveries, do not change significantly after the event. All other countries, Gabon in which a period of political reforms took place after the peak of oil discoveries, were somehow negatively affected by the variation in oil endowment. This effect is sizable, since the level of democracy in countries that have reached the peak of oil discoveries is, on average, 8% lower than what would have been the case without the peak of oil discoveries.

A plausible explanation for these results is that, as the rate of discoveries starts to decline, incumbents enforce higher entry barriers to retain the remaining resources. This is prevented in democracies with higher levels of executive constraints. Further studies should investigate whether this is the true mechanism that explains our findings.

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