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Oil discoveries and democracy

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Abstract: We evaluate the effect of natural resources on political regimes. We use the synthetic control method to compare evolution of the democracy level of countries affected by giant oil discoveries with the weighted democracy level of countries that do not incur the same event and have similar pre-event characteristics. Focusing on 12 countries affected by the peak of oil discovery from the 1970s, we find that the exogenous variation in oil endowment does not have the same effect on all countries. In most of cases, the event has a negative effect in the long run, but countries with a high level of democracy in the pre-event period are not affected by the peak of oil discoveries. These results support heterogeneity and non-linearities claimed in the more recent theoretical literature.

Keywords: natural resources, oil discoveries, democracy, synthetic control method
JEL classification: C21, C23, O57, P48

Tables and Figures: at the end of the paper.

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1 Introduction

> [. . .] the problem is often not the lack of natural resources. Many societies with unfavorable conditions do not lack for resources. Well-ordered societies can get on with very little; their wealth lies else-where: in their political and cultural traditions, in their human capital and knowledge, and in their capacity for political and economic organization. Rather, the problem is commonly the nature of the public political culture and the religious and philosophical traditions that underlie its institutions. The great social evils in poorer societies are likely to be oppressive government and corrupt elites and the subjection of women abetted by unreasonable religion [. . .]. (Rawls 2001: 64)

Natural resources such as minerals, oil, and gas are a source of rent for a state. However, there is strong evidence that large endowments of natural resources may reduce economic growth and are associated with non-democratic regimes. This problem is often called 'resources curse'.[1] The link to explain this perverse relationship is the public sector: rents from natural resources are used by politicians as a tool to remain in power. For example, a job in the public sector may be offered in exchange for a vote, or simply in acceptance of the status quo in a non-democratic regime. So-called *white elephants* projects (expensive, used below capacity, and therefore unsustainable over time) are another example of waste of public monies accrued from extractive resources.[2] Overall, there is an excessive expansion of the public sector that leads to inefficiency. Moreover, a growing extractive sector with high profits tends to attract capital, reducing its availability for investments in other industries. First, this lowers funds for other profitable but less politically linked companies; second, it diminishes diversification and exposes the country to idiosyncratic shocks in the resource-abundant sector. In turn, both may hamper economic growth in the medium term.

The evidence on the resource curse is not unanimous. This paper aims to take heterogeneity across countries seriously: we perform a data-driven analysis that, instead of calculating average effects of natural resource across countries, compares for each country the actual political regime with the counterfactual situation of this country in the absence of a natural resource shock (in our analysis, a giant oil discovery). More precisely, we apply the synthetic control method (SCM), developed by Abadie and Gardeazabal (2003) and extended in Abadie et al. (2010), that can deal with endogeneity from omitted variable bias by accounting for the presence of time-varying unobservable confounders. Moreover, it comes with the advantages of transparency (as the weights identify the countries that are used to estimating the counterfactual outcome of the country that discovers an oil field) and flexibility (as the set of potential controls can be appropriately restricted to make the underlying country comparisons more sensible).

The choice of the natural resource measure is critical in a study like this, as exogeneity is a pre-requisite for a meaningful claim of causality. Oil production, the typical measure of natural resource abundance, is imperfect because production is non-monotonic over the lifecycle of any oilfield. Therefore, this is a poor indicator of oil wealth. Following Tsui (2011), we exploit the exogenous variation in oil endowment to provide evidence that does not suffer from an endogeneity problem. In particular, we evaluate the effect of the peak of oil discoveries, defined

[1] For a comprehensive review, see van der Ploeg (2011).

[2] Anecdotal evidence of the success and failure in the political economy of natural resources is collected in Collier and Venables (2011). Matsen et al. (2016) define petro populism as the economically excessive use of natural resource revenues to buy political support.

as the point in time after which the rate of oilfield discoveries begins to decline. We argue that this event is more plausibly exogenous than the first oil discovery as it depends more on geological factors than on exploration. Our findings are in line with the literature according to which the effect of natural resources on democracy depends on the quality of institutions (Mehlum et al. 2006; Robinson et al. 2006).

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

2 Natural resources and political regimes

This section presents a selective review of the political resource curse problem. In contrast with the first wave of models (Krugman 1987; Sachs and Warner 1999), and those based on rent-seeking (Lane and Tornell 1996; Torvik 2002) that implied an unconditional negative relationship between resource abundance and growth, a fairly standard result is that countries with good institutions are able to use resource rents to increase their economic performance. This is because well-developed institutions have enough checks and balances to prevent the predatory behaviour of politicians and the unproductive use of government expenditure.[3]

According to Robinson et al. (2006), politicians tend to over-extract natural resources because they discount the future too much. This raises the value of being in power and provides politicians with more resources to influence elections results and increase 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. Similarly, as Mehlum et al. (2006) show, the quality of institutions determines whether or not countries avoid the resource curse. Taken together, these results contrast Sachs and Warner's (1999) claim that institutions are irrelevant for the resource curse.

Natural resources make it more difficult for citizens to solve the collective action problem when facing a kleptocrat because they provide rulers with substantial resources to buy off opponents. According to Acemoglu et al. (2004), a kleptocrat expropriates the wealth of citizens and uses the proceeds for his own consumption. The success of a kleptocrat rests on the ability to use a divide-and-rule strategy. Members of society need to cooperate in order to depose the kleptocrat, but this cooperation may be neutralized by imposing punitive taxation on the citizens who propose such a move and redistributing the proceeds to those who may agree to it. In equilibrium, all citizens are exploited and the kleptocrat remains unchallenged.

Empirical evidence on the political resource curse has been mainly addressed with 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 perceptions index, which in turn is associated with lower growth (Mauro 1995), and natural

[3] Marchi Adani and Ricciuti (2014) provide evidence on the role of governance quality for African countries. In a more impressionistic way, Robinson et al. claim: 'For every Venezuela and Nigeria, there is a Norway or a Botswana. A satisfactory model should explain why resources seem to induce prosperity in some countries but not others' (2006: 451).

resource wealth stimulates corruption among bureaucrats and politicians (Ades and Di Tella 1999). According to Bhattacharyya and Hodler (2010), natural resources induce corruption in countries that have been in a non-democratic regime 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 unless there are sufficient checks and balances.

A new line of empirical research involves quasi-experimental studies. Vicente (2010) compares changes in perceived corruption in Sao Tome, which announced a significant oil discovery in 1997–99, with those in Cape Verde, which did not find oil. Both countries share similar histories, culture, and political institutions. He also finds that corruption increased by almost 10 per cent after the announcement of the oil discovery and slightly decreased later. In a regression-discontinuity study not explicitly related with natural resources, Brollo et al. (2013) find that windfall government revenues on Brazilian municipalities increase corruption and the chances of the incumbent holding on to office but decrease the quality of politicians.

Our analysis follows some insights from Tsui (2011) as far as the choice of oil discoveries as the main variable related with the resource curse is concerned, although his empirical strategy is based on a parametric instrumental variables approach. He 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: it is unlikely for the first exploratory borehole in a new area to succeed. Cotet and Tsui (2013) report that, with the current technology, the success rate of exploration drilling is still below 50 per cent, and historically this has been much smaller. It is therefore plausible to treat oil discoveries as positive oil shocks, whose timing and size are more exogenous than oil production. Moreover, the size of deposit, the oil quality, and other cost-determining characteristics are exogenous. Tsui (2011) finds that larger oil discoveries cause slower transitions to democracy; however, there is no such effect in democratic countries. This effect is positively correlated with oil quality and negatively correlated with exploration and extraction costs.

We depart from this approach in a fundamental way. The approach adopted by Cotet and Tsui (2013) produces average effects of oil discoveries on the level of democracy, whereas ours gives the effect in each treated country. Their approach, therefore, is more general at the cost of hiding differences across countries. Our methodology returns the country-specific effect at the price of concentrating on a few cases. We think that the two approaches complement each other.

Our methodology has been applied, in addition to panel difference-in-differences, in the study by Smith (2015) that uses resource discovery in countries that were not previously resource-rich as a plausible exogenous source of variation. He finds a positive effect on gross domestic product (GDP) per capita levels in non-OECD (Organization for Economic Co-operation and Development) countries, and mixed evidence of the long-run positive effect of resources on productivity, capital formation, and education.

3 The synthetic control approach

The SCM, applied in the present study, provides quantitative inference in small-sample comparative studies by estimating the counterfactual situation of one or a few aggregate entities in the absence of an event or intervention (Abadie and 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 of interest (Abadie et al. 2015). In our case, we compare the democracy level of countries that reach the peak of oil discoveries with the weighted democracy level of countries that do not incur the same event and have similar pre-event characteristics.

To frame the SCM in the context of the present study, assume that there is a balanced panel of $I+1$ countries indexed by i and observed over T years. Among these, country $i=1$ reaches the peak of oil discoveries at time $T_0<T$ (treaded unit); 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_{1t} is the observed outcome of country $i=1$ for a post-event period t, and Y_{1t}^{N} is the unobservable potential outcome of country $i=1$, which 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 kth 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 summation:

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

subject to $w_i \geq 0$ and $\sum_{i=2}^{I} w_i = 1$.[4] Here, v_k is a weight that reflects the predictive power of variable k. In the following analysis, we choose the positive semi-definite 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.[5] Thus, the lower the MSPE, the better the synthetic control resembles the characteristic of the treated unit. To achieve lower MSPE, we implement the nested optimization procedure that searches among all $\boldsymbol{V}$ matrices and set of W weights for the best fitting convex combination of the units in the donor pool.

[4] This restriction prevents extrapolation outside the support of the data. See Abadie et al. (2015) for a discussion about its relevance.

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

Moreover, to ensure we have found the global minimum in the parameter space, we run the nested optimization using three different starting points of $\boldsymbol{V}$.[6]

This data-driven procedure reduces discretion in the choice of the comparison units and comes with the advantage of transparency as it makes explicit the relative contribution of each unit in the donor pool to the counterfactual outcome. In addition, the SCM allows the unobserved variables affecting the outcome to vary with time. In fact, when the number of pre-event periods is large, only those units that are similar in both observed and unobserved characteristics should produce similar paths of the outcome under scrutiny. Therefore, if the trajectories of the democracy level of the treated unit and the synthetic control are alike over extended years prior to the peak of oil discoveries, a gap 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 (Rubin 1990). However, Abadie et al. (2010) provide an alternative model of inference defined as 'placebo studies' and 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 is meant to assess whether the estimated effect for the treated country is large relative to the effect for a country chosen at random. In this study, we conduct 'in-space placebo tests' that 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 of the treated country. If the estimated effect in the treated country is larger than most of the effects obtained by the (fake) experiments, we can safely conclude that the baseline results are not just driven by random chance. This means that if the path of the post-event level of democracy of our case studies falls well outside the distribution of placebo effects, we will attribute that effect to the peak of oil discoveries.

4 Democracy, predictors, and event periods

We analyse the level of democracy using the Polity IV dataset (Marshall et al. 2014), which provides a 21-point scale ranging from −10 (hereditary monarchy) to +10 (consolidated democracy). To scale down the variance and reduce the effect of outliers, we transform the Polity score to lie between 0 and 1, with 1 corresponding to the higher level of democracy.

The set of predictors encompasses those factors that the literature identifies as determinants of democracy. We take into account the relationship between political regimes and economic factors including the log of GDP per capita (*Gdp*).[7] We also include a set of additional variables related to economic development that may predict a country's democracy level (see Acemoglu and Robinson 2006; Barro 1999; Lipset 1959): the index of human capital (*human capital*); the sum

[6] The three starting points are the regression-based V, the equal V weights, and a third procedure that uses the Stata maximum likelihood search. The nested optimization procedure is implemented by the Stata routine synth statistical software (see Hainmueller 2016).

[7] Several studies corroborate the results of the seminal work of Lipset (1959) according to which economic development consolidates democracy. We use real gross domestic product on the expenditure side that allows comparing living standards across countries and over time (Feenstra et al. 2015).

of imports and exports over GDP (*openness*); and the value added by the mining,[8] manufacturing, and primary sectors as percentage of the GDP. In addition, we consider the hostility level of interstate disputes (*hostility*), and the total amount of natural resources rents as 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.

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 countries. We consider that year as the period in which the event under scrutiny takes place.

The predictors are averaged over a 10-year pre-event period,[9] and the path of the outcome variable is analysed until 2014. Owing to data availability, we restrict our analysis to countries affected by the peak in the 1970s or later.[10] We also exclude the developed countries that do not show any variation in the Polity score in the time span we consider.[11] Table 1 shows the countries analysed and the year in which they reached the peak of oil discoveries, whereas Appendix Table A1 lists the events excluded. For each treated unit, the donor pool encompasses all the countries not affected by the event for which data are available. Table 2 provides the definitions, sources, and descriptive statistics of variables.

To control whether the characteristics that predict the democracy level are also able to predict the peak of oil discoveries, we run cross-sectional linear regressions.[12] The dependent variable is equal to 1 if the country has reached the peak of oil discoveries since 1970, and 0 otherwise. The 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 1 and 10 per cent, respectively. However, when we consider a multivariate regression, only the initial level of human capital is a significant predictor of the peak of oil discoveries. The reason for this unusual result may derive from our sample that does not include developed countries that have reached the oil peak. These countries should present a high level of human capital. In any case, this result does not invalidate our analysis since the SCM allows us to discard those countries that have pre-event characteristics dissimilar from the treated unit.

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 the predictor balance and the root mean square predicted error (RMSPE) for each of our case

[8] The value added by the mining sector is obtained subtracting manufacturing from the variable '*mining, manufacturing, utilities*' taken from the UNCTADStat database (UNCTAD 2015). The noise of utilities in the measurement of the mining sector is small (Caruso et al. 2014).

[9] Data on total rents, mining, manufacturing, and primary are available from 1970. Thus, 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 Viet Nam.

[10] Angola, United Arab Emirates, Uzbekistan, and Yemen are excluded because of the lack of pre-event data.

[11] These countries are Denmark, Italy, Netherlands, Norway, and United Kingdom.

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

studies. 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. As we consider that magnitude too high to have a good fit between the path of the outcome variable of the treated unit and its synthetic control, we discard these countries in the following discussion.

Figures 1–12 provide a graphical illustration of the results: panels (a) display the trajectories of the democracy level of each country and their synthetic counterparts, whereas panels (b) show the gap between the two. Table 5 presents, for each case study, the average effect of oil discoveries calculated by averaging the distance between the outcome of the treated country and the synthetic control every five years after the peak of oil discoveries. Appendix Table A2 lists the potential controls and the weight assigned to each country in the synthetic control.

The main finding of the analysis is that oil discoveries do not affect all countries in the same way. Most of the case studies present a negative outcome gap in the long run. Figure 2 shows that the level of democracy of Cameroon is slightly lower than the synthetic control after the peak of oil discoveries. This negative outcome gap increases consistently five years after the peak of oil discoveries. Ten years after this event, the peak of oil discoveries has a negative average effect of 0.16. In 2014, the level of democracy of Cameroon is 0.5 points lower than the level that the country would have reached in the absence of the peak. The path of democracy of Chad presents a jump after the peak (Figure 3). However, this result is because the period of anarchy started in 1979, two years after the peak (Collins and Burns 2013), 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. The democracy scores of the Republic of Congo (Figure 5) and Sudan (Figure 10) exceed those of their synthetic controls for a short period (five and four years, respectively). Nevertheless, in the long run, the level of democracy of both of them is lower than what would have been observed in the absence of the peak of oil discoveries. Viet Nam's democracy score is constant during the post-event period. However, the SCM allows estimating that, given the pre-event characteristics of the country, its level of democracy in 2014 would have been 0.63 points higher than the observed level. Kazakhstan has a negative outcome gap in the pre-event period that increases two years after the event, although the magnitude of the effect is not high (–0.15).

For all of those countries, the placebo tests presented in Figure 13 confirm a significant negative effect of oil discoveries on democracy in the decades following the event. On the contrary, oil discoveries affect the level of democracy of Brazil only in the short run (Figure 1). Indeed, after a drop of the democracy level with respect to the synthetic control, Brazil caught up with its counterpart ten years after the peak of oil discoveries. Figure 13a proves the robustness of these results.

Mexico and Tunisia do not show clear paths. In Mexico, the peak of oil discoveries seems to arrest the increase of democracy that started at the eve of that event. However, as in the case of Tunisia, the country presents significant negative levels of the outcome gap. Instead, we cannot reject the null hypothesis of no effect in two cases: Colombia (Figure 13d) and India (Figure 13g). Indeed, even if for both countries the average effect is negative, their post-event levels of democracy do not fall well outside the distribution of placebo effects. For that reason, we can safely affirm that oil discoveries have no effect on the democracy level of India and Colombia. Interestingly, these are the only two countries with a high level of democracy in the pre-event period (>0.9).

Finally, a striking case is represented by Gabon (Figure 6), the only country in which the peak of oil discoveries seems to have a positive effect on democracy. However, these results are misleading because, after the event under scrutiny, another shock affected the political

institutions of the country. In fact, in the 1990s, violent demonstrations and strikes led to political reforms including the transformation of the political system to a multiparty democracy (Collins and 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.

6 Robustness checks

In this section, we run a robustness check to test the sensitivity of our main results to changes in the measurement of democracy level. 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 all votes casted in parliamentary or presidential elections, whereas the latter is measured by the percentage of the population who actually 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. Table 6 presents, for each indicator, the average effect of oil discoveries calculated every five years after the peak of oil discoveries.[13]

The trends of the outcome gaps show that the results of the previous analysis are robust. In particular, the path of *democracy* gap replicates almost exactly the one given by *Polity*.[14] This is not true for Kazakhstan, whose average effect is positive until ten 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. In fact, 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.[15] Another exception is Mexico for which the effect of oil discoveries is negative and significant, considering both *democracy* and *competition*. The negative gap starts to decrease five years after the peak. Overall, we can claim that the peak of oil discoveries has at least delayed democratization in Mexico.

7 Conclusions

In this paper, we have undertaken a case-study analysis to evaluate the effect of giant oil discoveries on the political regimes of the affected countries. We used the SCM to estimate the democracy level that would have been observed in the absence of the event. This approach allows us to overcome the weaknesses of previous analyses as it can deal with the endogeneity problem and the omitted variable bias.

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-

[13] Graphs and placebo tests are omitted to save space, but are available upon request from the authors.

[14] We cannot assert the same considering participation. However, we failed to obtain low value of the root mean square predicted error (RMSPE) in most of the cases, as proven by the difference between the treated units and the synthetic controls at t_0.

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

linearities depending on the initial level of democracy itself. Indeed, only the democracy levels of India and Colombia, which have a democracy score above 0.9, do not change significantly after the peak of discoveries. All other countries, with the exception of Gabon that undertook a period of political reforms after the peak of oil discoveries, are negatively affected by the variation in oil endowment. A plausible explanation of these results is that, as the rate of discoveries starts to decline, the incumbents enforce higher entry barriers to grab the residual resources. This is prevented in democracies with higher levels of executive constraints.

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Table 1: Case studies

Country	Peak of oil discoveries	Start year synth
Brazil	1975	1965
Cameroon	1977	1967
Chad	1977	1967
Colombia	1992	1982
Republic of Congo	1984	1974
Gabon	1985	1975
India	1974	1964
Kazakhstan	2000	1991
Malaysia	1973	1963
Mexico	1977	1967
Pakistan	1983	1973
Sudan	1980	1970
Thailand	1981	1971
Tunisia	1971	1961
Viet Nam	1975	1965

Source: Authors' compilation based on Campbell (2006).

Table 2: 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 et al. 2015)	8. 055	1.160	5.219	11.325
Human capital	Index of human capital per person, based on years of schooling (Barro and 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)	UNCTADStat (UNCTAD 2015)	6.607	8.547	0	72.123
Manufacturing	Value added by sectors of economic activity, annual, 1970–2013: manufacturing (percentage of GDP)	UNCTADStat (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)	UNCTADStat (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 et al. (2015)	0.853	1.591	0	5

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

Source: Authors' compilation based on data from sources listed in table.

Table 3: Peak of oil discovery and democracy predictors in 1970

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Gdp	−0.030								0.067
	(0.033)								(0.085)
Human capital		−0.150***							−0.344**
		(0.056)							(0.149)
Total rents			0.001						−0.004
			(0.006)						(0.006)
Mining				0.000					−0.000
				(0.006)					(0.008)
Manufacturing					−0.002				−0.000
					(0.003)				(0.006)
Primary						0.000			−0.003
						(0.002)			(0.004)
Openness							−0.153*		−0.134
							(0.078)		(0.101)
Hostility								0.030	0.032
								(0.027)	(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.

Source: Authors' compilation based on variables defined in Table 2.

Table 4: Predictor balance and root mean square predicted error (RMSPE)

Predictor	Case study	
	Brazil 1975	Synthetic Brazil
Gdp	8.049063	8.494432
Human capital	1.423229	1.592064
Total rents	3.032327	2.624917
Mining	2.817145	4.866887
Manufacturing	29.25174	19.27867
Primary	11.87682	25.98486
Openness	0.1084437	0.27975
Hostility	0.4	3.0722
Average pre-discovery democracy	0.075	0.07599
RMSPE		0.001012
	Cameroon 1977	Synthetic Cameroon
Gdp	7.177065	7.141711
Human capital	1.311305	1.384907
Total rents	4.055883	6.277098
Mining	1.17727	1.180156
Manufacturing	14.70772	11.03428
Primary	28.28982	44.37049
Openness	0.2701598	0.2741007
Hostility	0.4	0.406
Average pre-discovery democracy	0.125	0.12755
RMSPE		0.0075677
	Chad 1977	Synthetic Chad
Gdp	7.265192	7.25084
Total rents	4.75743	4.746761
Mining	0.9221356	0.921185
Manufacturing	12.31258	12.28897
Primary	41.9175	41.82736
Openness	0.498415	0.4972167
Hostility	0.2	0.1984
Average pre-discovery democracy	0.07	0.07283
RMSPE		0.0336496
	Colombia 1992	Synthetic Colombia
Gdp	8.731305	9.189705
Human capital	2.016568	2.145918
Total rents	6.595242	1.345631
Mining	6.283752	4.958925
Manufacturing	18.12654	21.17535
Primary	12.55478	7.596763
Openness	0.2025784	0.2305646
Hostility	1.2	1.2468
Average pre-discovery democracy	0.905	0.904515
RMSPE		0.0011125
	Republic of Congo 1984	Synthetic Republic of Congo
Gdp	7.536801	7.582842
Human capital	1.667621	1.458849
Total rents	39.64646	21.13613
Mining	28.3415	19.28067
Manufacturing	9.006013	9.808753
Primary	13.46419	16.33363
Openness	1.111467	1.124935
Hostility	0.5	0.4995
Average pre-discovery democracy	0.125	0.12557
RMSPE		0.0149957
	Gabon 1985	Synthetic Gabon
Gdp	9.252937	7.839756
Human capital	1.59167	1.627161
Total rents	47.64735	12.65417
Mining	41.641	6.981598

Manufacturing	6.07867	15.45709
Primary	5.053038	27.86907
Openness	1.016262	1.320546
Hostility	0.1	0.1008
Average pre-discovery democracy	0.05	0.0508
RMSPE		0.00063

	India 1974	Synthetic India
Gdp	7.055507	8.774614
Human capital	1.223596	2.135507
Total rents	2.316797	2.268751
Mining	2.117753	2.168657
Manufacturing	14.2285	26.663
Primary	42.94529	13.29678
Openness	0.1135095	0.2515587
Hostility	4	0.3451
Average pre-discovery democracy	0.95	0.94994
RMSPE		0.0005722

	Kazakhstan 2000	Synthetic Kazakhstan
Gdp	8.751681	8.707081
Human capital	2.708643	2.067864
Total rents	17.93863	9.386802
Mining	12.41103	2.115997
Manufacturing	11.92521	16.18919
Primary	13.41587	21.08155
Openness	1.21744	1.947997
Hostility	0.7777778	0.1145556
Average pre-discovery democracy	0.3222222	0.32225
RMSPE		0.0248456

Predictor	Malaysia 1973	Synthetic Malaysia
Gdp	7.909242	7.99283
Human capital	1.655252	1.69775
Total rents	6.420214	6.41138
Mining	9.681566	9.961237
Manufacturing	14.61374	14.594
Primary	28.48076	15.85045
Openness	0.6859536	0.5896284
Hostility	1.5	0.8885
Average pre-discovery democracy	0.85	0.834385
RMSPE		0.1645738

	Mexico 1977	Synthetic Mexico
Gdp	8.904852	8.059699
Human capital	1.65393	1.987598
Total rents	3.48081	3.472643
Mining	8.50995	8.469963
Manufacturing	19.22363	22.49874
Primary	10.6091	23.63679
Openness	0.1206917	0.2188393
Hostility	0	0.5021
Average pre-discovery democracy	0.2	0.1995
RMSPE		0.0001902

	Pakistan 1983	Synthetic Pakistan
Gdp	7.341958	7.060531
Human capital	1.3101	1.353643
Total rents	4.194234	1.987898
Mining	4.095575	4.535334
Manufacturing	10.42744	9.951427
Primary	34.40184	33.75569
Openness	0.3474532	0.3627543
Hostility	2.1	2.0756
Average pre-discovery democracy	0.45	0.442475
RMSPE		0.3453261

	Sudan 1980	Synthetic Sudan
Gdp	7.152358	7.239045
Human capital	1.137935	1.476076
Total rents	0.0002809	2.006756
Mining	1.892794	2.165256
Manufacturing	8.861436	10.98123
Primary	38.16304	38.15145
Openness	0.1021655	0.4820521
Hostility	1.5	1.5302
Average pre-discovery democracy	0.175	0.17774
RMSPE		0.046698
	Thailand 1981	Synthetic Thailand
Gdp	7.784089	8.283527
Human capital	1.70597	1.761231
Total rents	2.306225	2.597524
Mining	2.669549	6.407429
Manufacturing	19.71048	18.29137
Primary	25.37276	15.79119
Openness	0.4776597	0.4599142
Hostility	3.9	3.4765
Average pre-discovery democracy	0.435	0.43146
RMSPE		0.1992042
	Tunisia 1971	Synthetic Tunisia
Gdp	7.418731	7.490103
Human capital	1.199441	1.417062
Total rents	3.160351	3.295567
Mining	5.51892	1.988342
Manufacturing	8.745414	10.55169
Primary	15.21589	28.22424
Openness	0.6536856	0.4287062
Hostility	0.7	2.2609
Average pre-discovery democracy	0.055	0.056595
RMSPE		0.0142813
	Viet Nam 1975	Synthetic Viet Nam
Gdp	6.545513	7.523913
Human capital	1.739625	1.747607
Total rents	0	1.698035
Mining	3.951625	5.941236
Manufacturing	16.07247	15.72458
Primary	42.62852	34.60567
Openness	0.6227122	0.5732201
Hostility	5	1.3198
Average pre-discovery democracy	0.13	0.135505
RMSPE		0.024323

Source: Authors' compilation based on variables defined in Table 2.

Table 5: Average effect of the peak of oil discoveries on Polity IV indicator

Country	t_0	t_5	t_{10}	t_{15}	t_{20}	t_{25}	t_{30}
Brazil 1975	–0.251	–0.501	–0.394	0.036	–0.003	–0.018	–0.028
Cameroon 1977	–0.003	–0.047	–0.159	–0.388	–0.431	–0.412	–0.354
Chad 1977	0.061	0.369	0.133	–0.125	–0.228	–0.177	–0.239
Colombia 1992	0.000	–0.060	–0.099	–0.104	–0.113	–0.113	—
Republic of Congo 1984	–0.050	–0.062	0.076	–0.068	–0.256	–0.394	–0.403
Gabon 1985	–0.001	0.029	0.212	0.199	0.196	0.265	0.482
India 1974	0.001	–0.069	–0.063	–0.067	–0.086	–0.036	–0.020
Kazakhstan 2000	–0.022	–0.111	–0.151	–0.151	—	—	—
Mexico 1977	0.151	0.136	0.095	–0.108	–0.128	0.046	0.092
Sudan 1980	–0.047	–0.083	–0.090	–0.163	–0.607	–0.634	–0.659
Tunisia 1971	–0.005	0.029	0.224	–0.495	–0.554	–0.506	–0.395
Viet Nam 1975	–0.015	0.000	0.002	–0.045	–0.087	–0.280	–0.267

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

Source: Authors' compilation based on study data.

Table 6: Average effect of the peak of oil discoveries on Vanhanen's democracy indicators

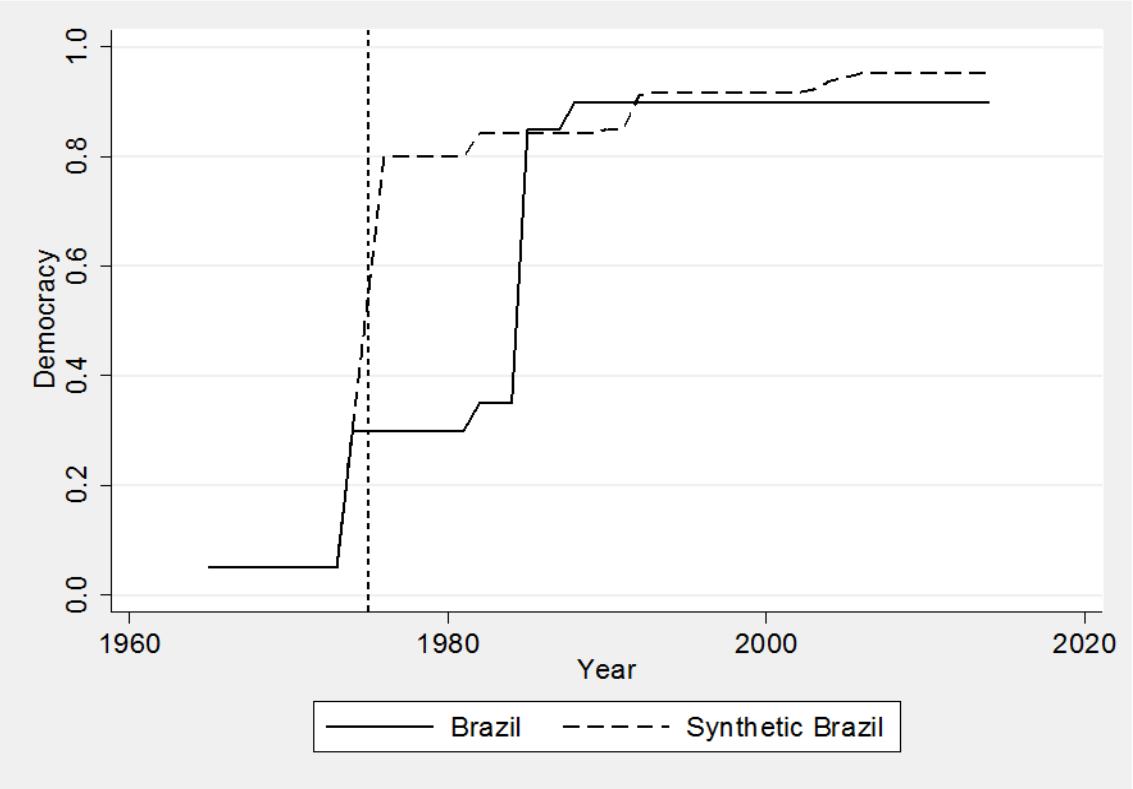
Country indicator	t_0	t_5	t_{10}	t_{15}	t_{20}	t_{25}	t_{30}
Brazil 1975							
Democracy	0.000	−13.411	−14.853	−5.648	0.372	0.733	5.229
Competition	0.000	−3.078	9.581	10.624	9.703	12.685	14.509
Participation	−0.981	−1.844	−26.276	−12.368	12.092	14.725	22.829
Cameroon 1977							
Democracy	−3.845	−6.663	−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 1977							
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 1992							
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 1984							
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 1985							
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
India 1974							
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 2000							
Democracy	4.658	3.418	−3.171	—	—	—	—
Competition	6.939	5.990	−10.113	—	—	—	—
Participation	1.511	−0.753	−3.049	—	—	—	—
Mexico 1977							
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 1980							
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 1971							
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 1975							
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.

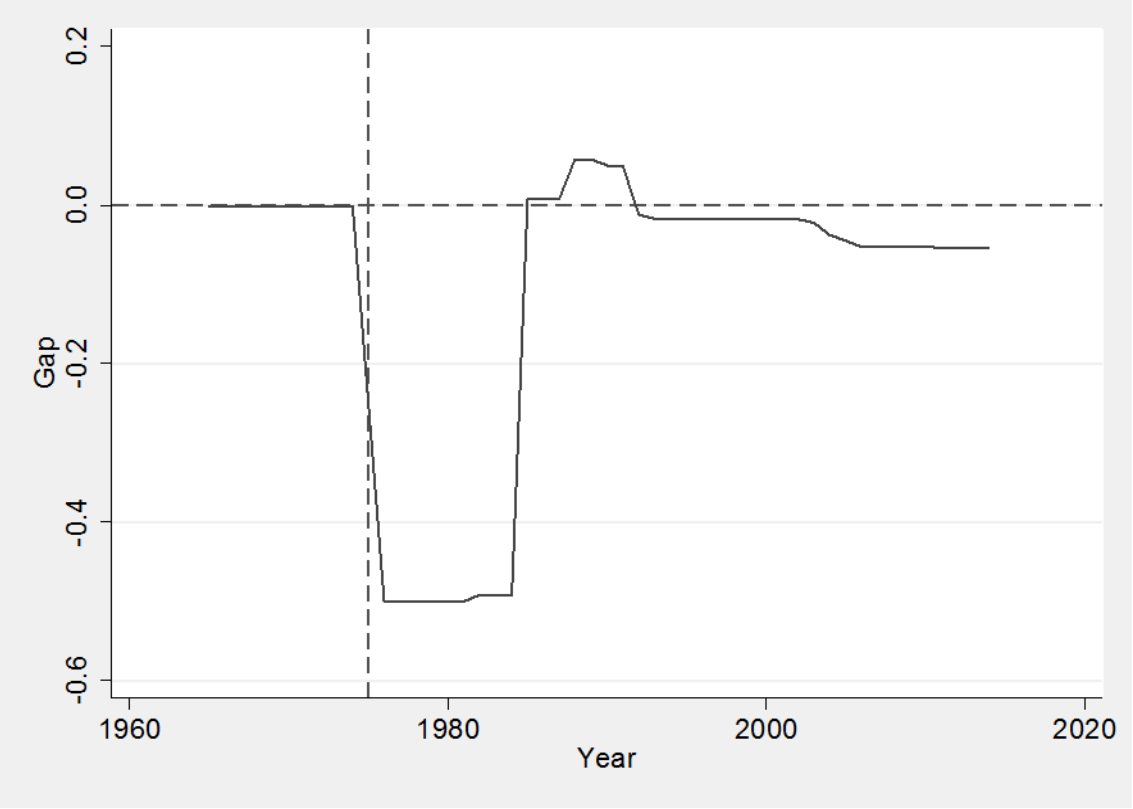
Source: Authors' compilation based on Vanhanen (2014).

Figure 1: Path of democracy: (a) Brazil 1975 versus synthetic control (b) outcome gap

(a)



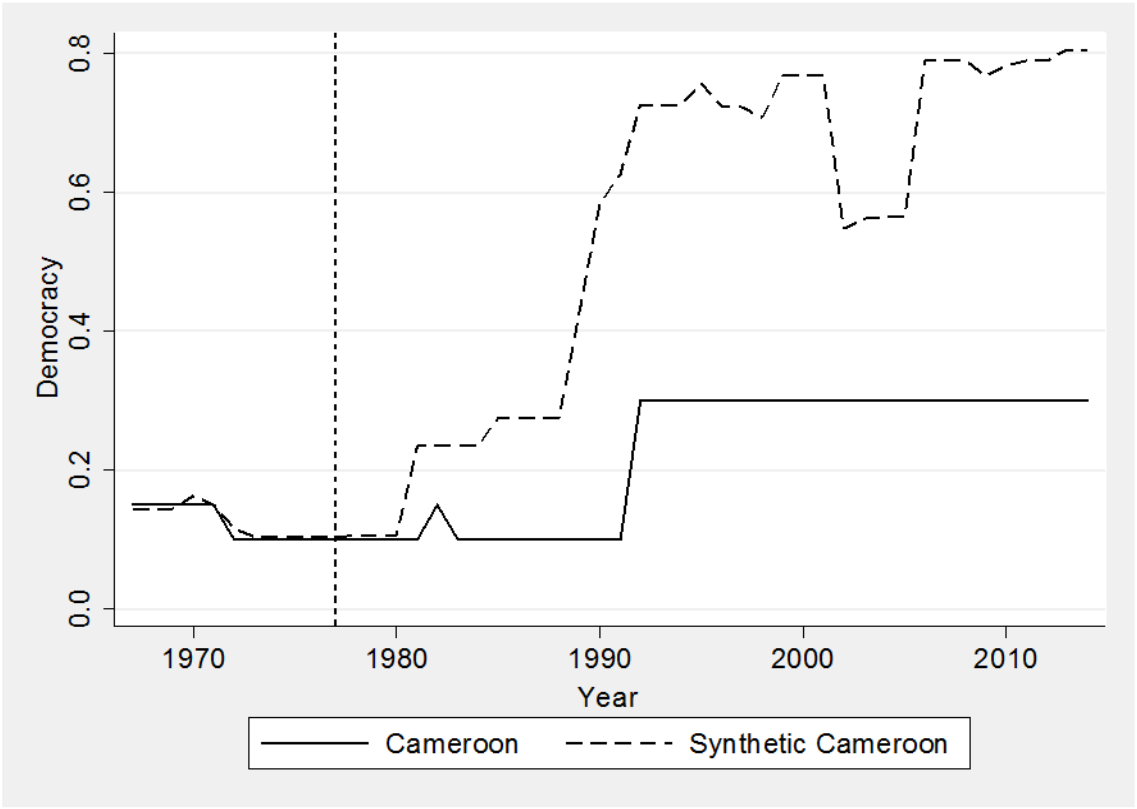
(b)



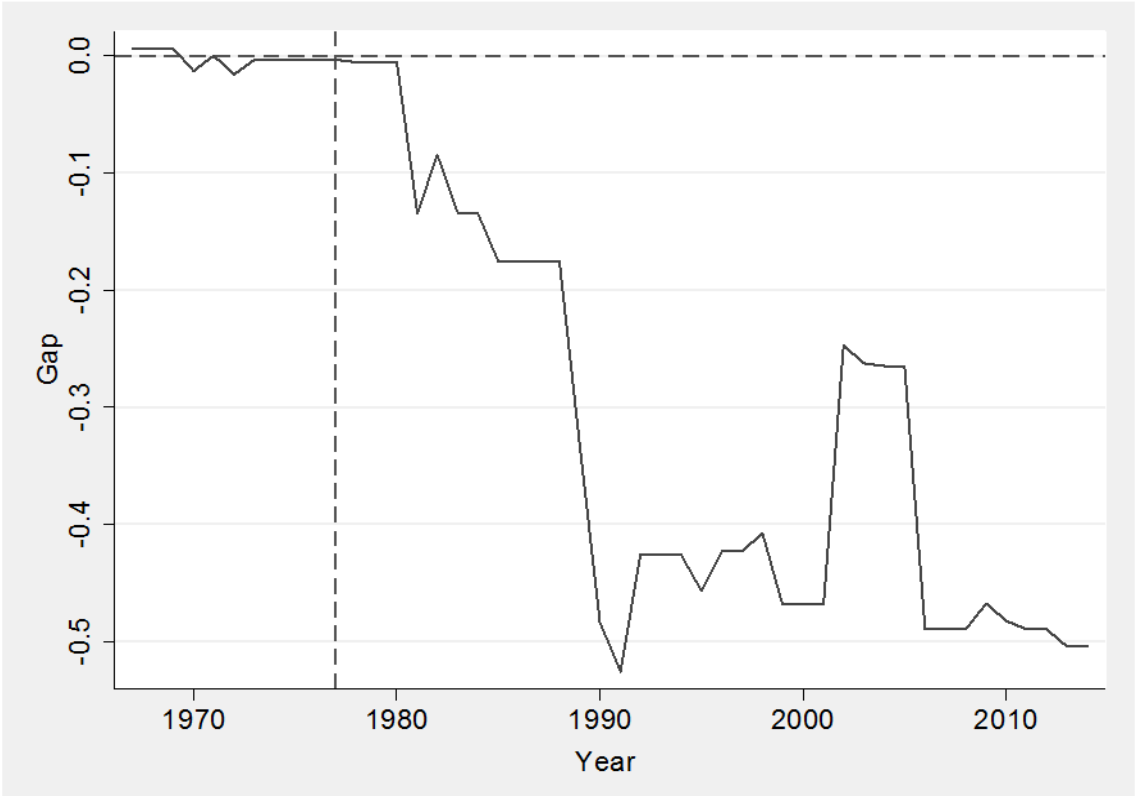
Source: Authors' illustration based on study data.

Figure 2: Path of democracy: (a) Cameroon 1977 versus synthetic control; (b) outcome gap

(a)



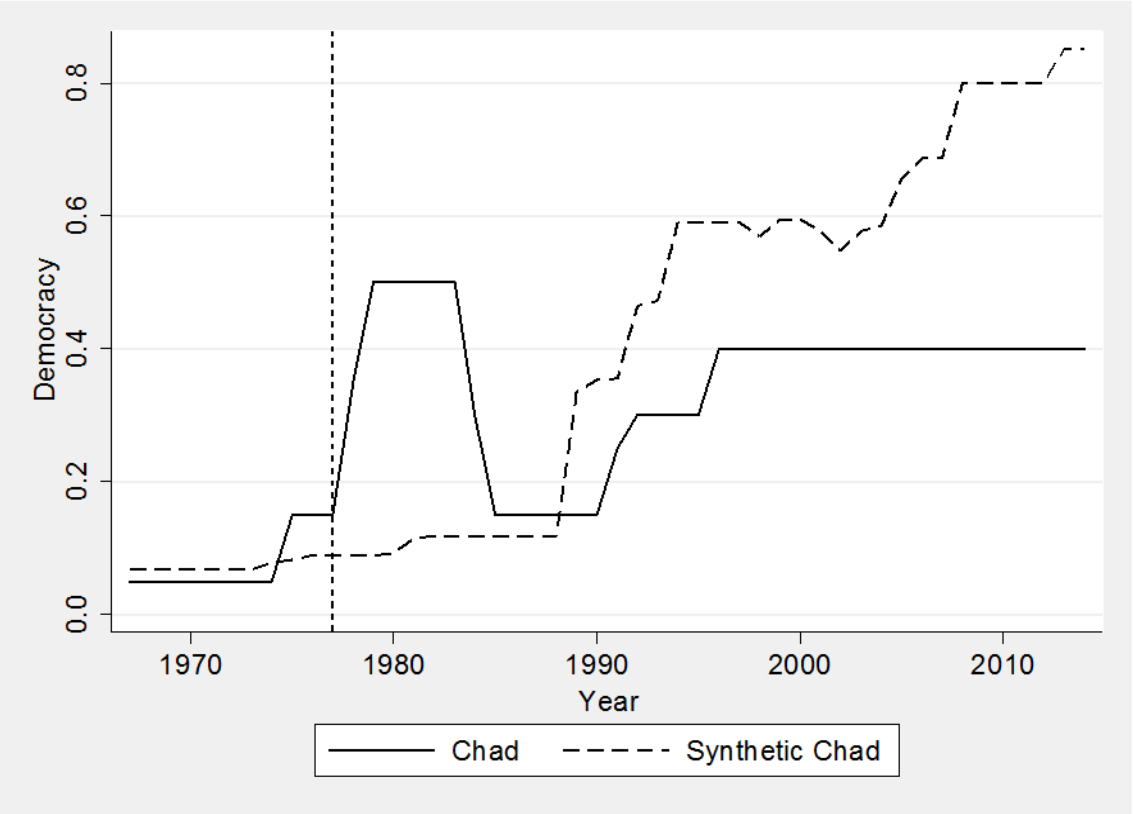
(b)



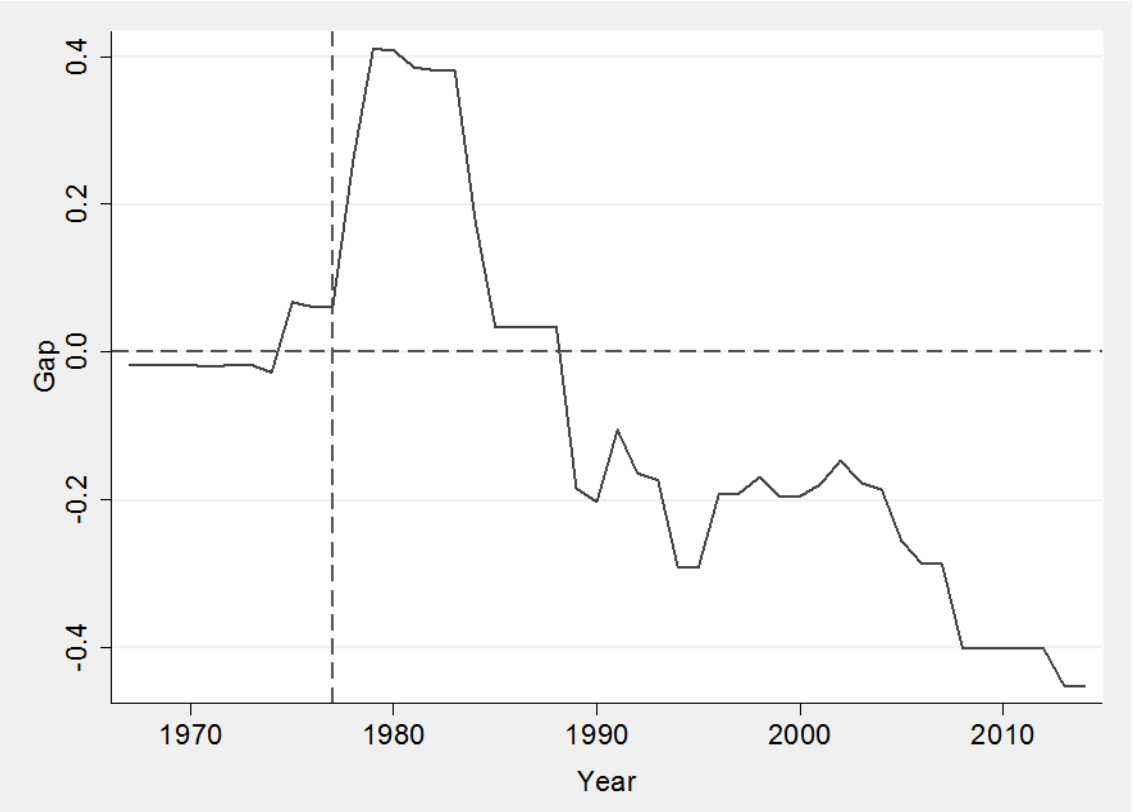
Source: Authors' illustration based on study data.

Figure 3: Path of democracy: (a) Chad 1977 versus synthetic control; (b) outcome gap

(a)



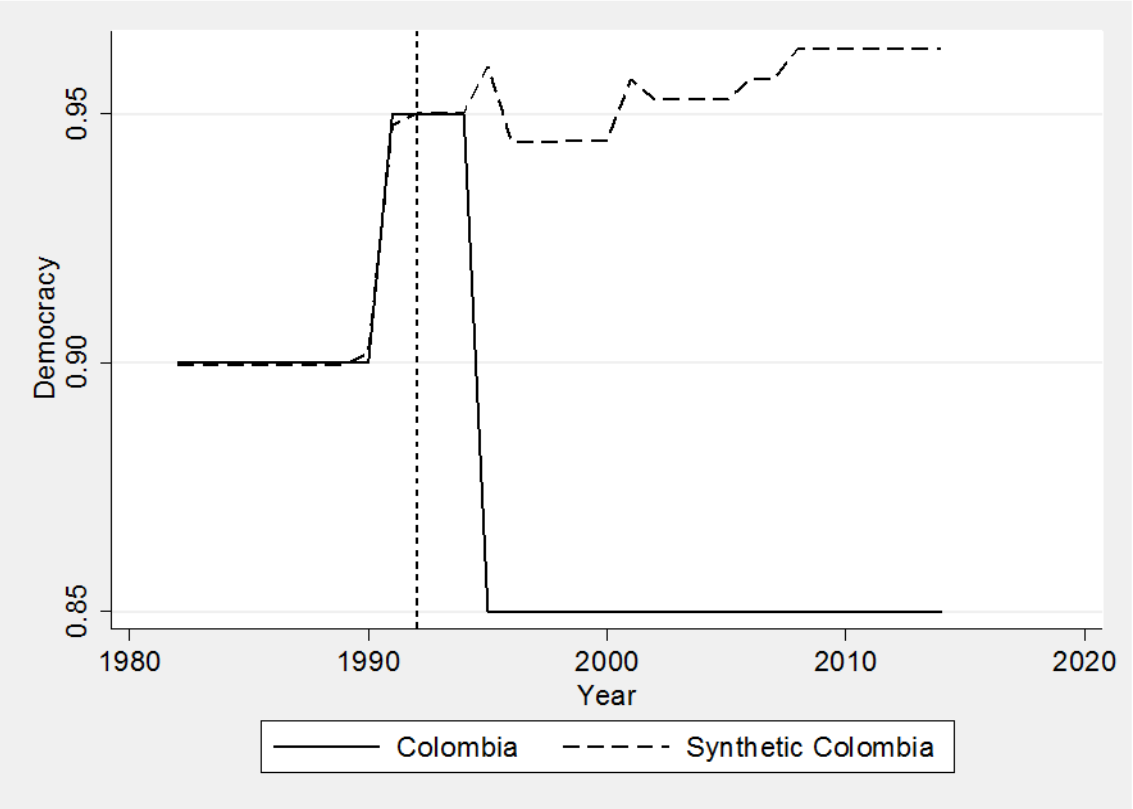
(b)



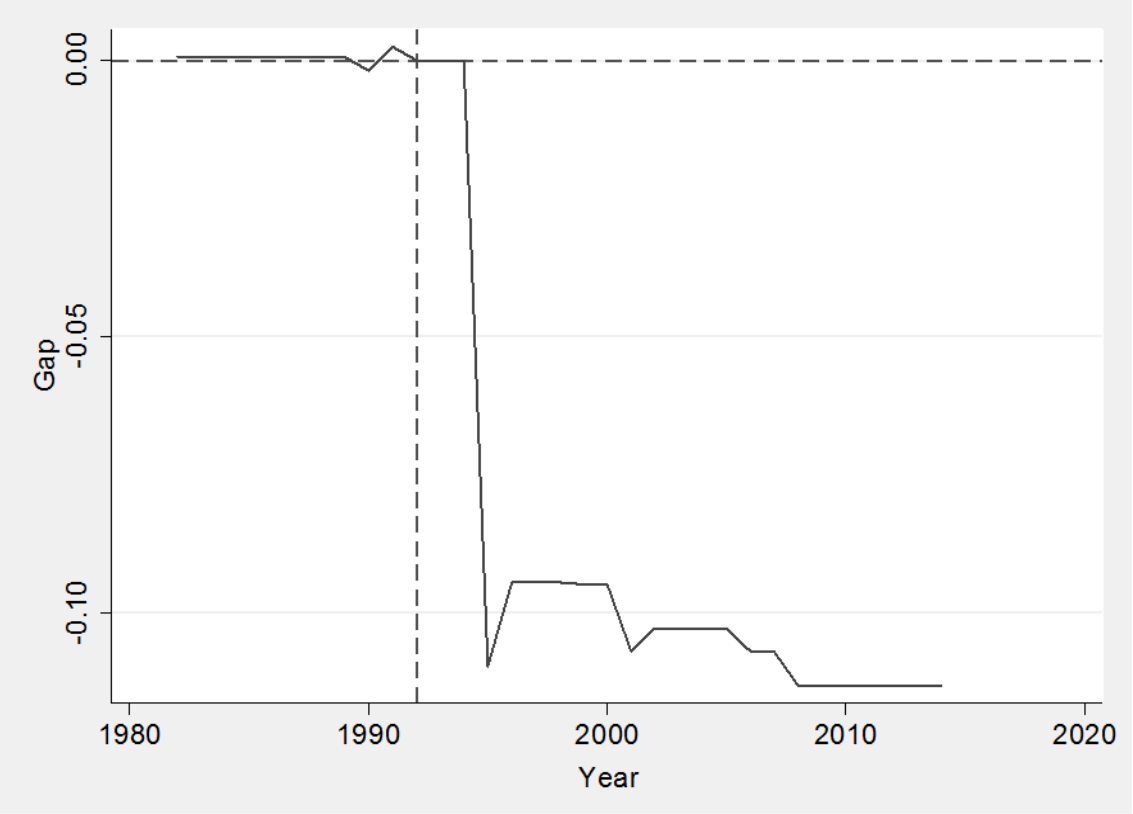
Source: Authors' illustration based on study data.

Figure 4: Path of democracy: (a) Colombia 1992 versus synthetic control; (b) outcome gap

(a)



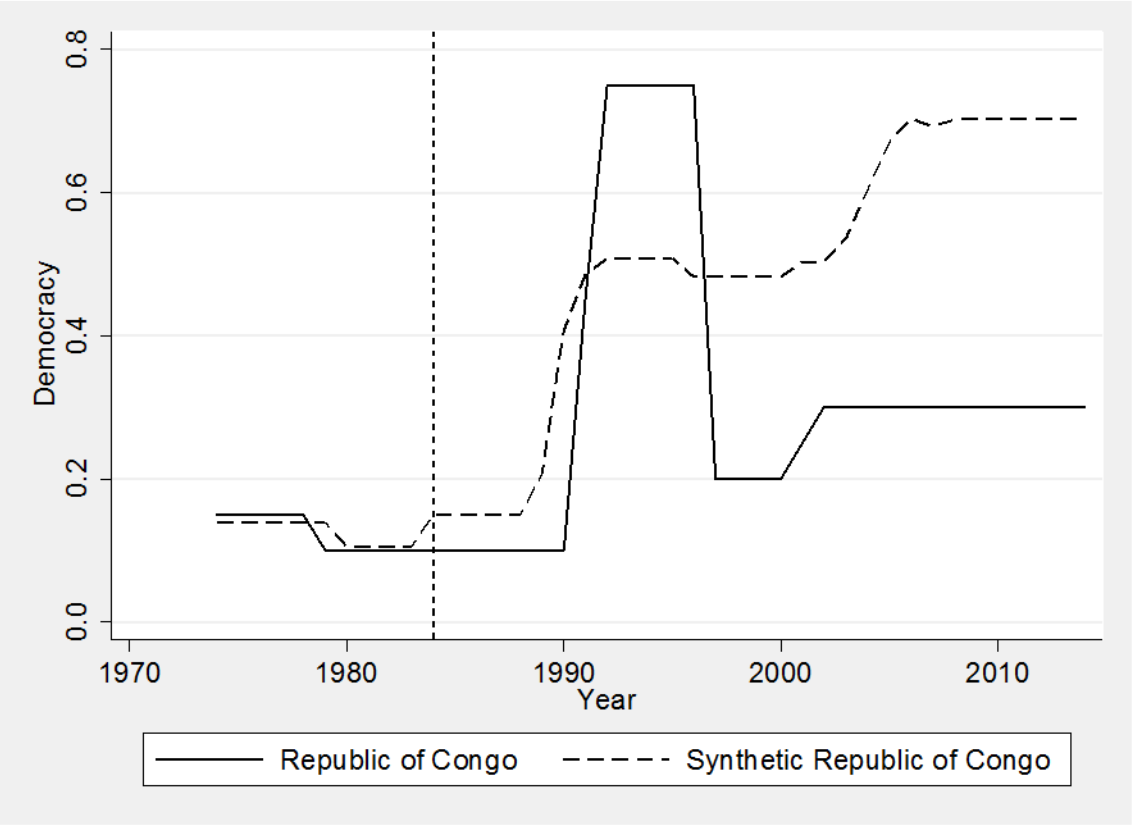
(b)



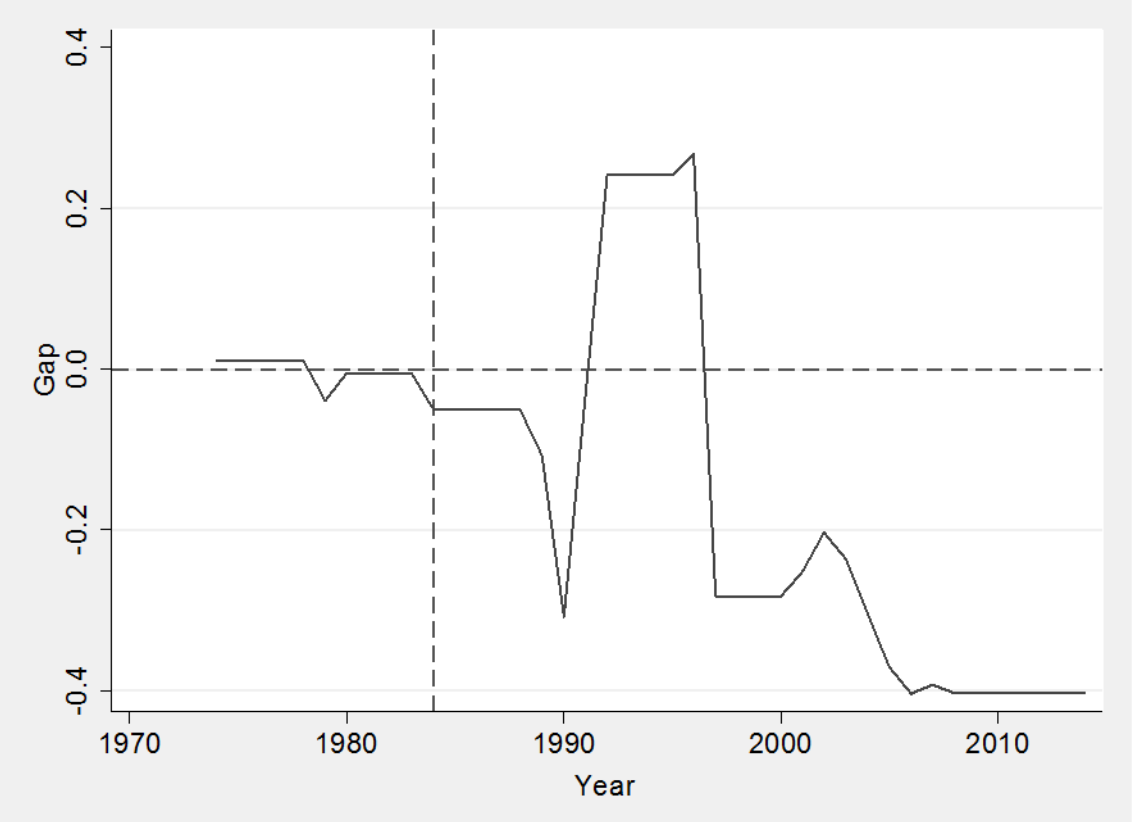
Source: Authors' illustration based on study data.

Figure 5: Path of democracy: (a) Republic of Congo 1984 versus synthetic control; (b) outcome gap

(a)



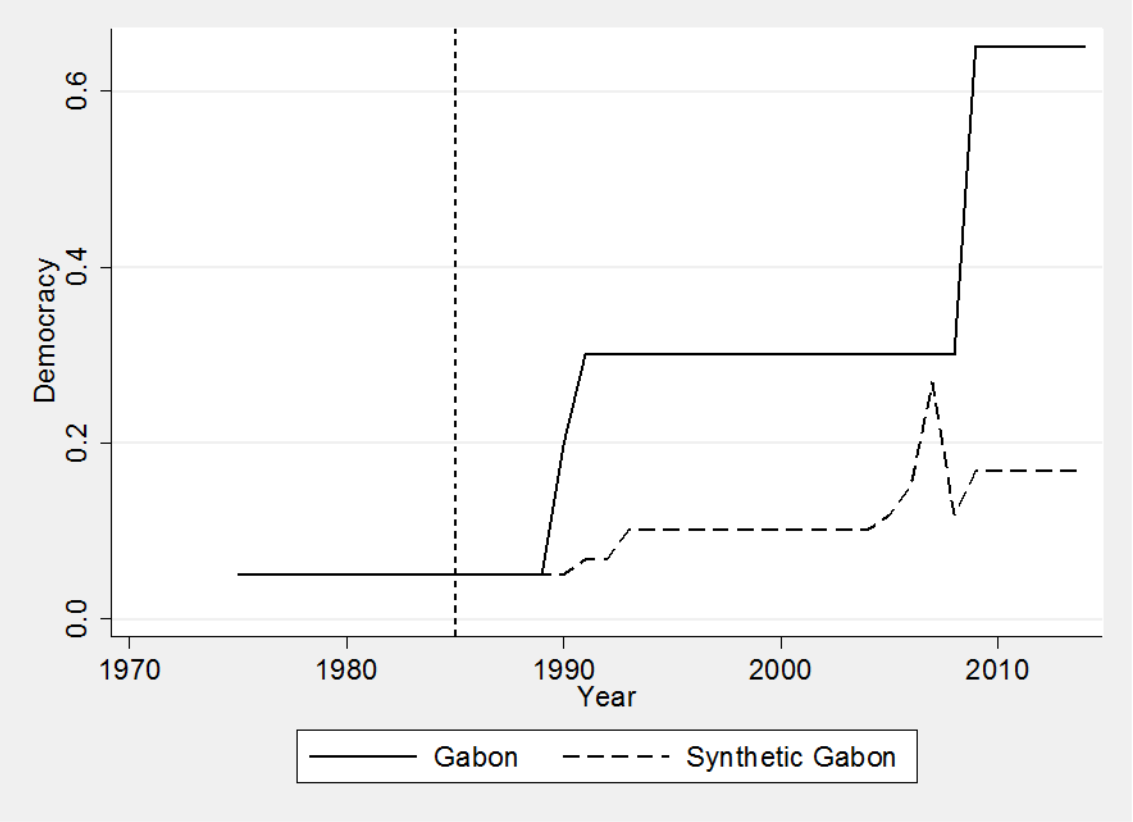
(b)



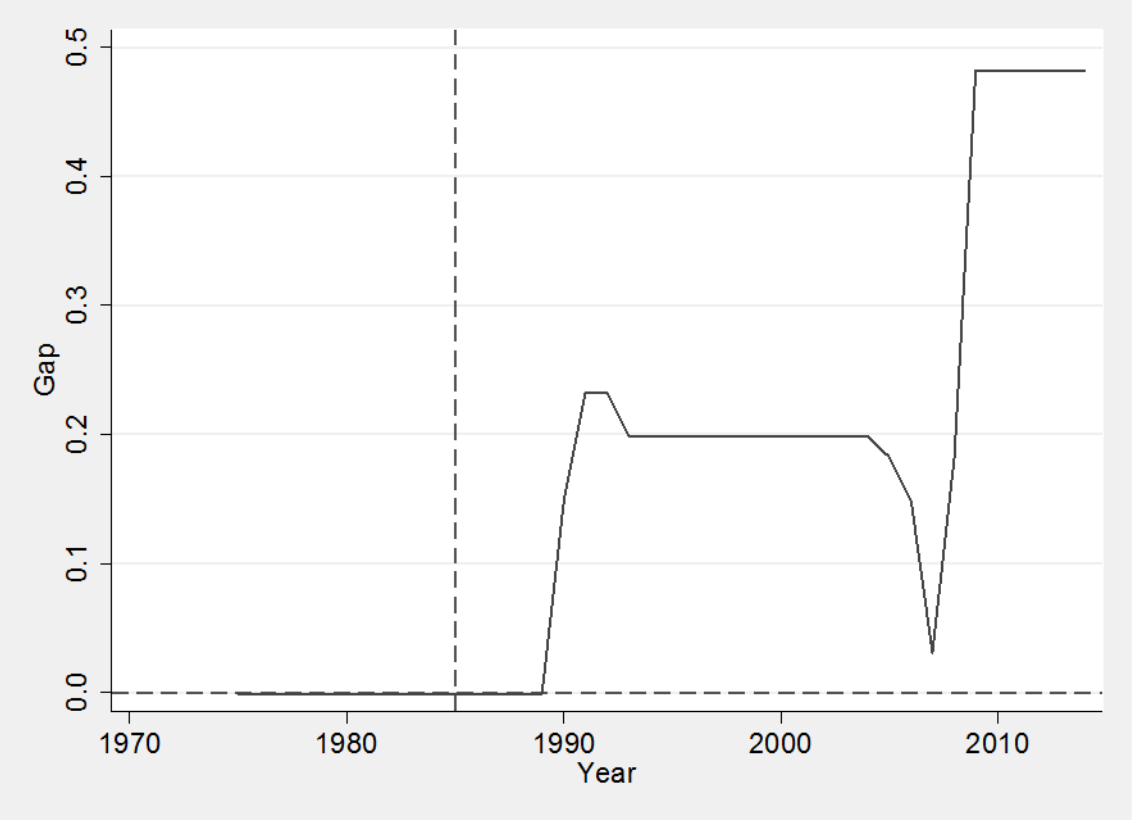
Source: Authors' illustration based on study data.

Figure 6: Path of democracy: (a) Gabon 1985 versus synthetic control; (b) outcome gap

(a)



(b)

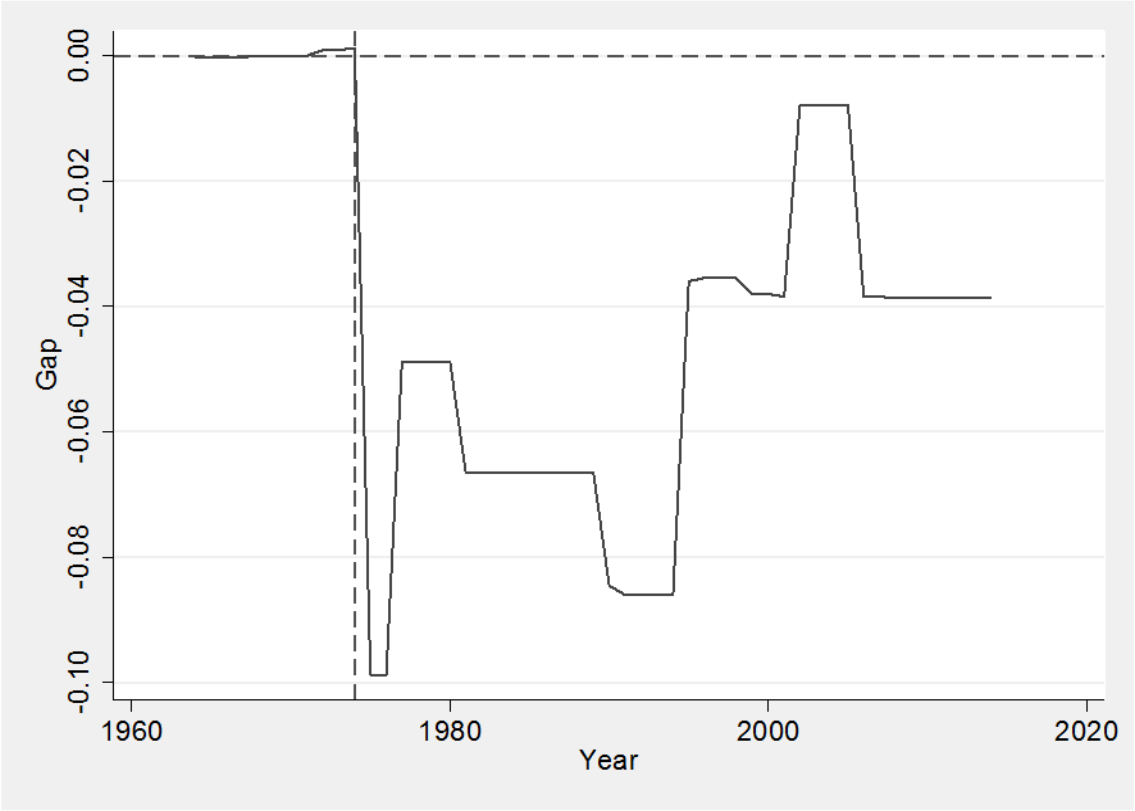


Source: Authors' illustration based on study data.

Figure 7: Path of democracy: (a) India 1974 versus synthetic control; (b) outcome gap

(a)

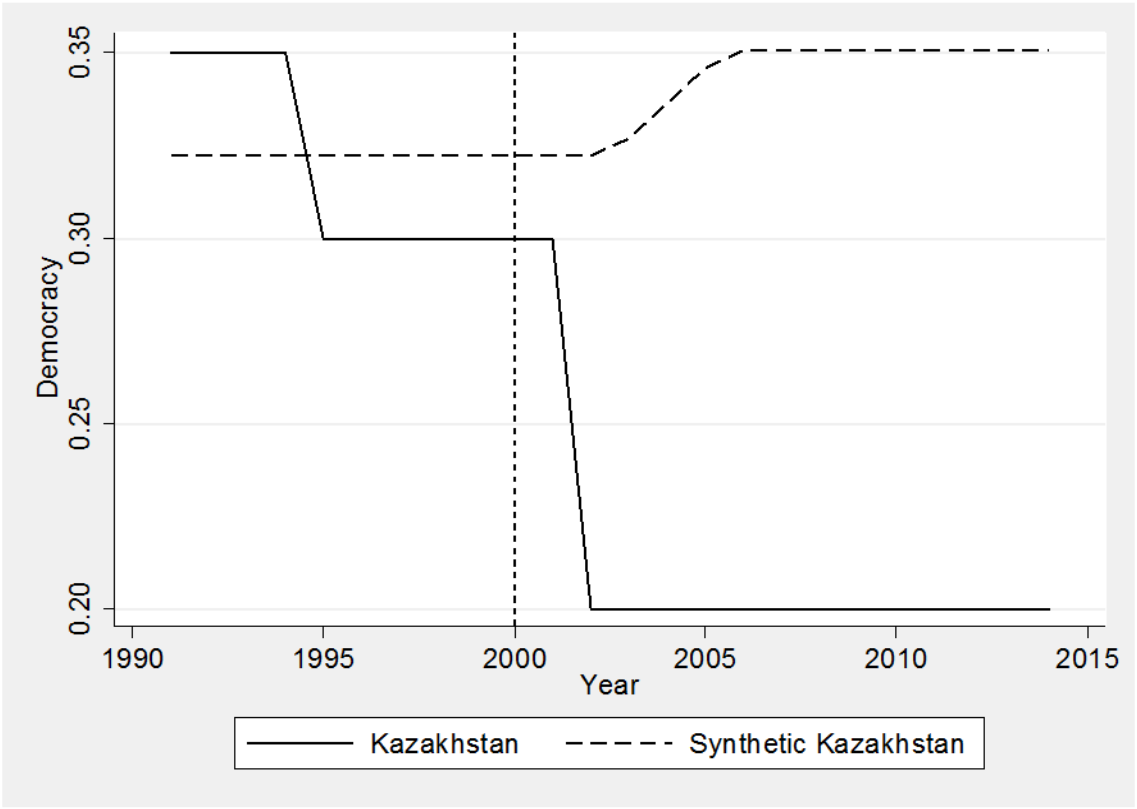
(b)



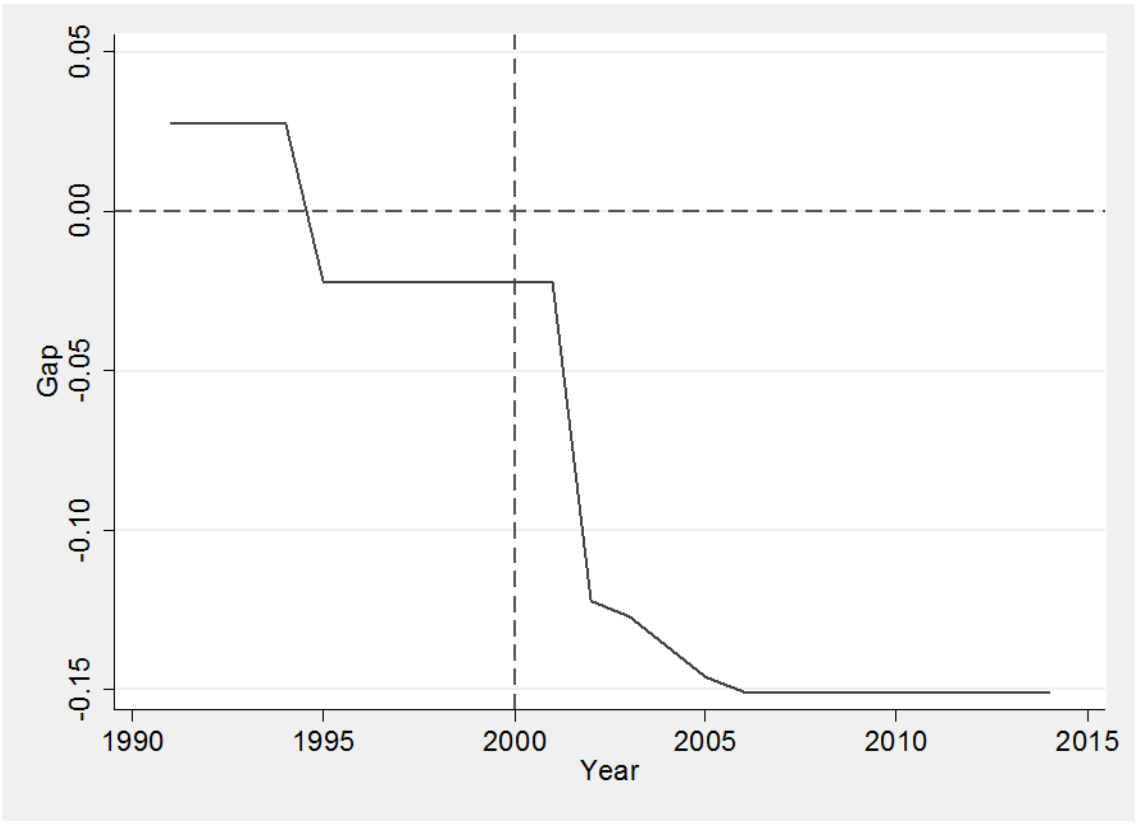
Source: Authors' illustration based on study data.

Figure 8: Path of democracy: (a) Kazakhstan 2000 versus synthetic control; (b) outcome gap

(a)



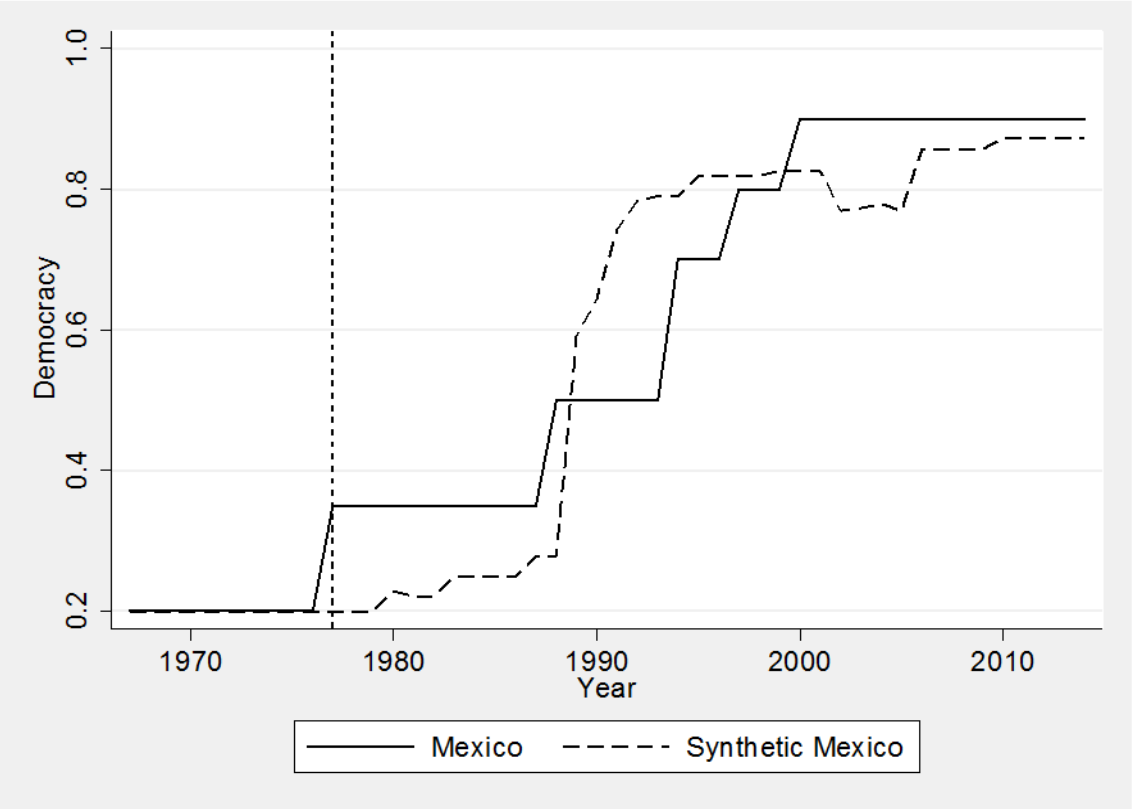
(b)



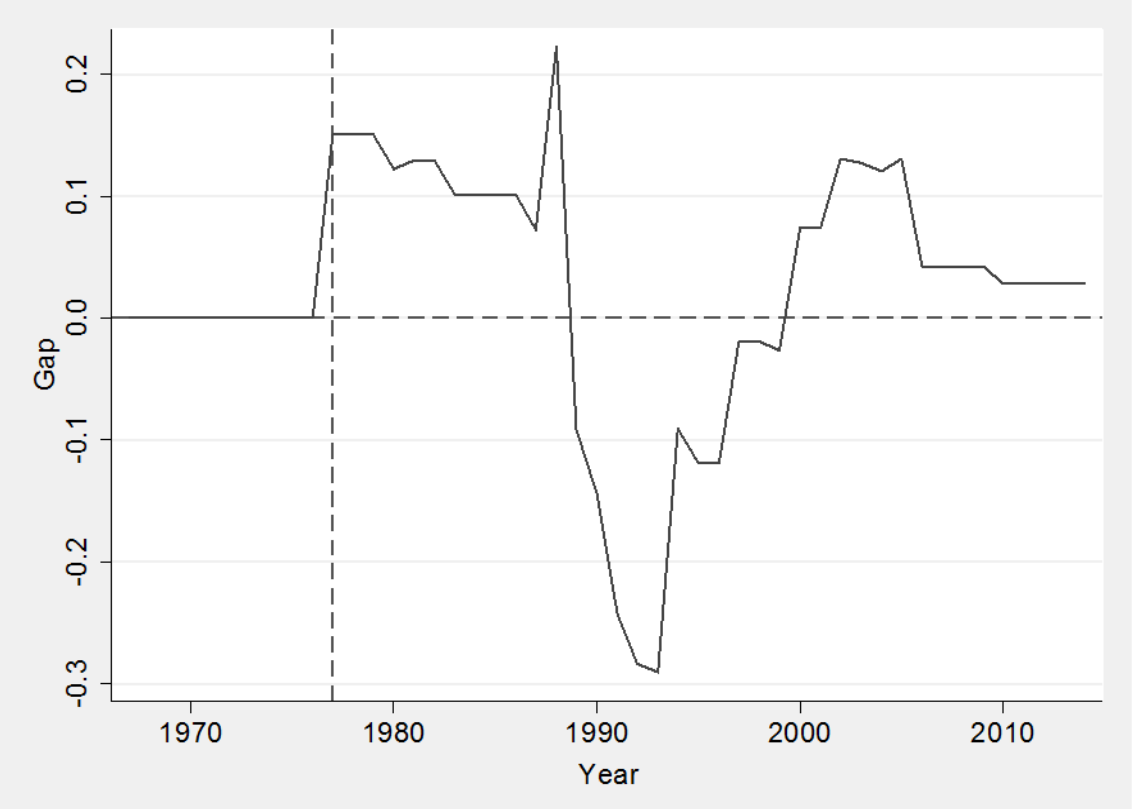
Source: Authors' illustration based on study data.

Figure 9: Path of democracy: (a) Mexico 1977 versus synthetic control; (b) outcome gap

(a)



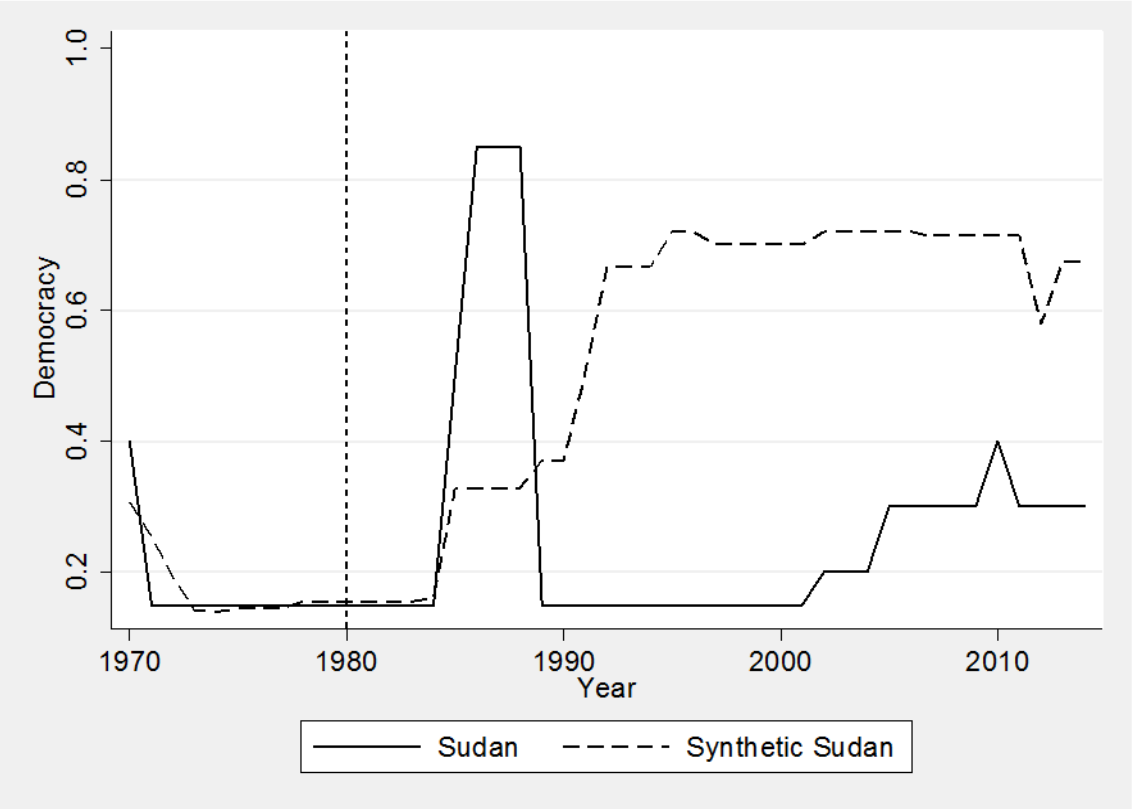
(b)



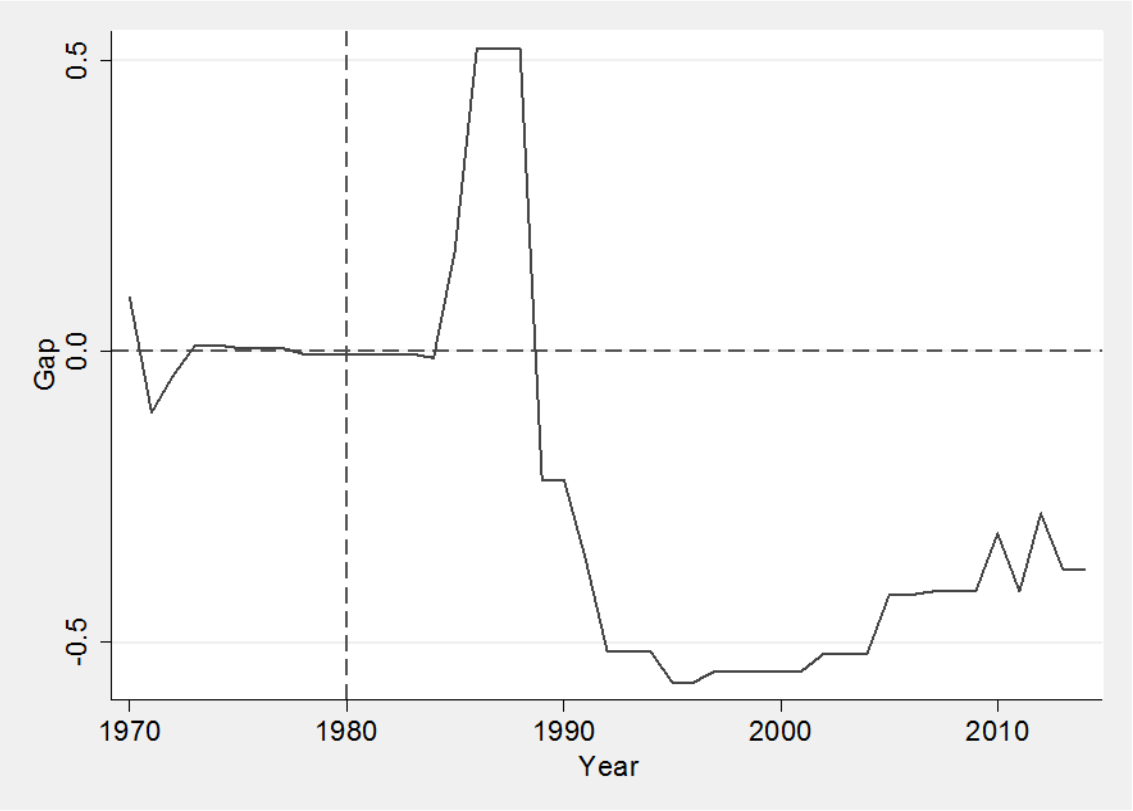
Source: Authors' illustration based on study data.

Figure 10: Path of democracy: (a) Sudan 1980 versus synthetic control; (b) outcome gap

(a)



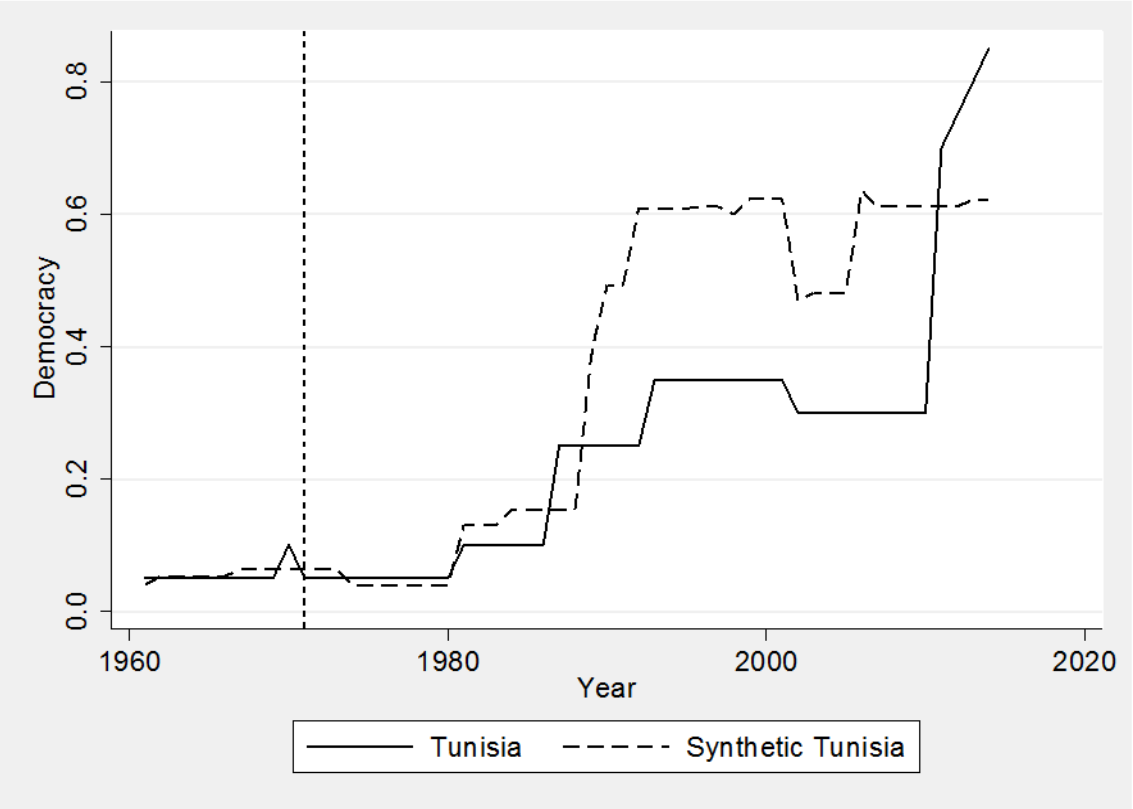
(b)



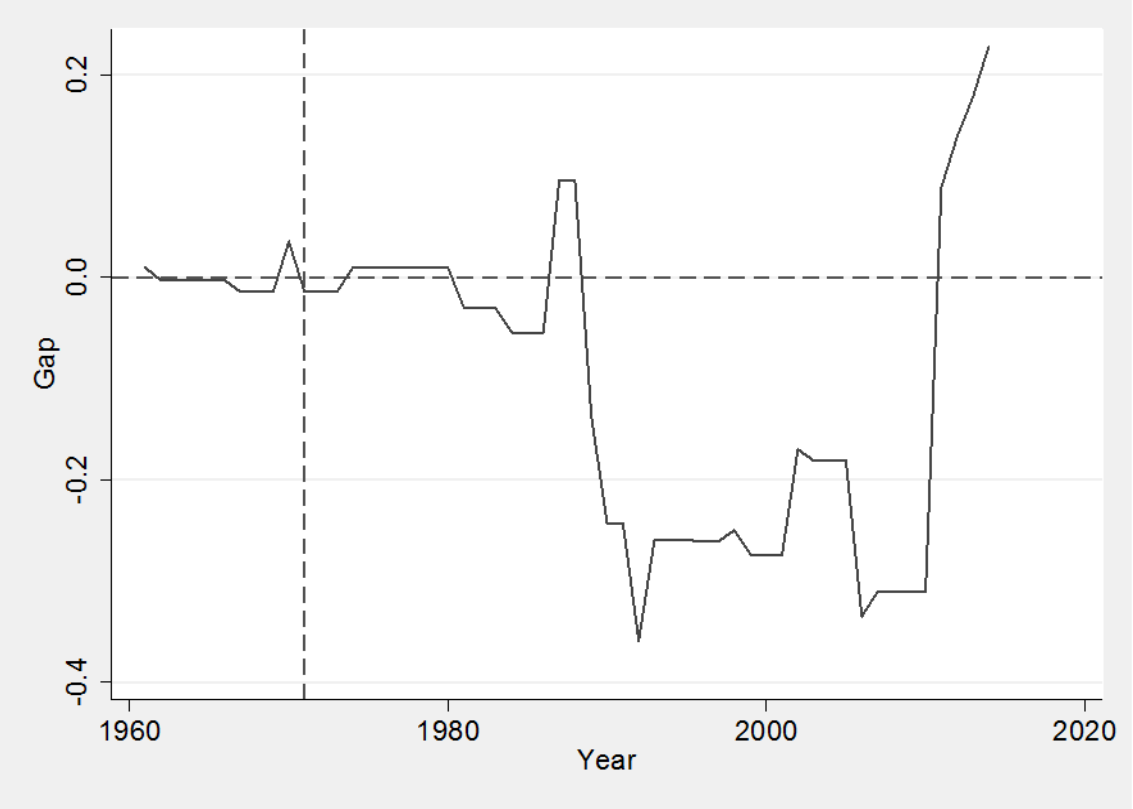
Source: Authors' illustration based on study data.

Figure 11: Path of democracy: (a) Tunisia 1971 versus synthetic control; (b) outcome gap

(a)



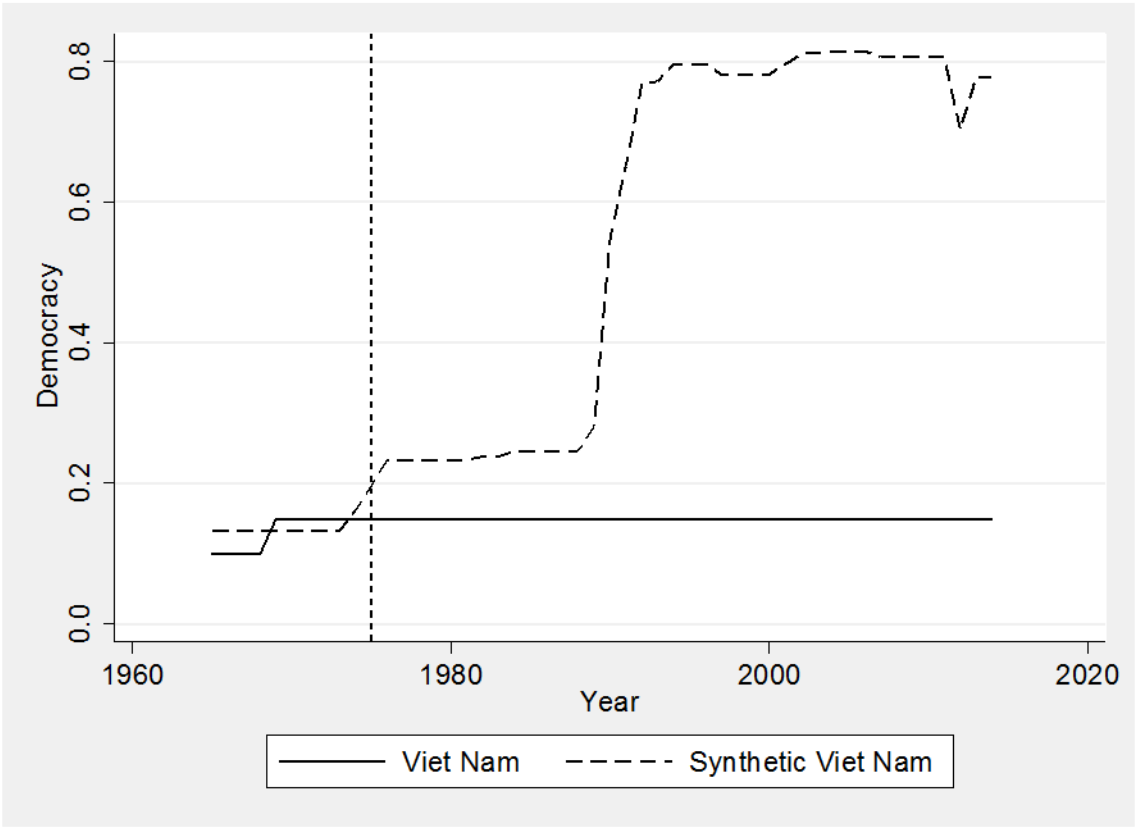
(b)



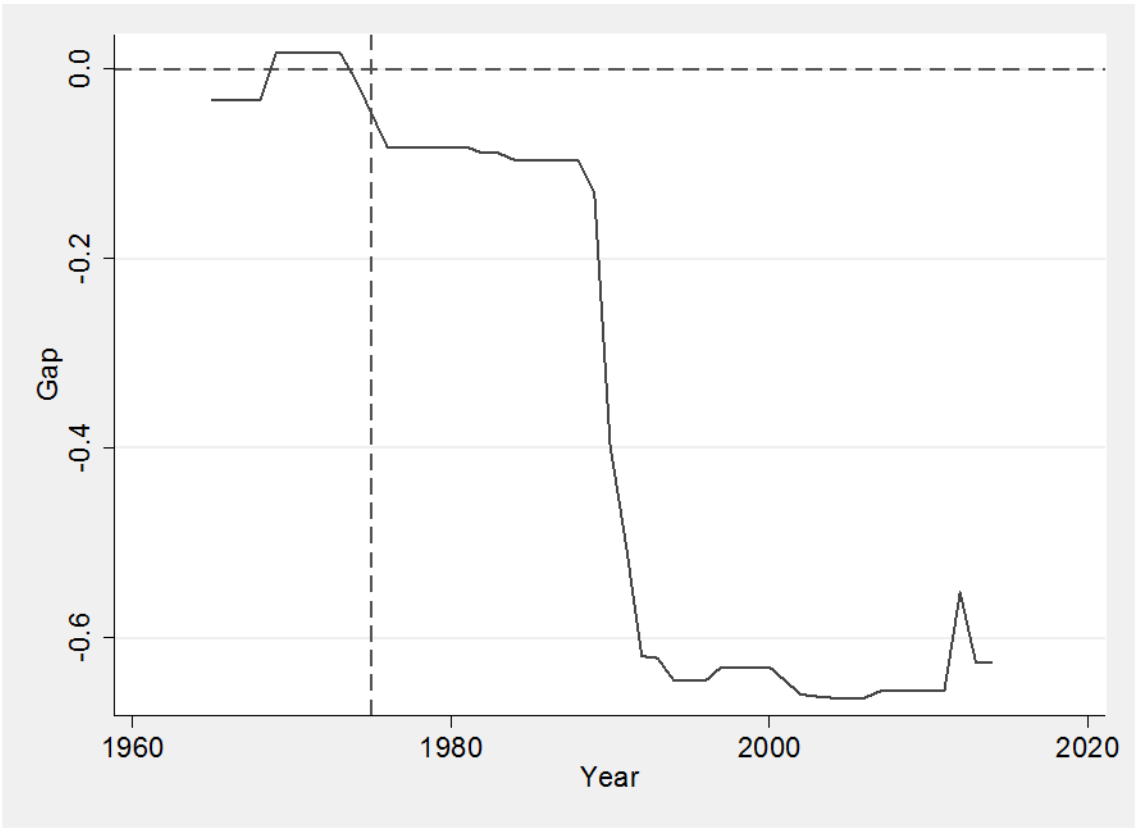
Source: Authors' illustration based on study data.

Figure 12: Path of democracy: (a) Viet Nam 1975 versus synthetic control; (b) outcome gap

(a)



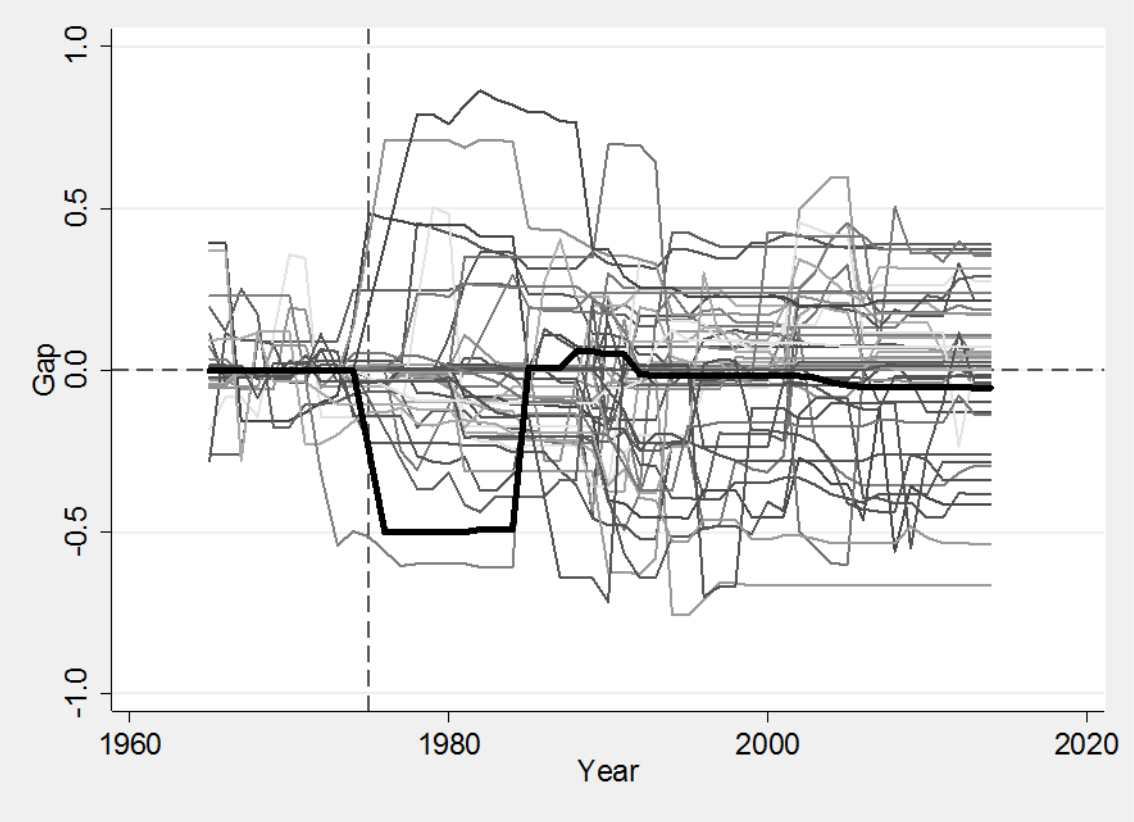
(b)



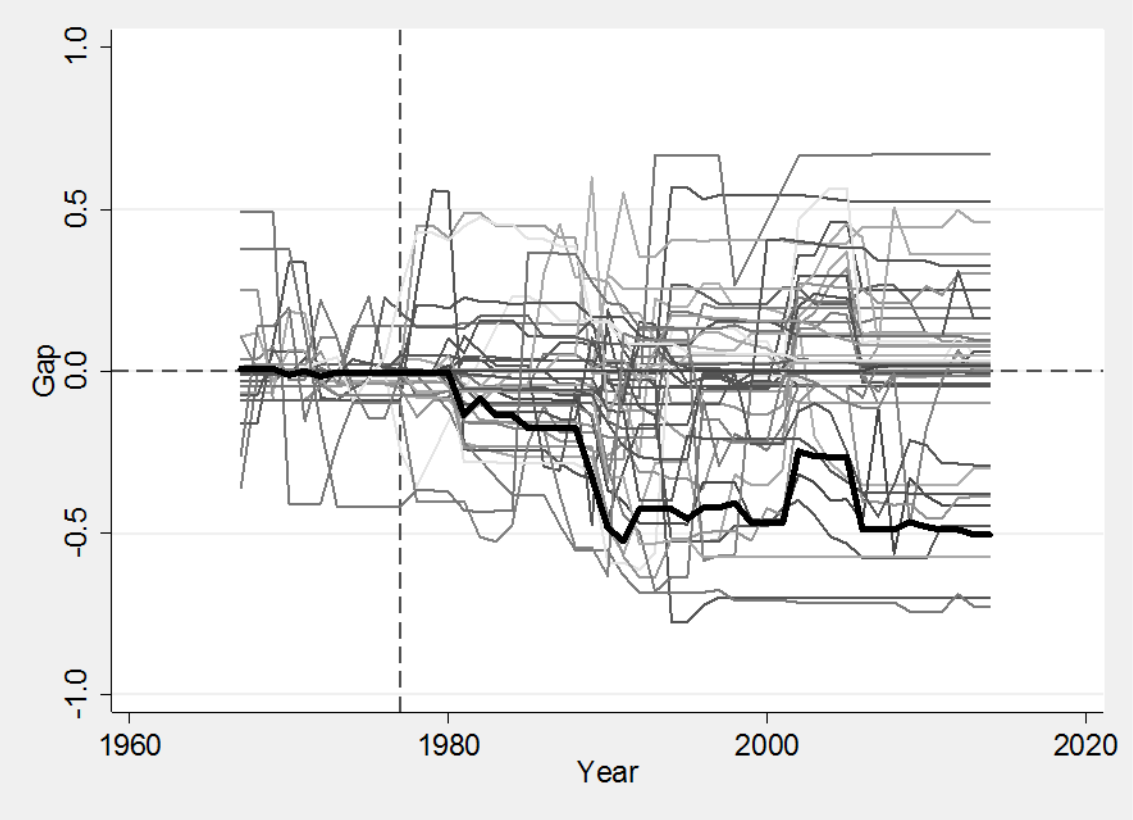
Source: Authors' illustration based on study data.

Figure 13: (a)–(l) Placebo tests

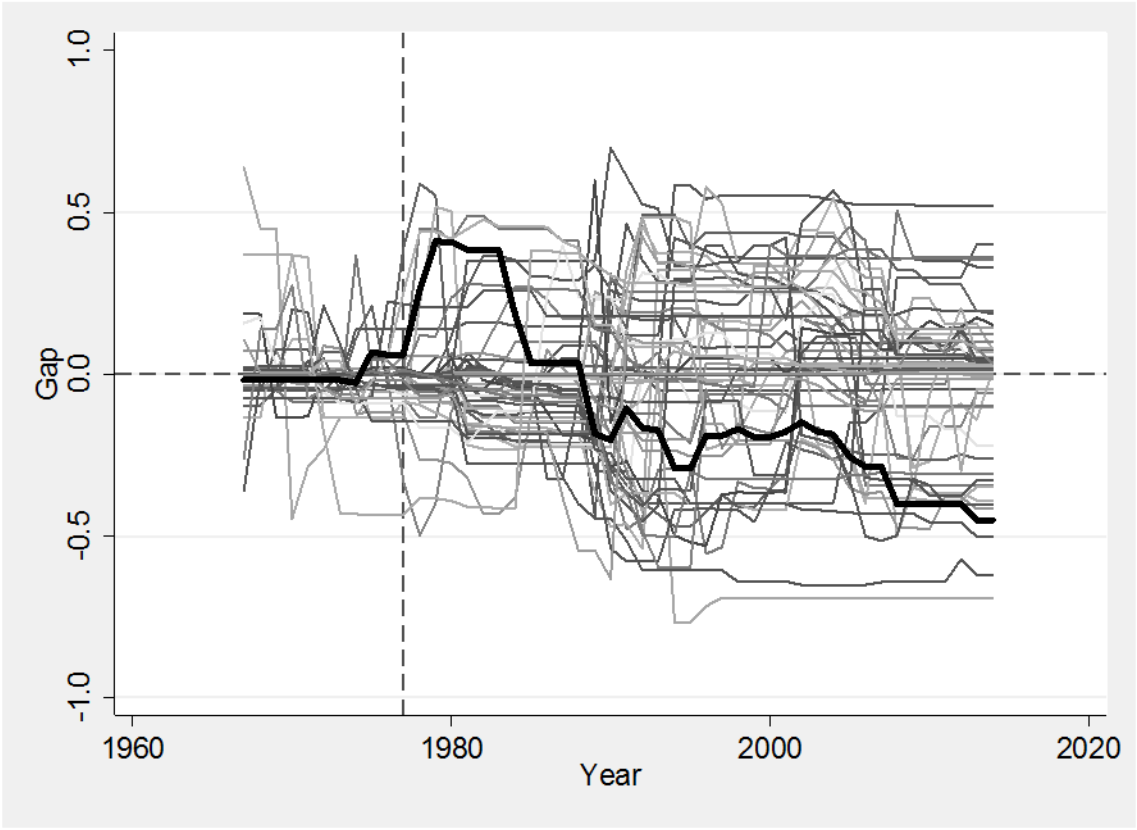
(a) Brazil



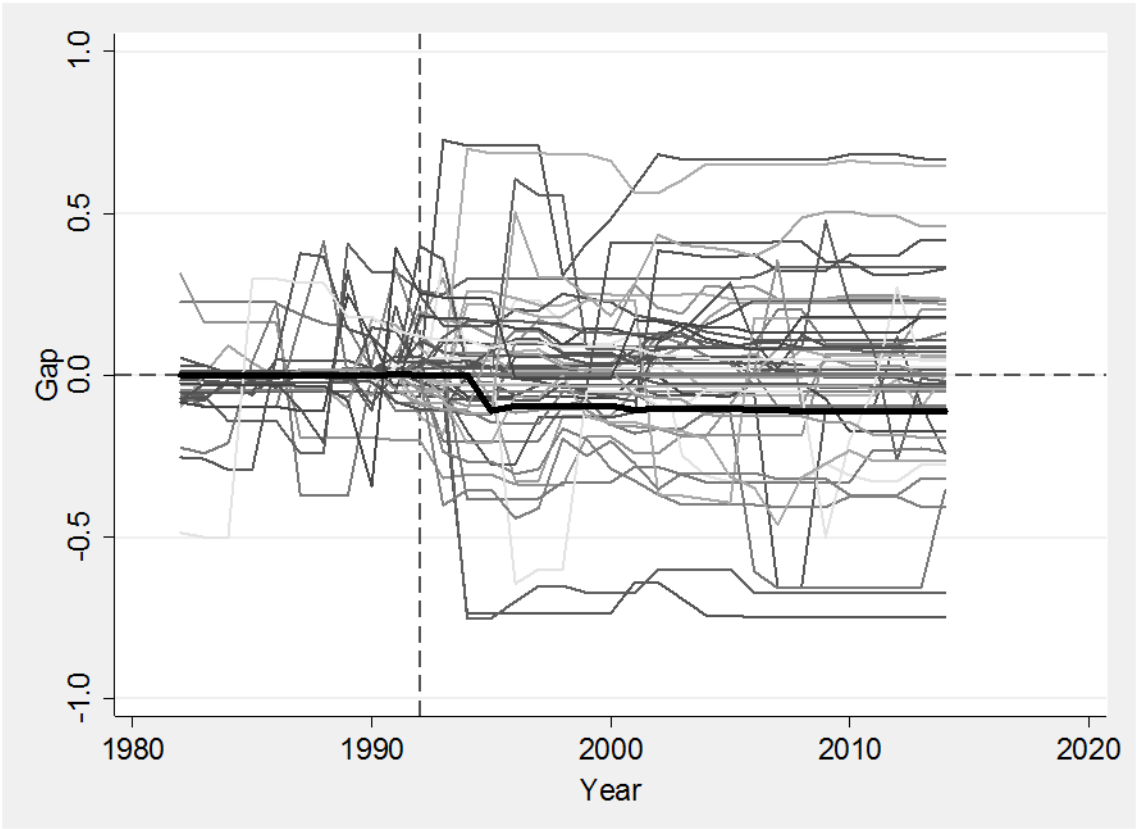
(b) Cameroon



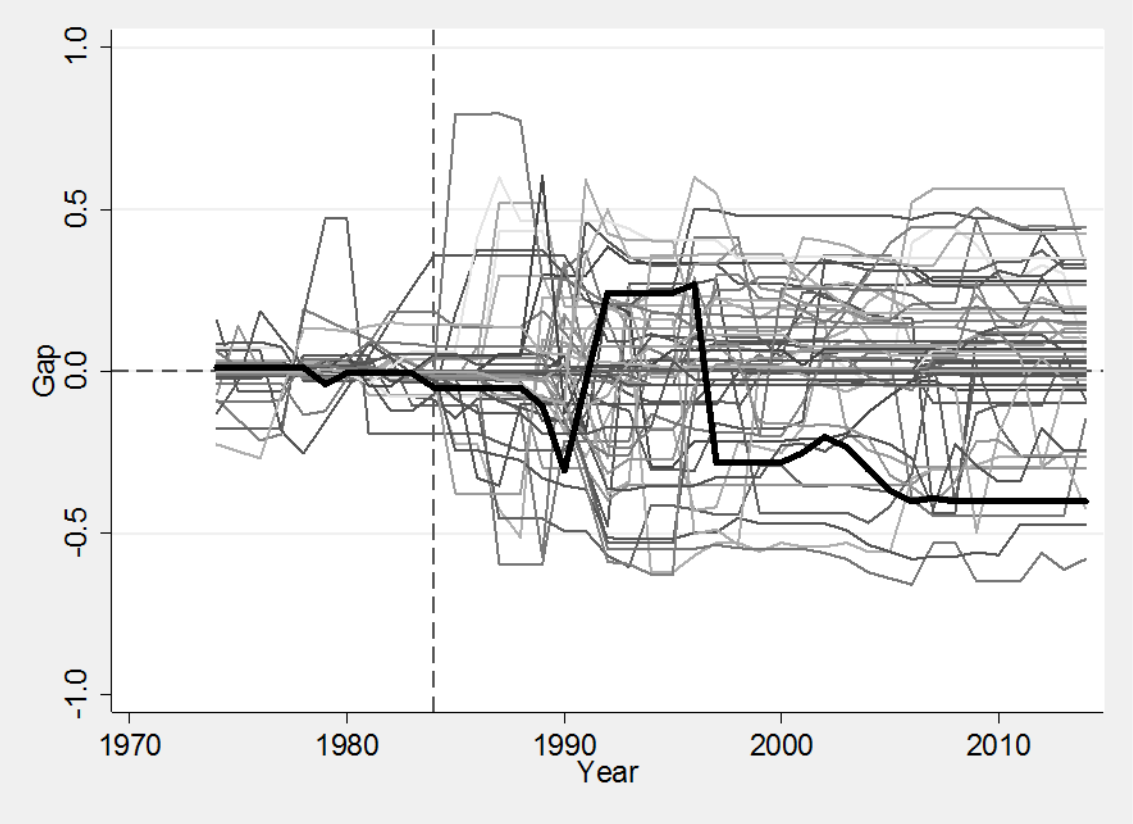
(c) Chad



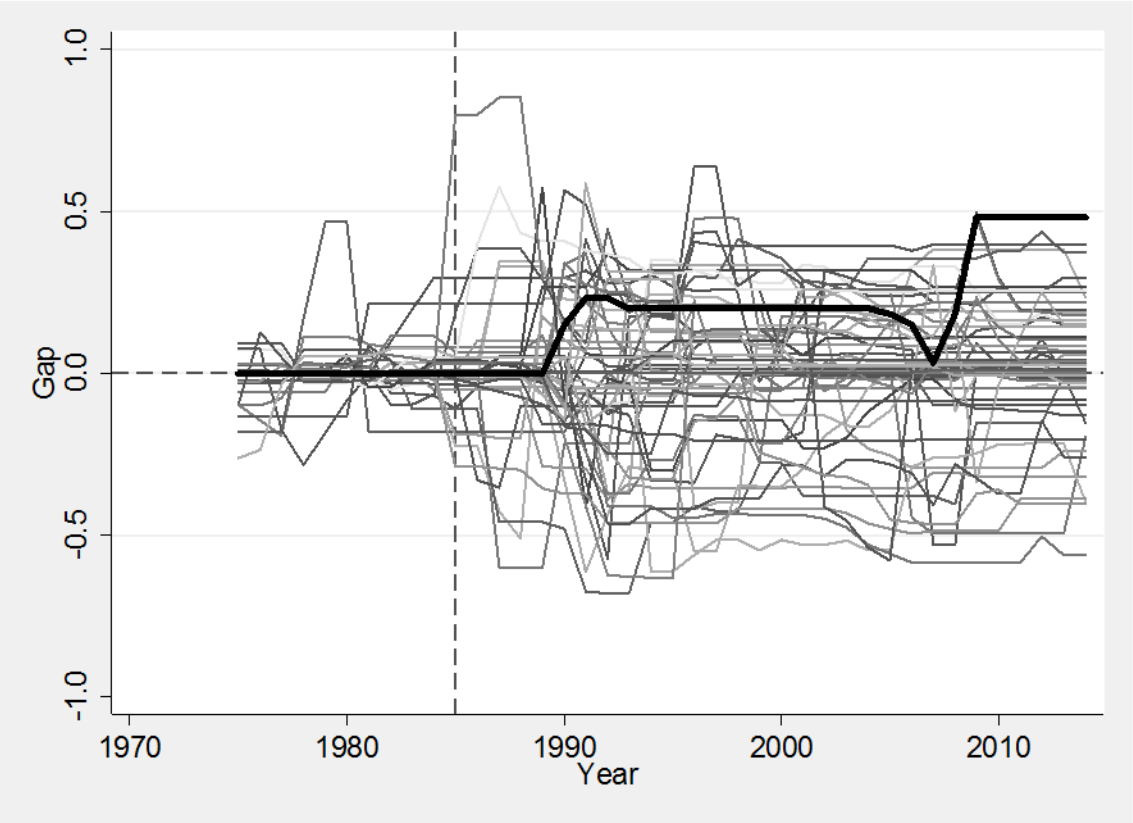
(d) Colombia



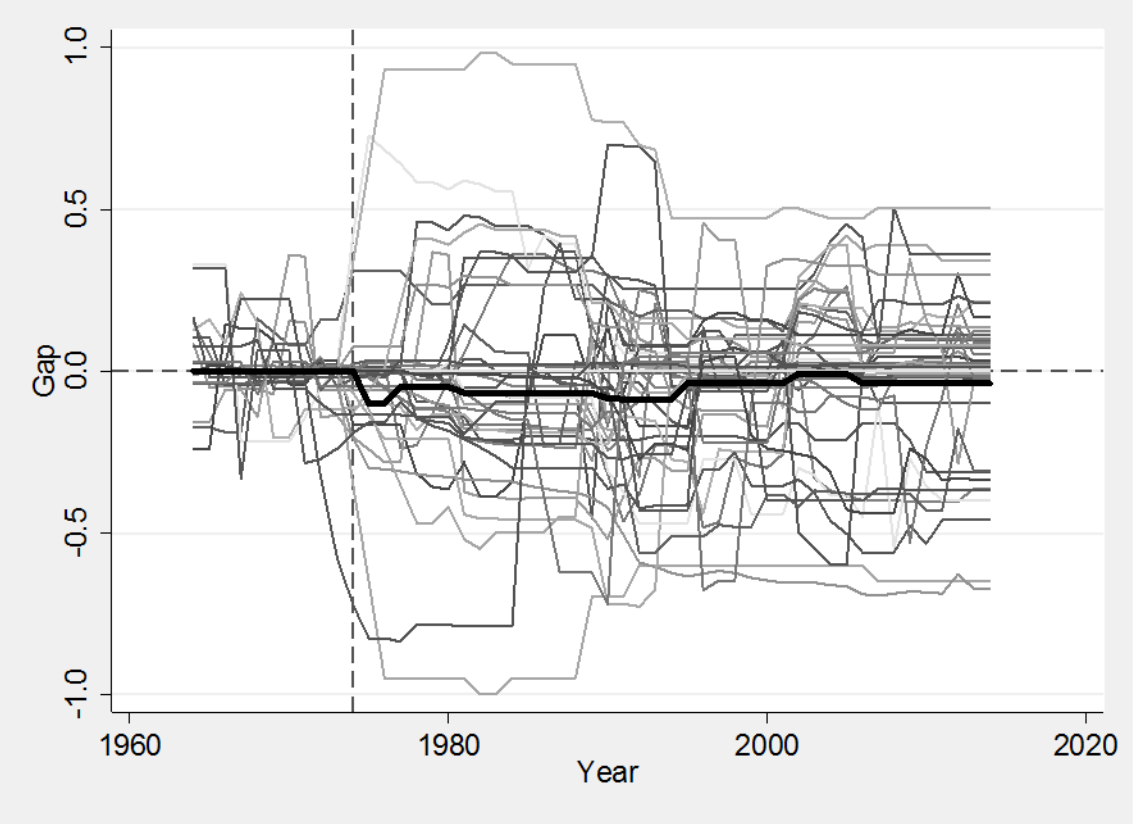
(e) Republic of Congo



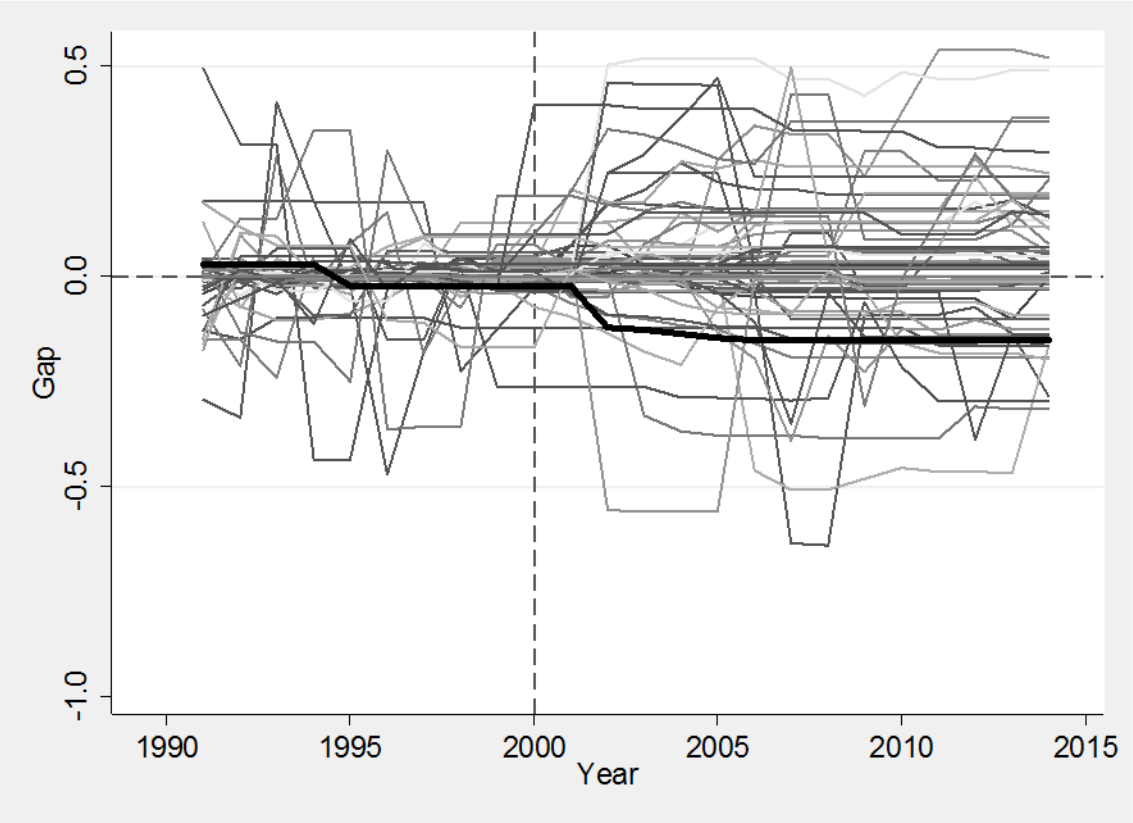
(f) Gabon



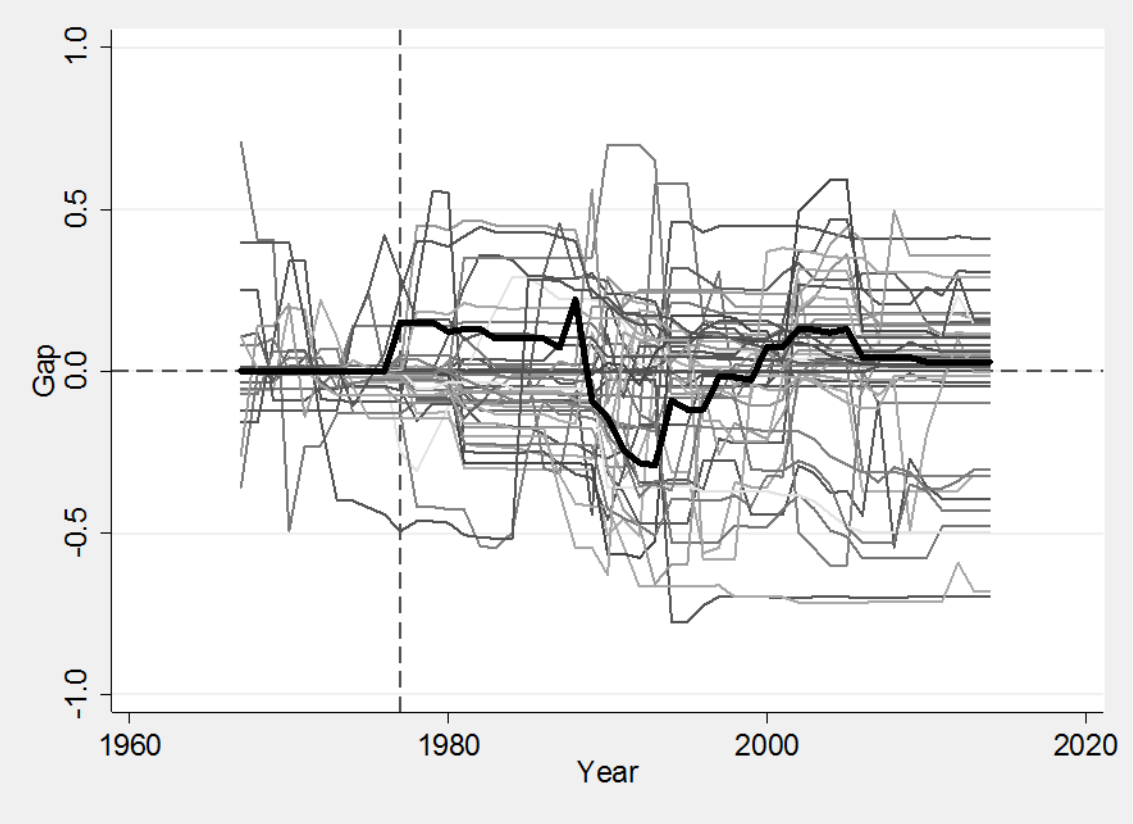
(g) India



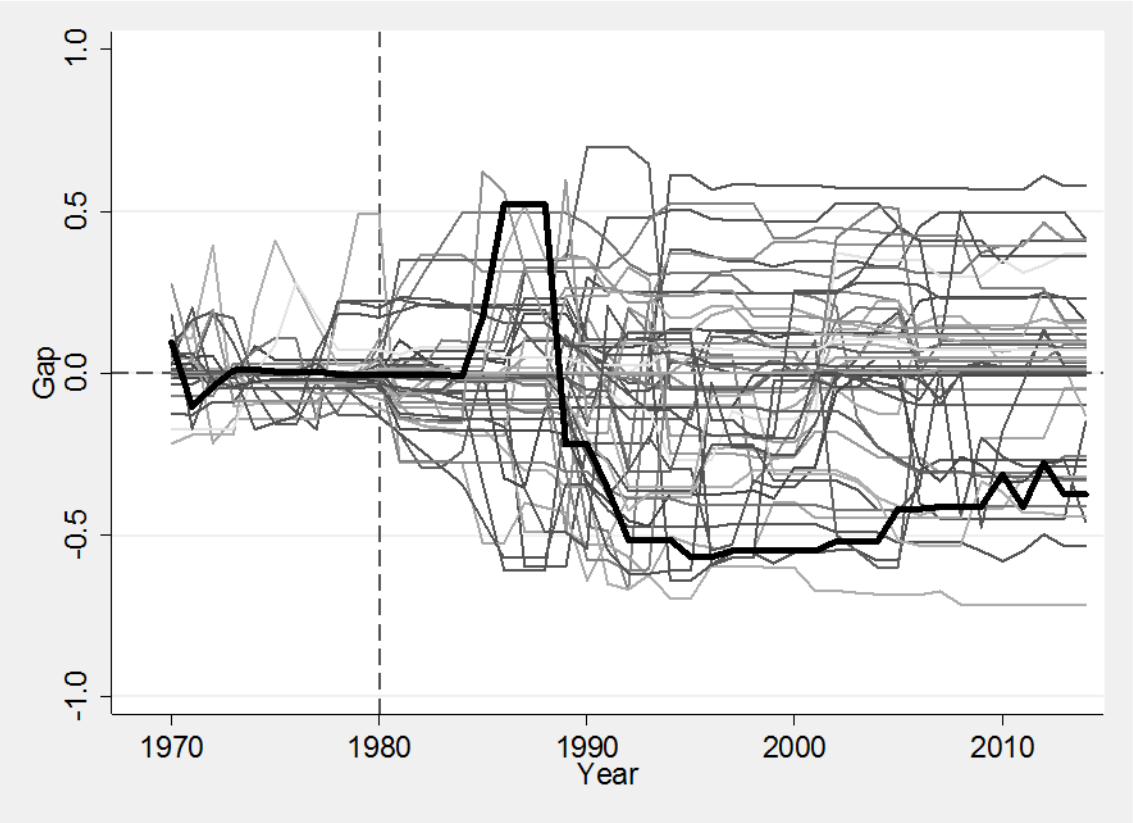
(h) Kazakhstan



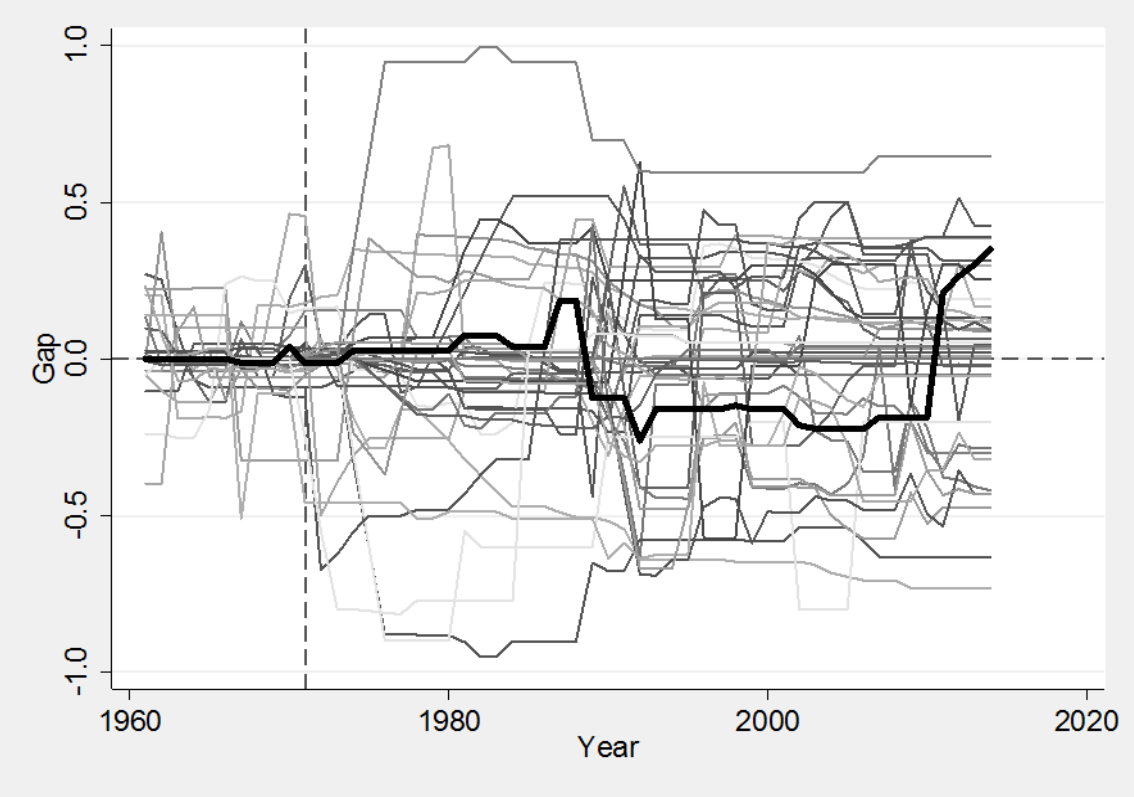
(i) Mexico



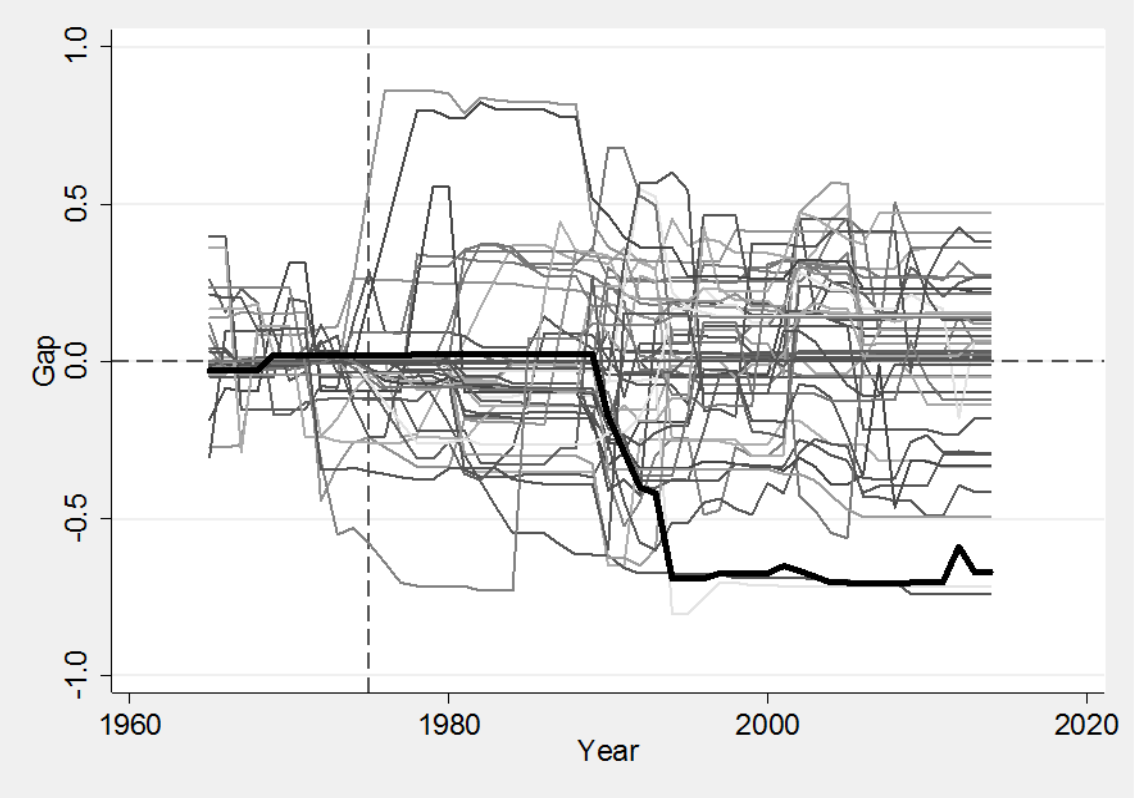
(j) Sudan



(k) Tunisia



(l) Viet Nam



Source: Authors' illustrations based on study data.

Appendix

Table A1: Discoveries excluded from the case studies

Country	Peak of oil discoveries	Country	Peak of oil discoveries
Albania	1928	Italy	1981
Algeria	1956	Kuwait	1938
Angola	1971	Libya	1961
Argentina	1960	Nigeria	1967
Australia	1967	Oman	1962
Austria	1947	Peru	1861
Azerbaijan	1871	Qatar	1940
Bahrain	1932	Romania	1857
Bolivia	1966	Russia	1960
Canada	1958	Saudi Arabia	1948
Chile	1960	Syria	1966
China	1959	Trinidad	1959
Croatia	1950	Turkey	1969
Ecuador	1969	Turkmenistan	1964
Egypt	1965	Ukraine	1962
France	1958	United Arab Emirates	1980
Germany	1952	United States	1930
Hungary	1964	Uzbekistan	1992
Indonesia	1945	Venezuela	1941
Iran	1961	Yemen	1978

Source: Campbell (2006).

Table A2: Country weights in the synthetic control and potential controls

Brazil	
Synthetic control	Central African Republic (0.01), Democratic Republic of the Congo (0.153), Morocco (0.004), Portugal (0.833)
Potential controls	Belgium, Bulgaria, Burundi, Sri Lanka, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Lao People's Democratic Republic, Liberia, Luxembourg, Malawi, Mali, Mauritania, Mongolia, Nepal, New Zealand, Niger, Paraguay, Philippines, Poland, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Spain, Sweden, Switzerland, Togo, Tanzania, Uruguay, Zambia
Cameroon	
Synthetic control	Benin (0.075), Nepal (0.368), Niger (0.049), Paraguay (0.301), Tanzania (0.156), Uruguay (0.051)
Potential controls	Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Dominican Republic, El Salvador, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Liberia, Luxembourg, Malawi, Mali, Mauritania, Mongolia, Morocco, New Zealand, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Spain, Sweden, Switzerland, Togo, Zambia
Chad	
Synthetic control	Bhutan (0.286), Ethiopia (0.007), Honduras (0.027), Malawi (0.169), Nepal (0.052), Paraguay (0.434), Portugal (0.023)
Potential controls	Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Finland, Gambia, Ghana, Greece, Guatemala, Guinea, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Liberia, Luxembourg, Madagascar, Mali, Mauritania, Mongolia, Morocco, New Zealand, Niger, Philippines, Poland, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Spain, Sweden, Switzerland, Togo, Tanzania, Burkina Faso, Uruguay, Zambia
Colombia	
Synthetic control	Nepal (0.007), Spain (0.884), Tanzania (0.048), Zambia (0.061)

Potential controls	Bangladesh, Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Czech Republic, Benin, Dominican Republic, El Salvador, Fiji, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Liberia, Luxembourg, Malawi, Mali, Mauritania, Mauritius, Mongolia, Morocco, Mozambique, New Zealand, Niger, Panama, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Swaziland, Sweden, Switzerland, Togo, Uganda, Uruguay, Zimbabwe
Republic of Congo	
Synthetic control	Jordan (0.228), Liberia (0.669), Zambia (0.103)
Potential controls	Bangladesh, Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Fiji, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Luxembourg, Malawi, Mali, Mauritania, Mauritius, Mongolia, Morocco, Nepal, New Zealand, Niger, Panama, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Spain, Swaziland, Sweden, Switzerland, Togo, Tanzania, Uruguay, Zimbabwe
Gabon	
Synthetic control	Mauritania (0.336), Singapore (0.001), Swaziland (0.664)
Potential controls	Bangladesh, Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Fiji, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Liberia, Luxembourg, Malawi, Mali, Mauritius, Mongolia, Morocco, Nepal, New Zealand, Niger, Panama, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, South Africa, Zimbabwe, Spain, Sweden, Switzerland, Togo, Tanzania, Uruguay, Zambia
India	
Synthetic control	Costa Rica (0.429), Japan (0.517), Lao People's Democratic Republic (0.001), Nepal (0.051), Zambia (0.002)
Potential controls	Belgium, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Cyprus, Benin, Dominican Republic, El Salvador, Finland, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Jordan, Kenya, Republic of Korea, Liberia, Luxembourg, Malawi, Mali, Mauritania, Mongolia, Morocco, New Zealand, Niger, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, South Africa, Spain, Sweden, Switzerland, Togo, Tanzania, Uruguay
Kazakhstan	
Synthetic control	Lao People's Democratic Republic (0.349), Liberia (0.095), Singapore (0.556)
Potential controls	Bangladesh, Armenia, Belgium, Botswana, Bulgaria, Burundi, Cambodia, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Czech Republic, Benin, Dominican Republic, El Salvador, Estonia, Fiji, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Kyrgyzstan, Lesotho, Latvia, Lithuania, Luxembourg, Malawi, Mali, Mauritania, Mauritius, Mongolia, Moldova, Morocco, Mozambique, Namibia, Nepal, New Zealand, Niger, Panama, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, Slovenia, South Africa, Spain, Swaziland, Sweden, Switzerland, Tajikistan, Togo, Uganda, Tanzania, Uruguay, Zambia, Zimbabwe
Mexico	
Synthetic control	Democratic Republic of the Congo (0.067), Japan (0.083), Nepal (0.142), Poland (0.57), Togo (0.137)
Potential controls	Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Jordan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Liberia, Luxembourg, Malawi, Mali, Mauritania, Mongolia, Morocco, New Zealand, Niger, Paraguay, Philippines, Portugal, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Spain, Sweden, Switzerland, Tanzania, Uruguay, Zambia
Sudan	
Synthetic control	Greece (0.014), Jordan (0.126), Mali (0.385), Tanzania (0.267), Uruguay (0.208)
Potential controls	Belgium, Botswana, Bulgaria, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Fiji, Finland, Gambia, Ghana, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Kenya, Republic of Korea, Lao People's Democratic Republic, Lesotho, Liberia, Luxembourg, Malawi, Mauritania, Mauritius, Mongolia, Morocco, Nepal, New Zealand, Niger, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, Singapore, South Africa, Spain, Swaziland, Sweden, Switzerland, Togo, Zambia, Zimbabwe

Tunisia	
Synthetic control	Jordan (0.485), Mongolia (0.034), Nepal (0.257), Paraguay (0.224)
Potential controls	Belgium, Bulgaria, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Finland, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Jordan, Republic of Korea, Lao, Liberia, Luxembourg, Mali, Mauritania, Mongolia, Morocco, Nepal, New Zealand, Niger, Paraguay, Philippines, Poland, Portugal, Rwanda, Senegal, Sierra Leone, South Africa, Spain, Sweden, Switzerland, Togo, Tanzania, Uruguay
Viet Nam	
Synthetic control	Bulgaria (0.355), Jordan (0.143), Malawi (0.035), Mali (0.297), Portugal (0.119), Singapore (0.05)
Potential controls	Belgium, Burundi, Central African Republic, Sri Lanka, Democratic Republic of the Congo, Costa Rica, Cyprus, Benin, Dominican Republic, El Salvador, Finland, Gambia, Ghana, Greece, Guatemala, Honduras, Ireland, Israel, Jamaica, Japan, Kenya, Republic of Korea, Lao People's Democratic Republic, Liberia, Luxembourg, Mauritania, Mongolia, Morocco, Nepal, New Zealand, Niger, Paraguay, Philippines, Poland, Rwanda, Senegal, Sierra Leone, South Africa, Spain, Sweden, Switzerland, Togo, Tanzania, Uruguay, Zambia

Source: Authors' compilation.