ERASMUS UNIVERSITY ROTTERDAM

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The Economic Impacts of Democratic Transitions in Africa:

Case Studies using the Synthetic Control Method

Abstract

The African continent has witnessed a wave of democracy over the past two decades along with higher levels of economic development in the region. This research paper examined the possible relationship between democratic transitions in Africa and economic development by analyzing the impact of 4 African countries that made a permanent transition to democracy. This was done using a new research method called the Synthetic Control Method first introduced by Abadie and Gardeazabal (2003). The method enabled the estimation of the average treatment effects of Benin, Ghana, South Africa and Burkina Faso by constructing a weighted combination of potential control countries, which represents the synthetic control, to represent the countries in absence of treatment. Although it was not possible to construct a reasonable synthetic control for Burkina Faso, the results of the other countries suggests that the impact of democratic transitions are heterogenous with positive and significant effects on the real GDP per capita levels several years after the democratic transition for Benin and Ghana, and small insignificant negative effects for South Africa. The results are however not robust to changes in the group of potential control countries.

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

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1 Introduction

For the last two decades the African continent has went through a great variety of developments. One of these major changes was the rise of more democratic regimes. From 1990 to 2000 most countries in the continent have transformed from closed autocratic regimes with no type of elections into countries with at least some form of elections including multiparty elections and access to more liberal political principles. Quite a few of these countries only appeared to be democratic by holding elections while continuing with their autocratic practices (Lührmann, Tannenberg, & Lindberg, 2018). However others, have made the full transition into democratic regimes with free and fair elections. At the same time Africa´s economy has been gradually growing compared to the periods before, with increasing GDP growth rates since 1993 (World Bank, 2020). Consequently, on might reason that the rise of democratic regimes and economic development may be connected.

Several studies have dived into the potential effects that the transition to democratic regimes might have on economic growth. Many of these studies have found either a negative (Barro, 1996; Tavares & Wacziarg, 2001), positive (Papaioannu & Siourounis, 2008) or insignificant results (Murtin & Wacziarg, 2014), resulting in no definite conclusion due to the differences in outcomes of the studies. However, last year Acemoglu, Naidu, Restrepo, and Robinson (2019) have published a research paper with spectacular estimates that conclude that a country that turned democratic has 20 percent higher GDP levels in the next 25 years compared to countries that remained autocratic. In this research they have adopted several new strategies, a dynamic (linear) panel model, semiparametric model and instrumenting democracy with regional democratization waves, to come to his conclusions. Inspired by the insights of Acemoglu et al. (2019) and their new approaches to study the effects of democracy on economic growth, this research paper proposes a new research method as well called the synthetic control method created by Abadie and Gardeazabal (2003) which builds on the limitations of time series regressions and the difference-in-differences method. This method will be used to achieve the main objective which is to see if full democratic transitions may explain the economic progress that countries of Africa have made. Therefore in this research paper the following question is proposed:

What are the economic impacts of democratic transitions of countries in Africa?

In order to answer this research question, the economic impacts of democratic transitions of four different African countries are evaluated. The four case countries for which such a synthetic control has been constructed are Benin, Ghana, South Africa and Burkina Faso. This research paper contributes to the existing literature in two ways. Firstly, in terms of the methodology used as the Synthetic Control Method (SCM) is applied. The effect of democratization on economic growth has been examined by applying several different quantitative research methods such as difference-in-differences or cross and within-country panel data regressions. The SCM enables a construction of a weighted combination of autocratic countries, called the synthetic control, to represent the country had it not have undergone a democratic transition. In this way it can compare the difference in real GDP per capita levels of a country that has undergone a democratic transition with this synthetic control as a counterfactual and allows for an individual country analysis. The method is useful as it builds on the limitations of time series regressions and the difference-in-differences method which previously have been used to study the effect of a democratic transition on economic growth and could potentially deal with the endogeneity concerns. Furthermore, previous literature has been focused on the average effect across all countries, through the application of the SCM this research paper is able to concentrate on the effects on economic growth of 4 individual countries that transitioned to a democratic regime. Secondly, the research paper introduces new data to measure democracy from the Varieties of Democracy (V-Dem) dataset (Coppedge et al., 2020). By utilizing the Regimes of the World (RoW) classification (Lührmann et al., 2018), which is an indicator of democracy that goes beyond the classification of a democracy based on for example, the existence of fair elections, it was possible to distinguish between genuine democratic transitions and transitions that moved to a so called sham regime.

The research paper is structured as follows: Chapter 2 gives an overview of the existing literature regarding the effect of democracies on economic growth and the different ways regimes have been measured. In chapter three the formal description of the SCM is presented along with the advantages and limitations of this method. Subsequently, chapter 4 provides the data that has been used for this research along with the case selection and the selection of the control countries. In chapter 5 the results of the applied SCM of the four countries is presented along with a robustness check. Lastly, chapter six is a conclusion.

2 Literature Review

The relationship between democracy and economic growth is a popular topic in the field of political economics and has been studied extensively over the past few decades. However despite the amount of research, both the theoretical and empirical literature on the impact of democratization on economic growth is strongly ambiguous. This chapter will begin by accessing the main findings from previous research on the effect of democracy on economic growth. The literature review will then look into the measurements of democracy and is followed by the main concerns regarding the previous literature.

2.1 Theoretical arguments

Theoretically, several early studies have argued that democratization can be beneficial for economic growth. One way is through the protection of property rights. Olsen (1993) claims that a democratic system can protect property and contract rights better because authoritarian regimes cannot make credible commitments to these rights. Dictators have greater power and therefore have the ability to steal more from the public, leading to a detrimental effect on economic growth (Olson, 1993; McGuire & Olson, 1996). This view was expanded by Clague, Keefer, Knack and Olson (1996), who pointed out that with democratic systems property rights are better protected, and therefore the incentives for investment are greater. Alesina, Özler, Roubini, and Swagel (1996) highlight that a reduction of political instability better national and foreign investments as well, due to a decrease in uncertainty. Moreover, democratization is expected to stimulate growth as more attention is given to public education (Saint-Paul & Verdier, 1993) and better management of economic reforms (Haggard & Kaufman, 1997).

Contrary to the former reasonings, democratic transitions can have negative effects on economic growth as democracies are generally associated with redistributive policies that are presumed to hamper growth (Alesina & Rodrik, 1994). Additionally, Olson (1982) argues that demanding interest groups that are key voting groups are common in democracies. This could lead to the introduction of policies that are not consistent with the interests of the general public thereby sacrificing economic growth to protect these groups. In an authoritarian regime leaders are not pressured in this way and are more capable of formulating better policies.

2.2 Empirical results

On the empirical front, past cross-country studies came across small negative effects when examining the effect of democratic institutions on growth. By controlling for a large amount of

variables, Barro (1996) studied the direct impacts of democracy. The results of the study conclude that democracy has a small net negative effect on economic growth and indicated that the relationship between democracy and economic growth is not linear but hump-shaped. Similarly, a moderately negative net effect of democracy on growth was found by Tavares and Wacziarg (2001). The researchers find that democracy promotes growth by the expansion of the accumulation of human capital yet hampers growth by the minimization of the investment in physical capital. To account for endogeneity bias, as growth could potentially influence democracy, Helliwell (1994) applied an instrumental variable method for its cross-country analysis which resulted in negative but insignificant outcomes of the effect democracy on economic growth. However, the instrument, which were past democratic values, used in the research may not be suitable due to the violation of the exclusion restriction as past democratic values could affect growth.

Due to the diversification of econometric specifications, time spans, control variables and estimation techniques, there are different outcomes for the studies regarding the effect of democracy on economic growth. To examine these differences, Doucouliagos and Ulubasoglu (2008) performed an extensive meta-analysis based on 483 regression estimates coming from 84 studies published before 2005. Of these regression estimates, slightly more than half of the estimates were statistically insignificant and 27 and 15 percent of the significant estimates were positive and negative, respectively. The result do not conclude that the effect of democracy on economic growth is nonexistent, however the authors did conclude that there is no direct impact but positive indirect impacts on growth via lower levels of inflation, political instability and higher levels of economic freedom and human capital (Doucouliagos & Ulubasoglu, 2008). The study supports prior findings of Tavares and Wacziarg (2001) and stimulated further research that take into account the bias surrounding the research on the topic.

More recent within-country analyses have found that democratization benefits growth. Such as Rodrik and Wacziarg (2005) who showed, by including time and country fixed effects and controlling for different sorts of regime transitions in their estimations, that in the short run the impact of a democratization on economic growth is positive. Persson and Tabellini (2009) studied the impact of democratic transitions as well containing data which dates back to 1850 , as most studies depend on very short samples, and indicated a considerable increase in growth after a democratic transition. Likewise, Papaioannou and Siourounis (2008) estimated with their dynamic analysis that during democratic transitions there is moderate growth and after are followed by a stable medium and long term increase in economic growth. However, other studies that used comparable dynamic panel data methods, did not reach the same conclusion

such as for example the paper from Murtin and Wacziarg (2014) who indicated that there were no significant effects on economic growth after democratization. However most recently, Acemoglu et al. (2019), addressed the importance of the dynamics of economic growth and the reoccurring challenges of endogeneity as prior to the democratic transition, there is on average a drop in the GDP rates. By adopting a dynamic (linear) panel model, semiparametric model and instrumental variable strategy (instrumenting democracy with regional democratization waves), the researchers obtained remarkable results namely that permanent transitions to democracy encounter an 20 percent increase in GDP per capita over a 25 year long period. Altogether, the literature regarding the effect of democratizations on economic growth is inconclusive. In order to investigate the findings of the findings of the latest research, this paper proposes the hypothesis that countries that experienced a democratic transition have experienced a significant positive impact on economic growth. To investigate this hypothesis a sample of 4 countries have been selected that have undergone a democratic transition. Based on these case studies the following hypotheses are proposed:
The democratic transition in

a) Benin
b) Ghana
c) Burkina Faso
d) South Africa

has a positive significant impact on economic growth.

2.3 Measures of regime types

Various measures have been developed to conceptualize and classify democracy. With no consensus about how to formulate democracy, the interpretations range from dichotomous, continuous and polychotomous measures. There are two main methods that can be used to distinguish between a democracy and autocracy which are classified as qualitative or quantitative. Countries are labelled as democratic with the qualitative approach when they satisfy necessary conditions of a democracy. For example, Boix, Miller and Rosato (2013) apply three criteria to split countries into democracies and autocracies. A country is identified as democratic when their elections are free and fair, the majority of the male population have voting rights and the legislature must be elected directly or indirectly by popular elections. The disadvantage of this measure is that it may over or underestimate the actual amount of democracies and autocracies due to the lack of detail of the criteria and the limitation of placing the countries in only two categories. The quantitative approach to categorize countries into

regime types involves a continuous measure of democracy with a threshold where countries with values exceeding this threshold are considered to be democratic and with values below this threshold autocratic. Two popular democracy measures that enable the countries to be divided into categories are the Freedom House ratings (House, 2017) and the Polity scores (Marshall, Gurr, & Jaggers, 2019). House (2017) classifies the countries as being 'free', 'not free' and 'partly free' by equally combining its civil liberty and political rights scores. The downside to this classification is that it does not take into account conditions that may be necessary to call a country democratic. In addition, there is no clarity to whether partially free countries are considered to be democratic or autocratic. Marshall et al. (2019) use aggregated values to compile the Polity score, which has a range of values from -10 to +10, to categorize countries where countries with a score from -10 to -6 are considered to be autocracies, -5 to 5 have an anocracy and 6 to 10 have a democratic regime. Similar to the House classification there is no theoretical justification to why the separately measured degrees of democracy and autocracy are added up with equal weights (Munck & Verkuilen, 2002).

3 Methodology

The objective of this research paper is to examine the effect of a democratic transition on economic development of countries in Africa. In order to achieve this objective the SCM will be used which was first introduced by Abadie and Gardeazabal (2003) and later extended by Abadie, Diamond and Hainmueller (2010; 2015). The method is able to estimate the effect of the countries that underwent the democratic transitions by forming a weighted combination of potential control countries, (which are countries that remained autocratic over the whole time period), to represent the country that transitioned if it had not undergone the democratic transition. The SCM in this way combines elements from both the difference in differences (diff-in-diff) method and matching approach. In this chapter the main advantages and limitations of the SCM will be described and a formal description of the method will be presented. Lastly, the main assumptions of the method are discussed.

3.1 Advantages and limitations of the SCM

There are various advantages to applying the SCM compared to other panel data methods for this research paper. Firstly, the SCM is an appropriate method when it comes to a small amount of treated units and controls (Bouttell, Craig, Lewsey, Robinson, & Popham, 2018). Additionally, the SCM is driven by the limitations of the diff-in-diff method. The diff-in-diff method makes use of either one control unit or the average of all the potential control units to calculate the effect of the intervention. The SCM builds on this limitation by combining the potential control units with different weights in the best possible way to provide a comparison that is much more likely to be similar to the treated unit than the average of all the potential controls.

Another limitation of the diff-in-diff method is that the selection of the potential control units is not formalized, as the chosen units are based on the researchers speculations of which control unit is the best (Van Kippersluis, 2020). The SCM formalizes the selection process by using the available data to calculate the weights of the potential control units. This selection develops a synthetic control with similar characteristics to resemble the treated unit before the treatment as good as possible. Control units of the pool of potential controls that are not suitable to build a proper synthetic control are excluded, as the inclusion of these countries would be responsible for a biased estimate of the average treatment effect. These advantages of the SCM relax the parallel trend assumption of the diff-in-diff method, which would have assumed that the trends

of both the country that transitioned to a democracy and it's counterfactual are identical. The SCM is therefore useful as the validity of this parallel trends assumption is questionable in previous studies on the topic of democratization on economic growth.
Furthermore, the SCM allows for unmeasured time-varying confounders, while panel models such as the diff-in-diff method or fixed effects method only permit unmeasured time-invariant confounders. In this way the SCM can deal with endogeneity from omitted variable bias. The SCM can account for both the observed and unobserved time-varying confounders as it is assumed that the constructed synthetic control is composed of units that are similar to the treated unit in both observed and unobserved factors that affect the outcome variable and that a good fit is maintained with the treated unit for a long period of time in the period before the treatment (Bouttell et al., 2018).

One limitation of the SCM is that in order to measure the significance of the results, common statistical inference techniques are not applicable (Bouttell et al., 2018). In the context of the SCM, there are often a small amount of treated and control units, randomization is absent and the units are not sampled probabilistically as the treatment is varying at a high level of aggregation (Van Kippersluis, 2020). Abadie et al. (2003; 2010) therefore suggested using placebo tests based on permutation techniques in order to make inferences. This placebo test analysis involves re-applying the SCM to each and every control unit as if these were the treated, including the actual treated unit as a control unit, to estimate the 'placebo effect'. The placebo effects are then compared to the actual treatment effect in order to compute the p-value, which is the fraction of placebo effects that are larger than the effect of the actual treated unit. The effect of the treatment is considered to be significant if it can be seen that the effect of the treatment for the actual treated unit is way larger than the estimated effects for the placebo units. Another limitation is that the SCM does not take into account the possibility of reverse causality which is when the outcome variable also has an impact on the treatment instead of only the other way around. This is beyond the scope of this research paper, however this has to be considered when determining the credibility of the obtained results.

3.2 Description of the SCM

In order to explain how to SCM works, the formula descriptions of Abadie and Gardeazabal (2003), Abadie et al. (2010; 2015) are followed and made applicable for the 4 case studies. For each application of the SCM there is a panel of in total J + 1 countries (indexed by j), where j=1 is the only country that is transitioning to a democracy, and countries j = 2 to j = J + 1

represent the potential control countries that remain autocracies. The panel of countries are observed over the same time span t = 1,2, … , T, where t = 1, …, $T_0 - 1$ are the time periods before the democratization of country j and t = T_0, …., T are the period of the democratization and the periods after. Let Y_{jt}^I be the real GDP per capita of country j at time t when the democracy started, and Y_{jt}^N the observed real GDP per capita in country j at time t if it would have remained autocratic. The aim of this analysis is to measure the effect of the democracy for country j=1 on the real GDP per capita level after the transition which can be defined as "$\alpha_{1t} = Y_{1t}^I - Y_{1t}^N$" (Abadie et al., 2010, p. 495). As Y_{1t}^N is the value of real GDP per capita that is unobserved, it has to be constructed by using the SCM. The formula derived from Abadie et al. (2010) for the estimation of this unobserved value uses the following model:

$$Y_{jt}^N = \delta_t + \theta_t Z_j + \lambda_t \mu_j + \varepsilon_{jt} \quad (1)$$

Here, δ_t stands for the unknown common factor constant across in this case countries, θ_t denotes a (1 x r) vector of unknown parameters, Z_j is a (r x 1) vector of relevant observed prediction variables that are not affected by the treatment, λ_t is a (1 x f) vector of unobserved time-varying common factors, μ_j represents a (f x 1) vector of unknown country specific factors. Lastly, ε_{jt} are the zero-mean country-level unobserved transitory shocks (Abadie et al., 2010).

The synthetic control country consists of the weighted average of the control countries j = 2, …, J + 1 from the panel of the potential control countries. Let $W = (w_2, \dots, w_{J+1})'$ be defined as a generic (J x 1) vector of weights such that $0 \leq w_j \leq 1$ and $w_2 + \cdots + w_{J+1} = 1$ (Abadie et al., 2015). Every value of W offers a possible synthetic control country for country j. Abadie and Gardeazabal (2003) and Abadie et al. (2010) propose the selection of W such that the characteristics of the treated country j match the characteristics of the synthetic control country as much as possible. For this let X_1represent a (k x 1) vector of pre-treatment characteristics for the treated country and X_0 be the k x J matrix that gathers the values of the same pre-treatment characteristics for all the potential control countries. Thus, the gap in the values of the pre-treatment characteristics of the country that has undergone the democratic transition and the constructed synthetic control country can be defined as the vector $X_1 - X_0 W$. By minimizing this vector the optimal synthetic control W^* is constructed. If $W = W^* = (w_2^*, \dots, w_{J+1}^*)$ and there are enough pre-treatment periods $t \leq T_0$, then the synthetic control estimator α_{1t} of the effect of the treatment is:

$$\text{“}Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}\text{”} \quad (2)$$

(Abadie et al., 2015, p. 498). Which in this case is the gap between the real GDP per capita of the treated country and the real GDP per capita of the constructed synthetic control country at time t.

Some characteristics might be more important in estimating the level of real GDP per capita than others. To account for this difference let m = 1,…,k represent each characteristic, X_{1m} denote the value of the m-th variable for the treated country and X_{0m} which is a (1 x J) vector represent the value of the m-th variable for the panel of potential control countries. Abadie et al. (2015) show that the SCM can account for the different levels of importance by constructing W^* that obtains the lowest possible value for the mean squared prediction error (MSPE) of the constructed synthetic control with the following formula:

$$\text{“}\sum_{m=1}^{k} v_m (X_{1m} - X_{0m}W)^2\text{”} \quad (3)$$

(p. 497). With v_m illustrating the importance of the m-th prediction variable. Prediction variables that are considered to be more important to estimate the outcome will be given larger weights relative to the other variables. Last but not least, to consider the significance of the estimated effects, the two-sided p-value compares the placebo effects with the actual treatment effect, where $\hat{\alpha}_{1t}^P = \{\hat{\alpha}_{jt} : J \neq 1\}$ present the estimated effect obtained from the placebo tests of each country that is in the potential control group can be expressed as:

$$\text{“Pr}(|\hat{\alpha}_{1t}^P| \geq |\hat{\alpha}_{1t}|) = \frac{\sum_{j \neq 1} 1(|\hat{\alpha}_{jt}^P| \geq |\hat{\alpha}_{jt}|)}{J}\text{,,} \quad (4)$$

(Galiani & Quistorff, 2017, p. 836). It could be that the pretreatment fit of the placebo control units is poor, causing the estimated treatment effects of the placebos to be over- or underestimated. To account for this in this research paper the standardized p-values are considered,. These are the actual p-values weighted by the pretreatment fit of the constructed synthetic control for each country.

The computations of the synthetic controls outlined in this chapter will be done using Stata with the *synth* and *synth_runner* extension package (Abadie et al. 2015; Galiani & Quistorff, 2016). For more information on the implementation of the SCM, see Abadie and Gardeazabal (2003) and Abadie et al. (2010; 2015).

3.3 Assumptions of the SCM

The SCM relies on a number of assumptions. In spite of the fact that the assumptions of the SCM cannot be tested, they have to be examined as the satisfaction of these assumptions determines to what extend the obtained results can be trusted. One of the assumptions is that the treatment is only exposed to one unit and has no effect during the pre-implementation period (Abadie et al., 2010). In practice, the variables in the pretreatment periods (which include pretreatment GDP values, the investment ratio, secondary school enrollment, trade openness and others) may bias the estimates upwards or downwards due to the anticipation of the democratic transition. For instance, in anticipation of the democratic transition individuals and firms in a country start investing more and as a result economic growth increases. This then will lead to estimates that are biased downwards. On the other hand the estimates may be biased upwards if for example domestic elites and external investors reduce their investments if they consider a democratic transition to put their business at risk. It is reasonable to assume that anticipation effects are present in this research as democratic transitions are most of the times not instantaneous processes but can take years to go through the process to full democracy. This might be a potential concern for the reliability of the obtained estimates.

Moreover, it is assumed that the 'no inference assumption' holds meaning that the treatment should not affect the potential control units in any way. A threat to the satisfaction of this assumption is the existence of contamination - spillover effects (Abadie et al., 2010). Spillover effects could be plausible, as for example a democratic transition may lead to an increase in international migration from countries with authoritarian regimes. This could then affect the economic growth in the control group and will lead to estimates that measure both the effect of the economic growth of the treated country and the control countries. Additionally, the autocratic countries could be influenced to have more democratic views after observing the democratic transition of the treated country. Based on the findings of studies regarding spillover effects in Africa (Basdevant, Jonelis, Mircheva & Slavov, 2014; World bank, 2016) , in this research it is assumed that there are minimal or no spillover effects to and from the treated countries.

Lastly, a crucial assumption is that the treated unit and the potential control units should have similar characteristics (Abadie et al., 2010). Therefore, countries that have significantly different levels in the variables that are known to affect the outcome variable should be eliminated from the pool of potential control countries. At the moment however there is not a

general agreement on how to judge the similarity between the treated unit and the potential control unit and thus is subjective to the researcher.

4 Data and sample selection

4.1 Main indicators and case study selection

This research paper uses panel data to study the impact a democratic transition has on economic growth in African countries. In order to achieve this objective there has to be an indicator to define democratic transitions. The indicator for a democratic transition in this research paper is based on the Regimes of the World (RoW) indicator (Lührmann et al., 2018) using data from Varieties of Democracy (V-Dem) (Coppedge et al., 2020). The V-Dem dataset covers data of more than 200 countries from 1789 to 2019 with more than 470 indicators including democracy and election indices to conceptualize and measure democracy. The RoW indicator uses a number of these indices in order to categorize countries into 4 regime types which are closed autocracy, electoral autocracy, electoral democracy and liberal democracy. Where countries with a liberal democratic regime have multiparty elections that are free, fair and also allow for individual liberties and the rule of law, and countries with an electoral democracy that have the same election facilities as the liberal democratic regime however are not as fully protected of their liberties as the liberal democratic regimes. Closed autocratic regimes can be classified as having no actual voting opportunities for multiple people or parties. This research was mainly interested in this indicator because distinguishes itself from other democracy indicators by appointing countries to regime types by not only focusing on the existence of multiparty elections, but by examining whether these elections are free and fair as well. In this way, countries that appear to be democratic by holding elections while not actually sticking to democratic values are considered to be electoral autocracies. For instance, Burundi is considered to be democratic by Cheibub, Gandhi and Vreeland (2010), Geddes, Wright and Frantz (2014) and Boix et al. (2013) after the presidential elections that were held in 2005. However, the elections were indirect as members of the National Assembly and Senate picked the president and there was only one sole candidate to pick from (Vandeginste, 2015). The RoW indicator in this case does not consider Burundi as having a democratic regime but considered it to be a transition to an electoral autocracy (Lührmann et al., 2018). This demonstrates that the RoW indicator has higher requirements compared to other democracy indicators when appointing them to democratic regimes and allows this research paper to only consider

democratic transitions that are authentic and not consist of countries that transition to sham regimes.

This research paper does not only consider all transitions to democracy. There are three additional criteria that a country needs to fulfill in order to be considered to have undergone a democratic transition in this research paper. Firstly, the country has to be autocratic over the for a minimum of 10 years before the democratic transition. In addition, there has to be data on the country to be matched on its pretreatment characteristics. There are 4 countries in the total sample of countries located in Africa that fulfill all the criteria above and will be analyzed individually. The countries are presented in *Table 1* along with the year of the start of their democracy.

Table 1

First year under democratic rule for the African countries that met the criteria

Country	**Start of democratic period (T_0)**
Benin	1992
Ghana	1994
South Africa	1995
Burkina Faso	2000

Source: Author's elaboration along with the RoW classification

For the main outcome variable (*Y*), real GDP per capita is used as the indicator for economic growth. This is measured in year 2011 US$ and is obtained from The Maddison Project Database (2018). The time-span of the data runs from 1950 to 2016 and has available data for almost all countries used in this research paper as it covers 169 countries.

4.2 Period of analysis and donor pool construction

Due to the limitation of data of several variables before 1985, the time-span used for this research is from 1985 to 2007. However as the countries transitioned at different time periods, different time spans are used as this is based on the year of the democratic transition. The pre-treatment periods used to construct each synthetic control run from 1985 to T_0-1, where T_0 is the first year of the democratic transition. To construct a synthetic control that is comparable to the treated country, restrictions have been placed on the inclusion of countries to the group of

potential control countries. The group of potential control countries should only consist of countries that did not undergo any kind of democratic transition and remained autocratic from 1985 to 2007. Including countries that have had an similar treatment as the country that transitioned to a democracy will lead to understated estimates of the true treatment effect as these countries outcomes may contribute to the outcome of the constructed synthetic control. There are in total 44 countries that have stayed with an continuous autocratic regime. Not all of these countries have available data on all the pretreatment characteristics and therefore these countries have been excluded ending up with a final selection of 23 potential control countries. Ideally, it is preferred that the selected potential control group only consists of countries that already have similar pretreatment characteristics, however extending the potential control group could possibly increase the chances of constructing a better constructed synthetic control as there are more available countries lowering the RMSPE significantly.

4.3 Prediction variables

To ensure that the synthetic control unit represents the country that has undergone the democratic transition, the pretreatment characteristics of the treated country and the potential control countries have to be matched. The SCM requires that the included pretreatment characteristics (X) influence the outcome variable (Y), which is economic growth. As there are many factors that could affect economic growth, the pretreatment characteristics are selected on the basis of prior research regarding the determinants of the economic growth (Barro, 1991; 1997) and the study from the developers of the SCM (Abadie & Gardeazabal, 2003) that uses the SCM with the same outcome variable, GDP per capita. The following pretreatment characteristics are selected: inflation, trade openness, investments, population growth, human capital (proxied by primary and secondary school enrollment rates), fertility rate, life expectancy, government consumption and political stability.

In this research most of the same variables were used however due to limited data availability for prior years, proxies of some variables are used. This is the case for human capital which is now proxied by the average years of schooling and political stability for which the sum of magnitudes of major episodes of political violence is used. The data on the average years of schooling is obtained from the Penn World Tables (Feenstra, Inklaar, & Timmer, 2015), and the proxy for political stability from the Center for Systemic Peace Major Episodes of Political Violence dataset (Marshall, 2019). The data on inflation and the investments is from the International Monetary Fund's World Economic Outlook Database (International Monetary Fund, 2019). All other variables are from the World Banks World Development Indicators

(World Bank, 2020). A description of the variables that are used in this research paper is presented in Appendix 3. All these variables except for political stability are averaged over the pretreatment period to match with the treated country. The value of political stability of only the last pretreatment year is used as a predictor variable as this could be an indicator of what led to the democratic transition. In addition to these variables, lags of the outcome variable are also included as pretreatment characteristics in order to follow the trend of the pretreatment outcome. This possibly reduces omitted variable bias as the lagged outcome variables include the effects of the variables that have been excluded as pretreatment characteristics in this research. This paper includes four lagged variables in each model and includes one for the year before the treatment (T_0-1), two in the middle and one at the start of the pretreatment period.

5 Results

This chapter reports and discusses the results of the implemented SCM analysis for the four countries. The results are presented both graphically and numerically through figures and tables. As the results of the analyses differ, each treated country will be discussed in a separate section.

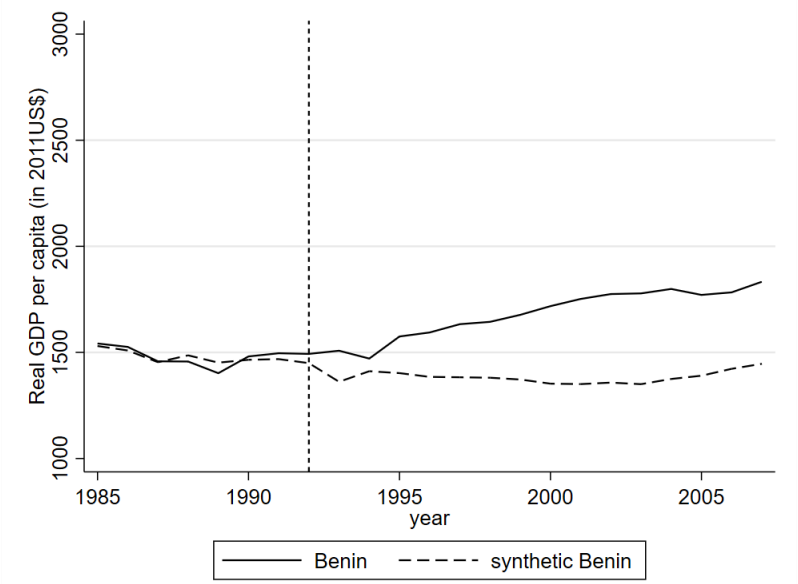
5.1 Benin

Figure 1 plots the development of the level of real GDP per capita of Benin (solid line) and the synthetic control of Benin (dotted line) from 1985 to 2007. The weights assigned to each country are presented in Table 5 of Appendix 1. The synthetic control consists of 7 countries given the following weights: Togo (0.311), Burundi (0.296), Central African Republic (0.165), Uganda (0.133), Cameroon (0.047), Syria (0.039) and Iran (0.01) meaning that the combination of these countries forms the best replica of Benin during the pretreatment years. The synthetic control unit closely follows the trend in real GDP per capita of the actual Benin for the first years of the pretreatment period (1985-1987) but slightly deviates after these years, starting with values above the actual Benin and in the last years beneath the values of real GDP per capita of the real Benin. In order to judge whether the pretreatment fit is good enough a threshold of a RMPSE of 50 is set in this paper. The RMSPE of the control is 26.627 which is well below this threshold. Table 1 in Appendix 1 also displays how well the synthetic control matches the actual Benin as the table compares the values of the prediction variables of the created synthetic control with the average of the whole group of potential control countries and the values of the actual Benin. Except for inflation and total investment, the pretreatment characteristics the synthetic control are very close to the real Benin, as well as the values of the real GDP per capita. Overall this confirms that the weighted combination of these countries is able to convincingly present the path from 1992 of Benin if the democratic transition had not occurred.

The economic effect of the democratic transition of Benin is the gap in real GDP per capita of Benin and the synthetic control of Benin. Figure 1 shows that the trends of GDP per capita of the synthetic control and the actual treated country immediately are diverging from 1992 onwards. The value of the real GDP per capita of the actual Benin is increasing over time (with a small dip in 1994) while the values of the synthetic control are first going in a downward trend for the first two years, followed by a small increase and continue to remain constant from 1995 onwards. Table 2 displays the estimates of the yearly impacts of the democratic transition for all posttreatment years hereby presenting the magnitude of the effect of the democratic

transition numerically. On average, the values of real GDP per capita are 20,89% higher for Benin compared to its synthetic control, with small effects right after the democratic transition of just a couple percent while gradually increasing to values of real GDP per capita up to 30% higher than the synthetic control. To conclude, these results suggest that the democratic transition has had a positive impact on Benin´s real GDP per capita.

Figure 1 Trends in real GDP per capita: Benin vs. synthetic Benin



To evaluate if the estimates are significant, series of placebo tests were performed by applying the SCM to every potential control country by pretending that they would have transitioned to a democracy in 1992. Figure 1 in Appendix 1 presents the treatment effects of the placebo tests which are the gap in real GDP per capita between the 'selected' treated country and its constructed synthetic control. These are presented as the grey lines in the figure while the black line presents the treatment effects of Benin. Some of the countries do not have a good pretreatment fit as the figure shows that the gap in real GDP per capita is already large in the pretreatment period. Therefore, as mentioned in the methodology section in this research paper the standardized p-values are considered. The standardized p-values show that the impact of the transition to democracy in Benin is statistically significant at a 10% significance level for the years 1998 to 2004 (from the 7^{th} year to the 13^{th} year of being a democracy) meaning that the estimated effects for these years are of a way greater size of relative to the placebo effects. For the other periods the standardized p-values are larger indicating that for these years there is not enough evidence to conclude that the estimates of the impact of the democratic transition are not coincidental.

Table 2

Treatment Effects – Benin

	Treatment effect	Treatment effect (Percentage)
1992	43.569	3.01
1993	146.503	10.76
1994	59.598	4.22
1995	172.605	12.31
1996	209.365	15.12
1997	250.121	18.09
1998	263.345**	19.07**
1999	304.679**	22.20**
2000	365.334**	27.01**
2001	401.315*	29.71*
2002	417.373*	30.74*
2003	427.673**	31.67**
2004	424.13**	30.85**
2005	380.783	27.39
2006	360.36	25.33
2007	386.853	26.75

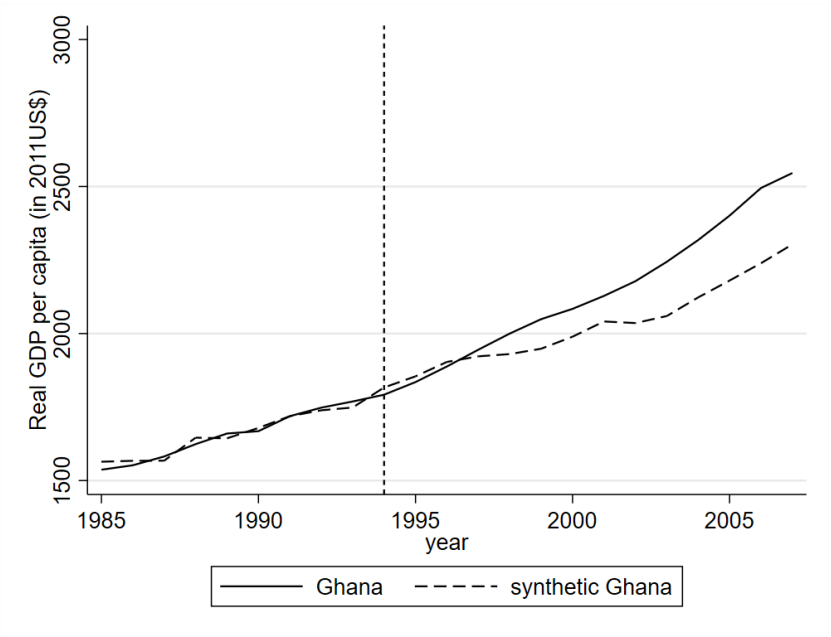
*p < .10 **p < .05 ***p < .001

5.2 Ghana

The second country for which a synthetic control is constructed is Ghana. The synthetic control consists of 6 countries: Nepal (0.624), Kenya (0.161), Uganda (0.120), Syria (0.053), Togo (0.033) and Malaysia (0.009). From Figure 2 it can be seen that the synthetic control has values slightly higher for the first pretreatment years but after that it follows the trend in real GDP per capita of the actual Ghana very closely. Table 2 in Appendix 1 shows that other than the average years of schooling which is somewhat lower for the synthetic Ghana the values of the pretreatment characteristics for the control are indeed very close to each other. The RMSPE of the control is 17.227 which is the lowest value obtained in this research paper. Altogether, this is the best potential control the synthetic control was able to construct and can accurately represents the path of Ghana if the democratic transition had not occurred. Figure 3 shows that there is not yet a major difference between the two lines for the first three years but the synthetic

control does have higher values of real GDP per capita for these years. Following these years the two lines do start to visibly separate and the values for the actual Ghana exceed the synthetic Ghana indicating that the democratic transition had a positive effect for these years.

Figure 2 Trends in real GDP per capita: Ghana vs. synthetic Ghana



The estimates in Table 3 indicate that the yearly impacts of the democratic transition for Ghana were negative for the first three years of the democracy and positive for the years after with the positive effect expanding over time. Over the years, the values of real GDP per capita are on average 5,21% higher for Ghana compared to its synthetic control with a real GDP per capita level of Ghana that is 15,21% higher than its counterfactual 14 years after turning into a democracy. The p-values from the placebo tests presented in Figure 2 in Appendix 1 show that the transition to a democracy has a statistically significant positive impact on Ghana's real GDP per capita for the 6^{th} year of being a democracy and from the 9^{th} to 14^{th} year and conclude that the democratic transition has benefitted the country´s economy for these years. The estimates for the other years are statistically insignificant meaning there is not enough evidence to conclude that the estimates of the impact of the democratic transition are not driven by chance.

Table 3

Treatment Effects – Ghana

	Model with Extended Potential Control Countries	Treatment effect (Percentage)
1994	-24.575	-1.35
1995	-19.433	-1.05
1996	-15.491	-0.81
1997	22.442	1.17
1998	69.777	3.61
1999	100.668*	5.17*
2000	94.647	4.76
2001	86.95	4.26
2002	142.259*	6.99*
2003	184.536***	8.96***
2004	195.077**	9.19**
2005	220.748**	10.12**
2006	255.717**	11.42**
2007	242.618**	10.53**

*p < .10 **p < .05 ***p < .001

5.3 South Africa

Figure 3 plots the development of the level of real GDP per capita of South Africa and the constructed synthetic control. The synthetic control consists of 6 countries: Algeria (0.558), China (0.298), Kenya (0.092), Saudi Arabia (0.026), Singapore (0.011) and Bahrain (0.007). The figure shows that the synthetic control only follows the levels of real GDP per capita of the actual South Africa for the first and the last two years. The RSMPE has a value of 278.519 which confirms that the pretreatment fit is very poor compared to constructed synthetic controls of Benin and Ghana. Most pretreatment characteristics presented in Table 3 in Appendix 1 are close to the values of the actual South Africa suggesting that there were countries that there was a combination of similar country characteristics however this combination of countries did not have past GDP levels that were the same as South Africa. Although the pretreatment fit is poor compared to the previous countries that were discussed, the results will still be presented as the judgment of a good fit can differ between readers. Figure 3 shows that the two lines do not

differ as much for the first three years after the democratic transition. Following these years the two lines do separate and the synthetic control outperforms the actual South Africa indicating that the democratic transition had an overall negative impact on the real GDP per capita levels. Over the years after the democratic transition, the values of real GDP per capita are on average 2.96% lower for South Africa compared to its synthetic control (Table 4). The results of the placebo test presented in Table 4 conclude that none of the estimates are statistically significant at a 10% significance level indicating that there is no evidence that these effects are different from other countries that have not been through this democratic transition.

Figure 3 Trends in real GDP per capita: South Africa vs. synthetic South Africa

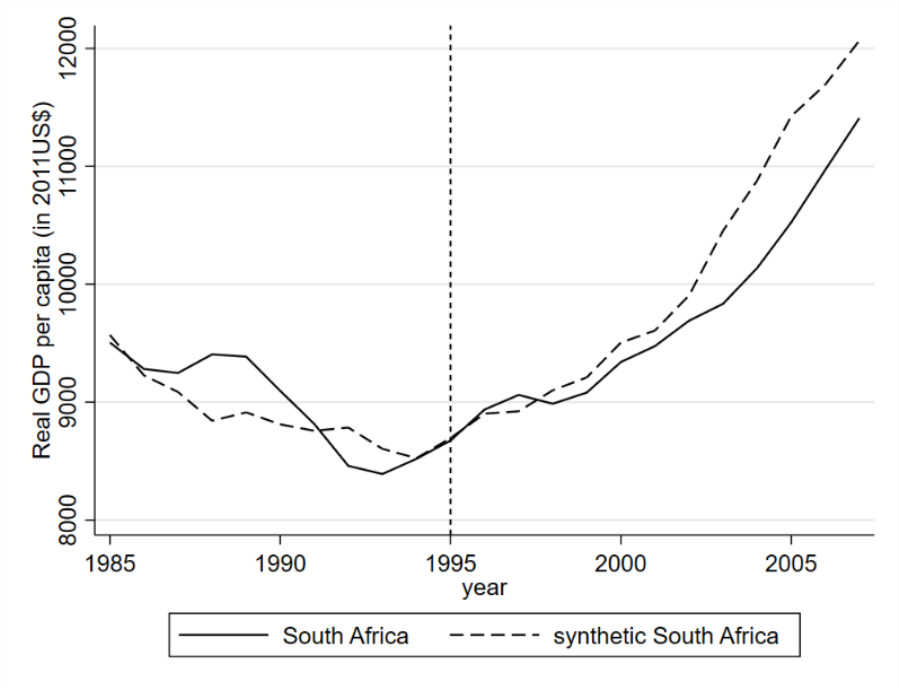


Table 4

Treatment Effects – South Africa

	Model with Extended Potential Control Countries	Treatment effect (Percentage)
1995	-20.777	-0.24
1996	34.862	0.39
1997	138.848	1.56
1998	-114.266	-1.26
1999	-128.373	-1.39
2000	-164.885	-1.73
2001	-131.873	-1.37
2002	-213.893	-2.16
2003	-619.536	-5.93
2004	-741.959	-6.82
2005	-900.391	-7.88
2006	-723.622	-6.19
2007	-657.024	-5.45

*p < .10 **p < .05 ***p < .001

5.4 Burkina Faso

Figure 4 displays the course of the constructed synthetic control for Burkina Faso and its synthetic control the synthetic control does not follow the pretreatment The synthetic control only consists of two countries where Central African Republic has a weight of 0.754 and Burundi 0.246. The RMSPE is 142.321 and similar to South Africa, the synthetic control has pretreatment characteristics that are close to the values of the actual Burkina Faso presented in Table 5 but not for the past GDP levels. As the values of the synthetic control are already higher from 1996 and onwards it is not possible with this synthetic control to draw any actual conclusions. One possible explanation that it was not possible to construct a good synthetic control is that Burkina Faso is a country with a lower level of real GDP per capita in Africa and there are less countries in the sample that have such low values which makes it harder to match both the pretreatment characteristics and the values of real GDP per capita. As expected the results of the placebo test conclude that none of the estimates are statistically significant at a

10% significance level indicating that there is no evidence that the difference in real GDP per capita is different from other countries that have not been through this democratic transition.

Figure 4 Trends in real GDP per capita: Burkina Faso vs. synthetic Burkina Faso

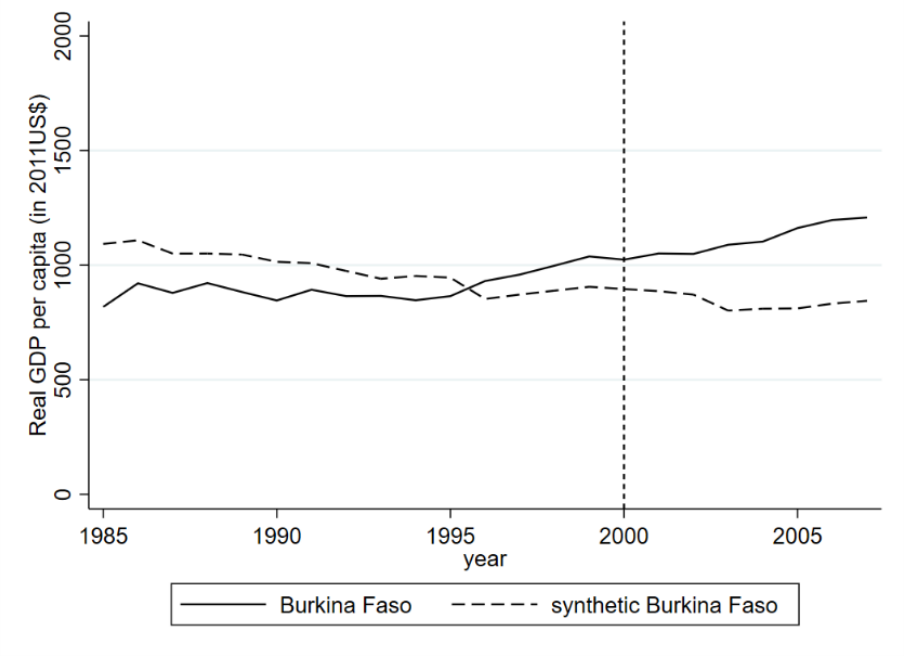


Table 5

Treatment Effects – Burkina Faso

	Model with Extended Potential Control Countries	Treatment effect (Percentage)
2000	127.96	14.28
2001	164.484	18.55
2002	177.366	20.35
2003	287.082	35.80
2004	292.836	36.15
2005	350.756	43.24
2006	364.724	43.82
2007	363.414	43.03

*p < .10 **p < .05 ***p < .001

5.5 Robustness Check: Removing non-African countries

In the previous section the potential control group consists of countries from the world, this second potential control group will only consists of countries that have remained autocratic located in Africa and is called the regional potential control group consisting of 14 countries. The reason for having two models is because there is a trade-off. The regional control group only consists of countries that may be more related to the treated countries when it comes to cultural and geographic factors but the previous extended potential control group could provide a better constructed synthetic control fit as there are more available countries which can lower the RMSPE significantly. Furthermore, it could be argued that the baseline results are completely dependent on the sample of countries that have been selected in this dataset. If a certain country in the potential control group might have been given a large weight compared to the others countries and has a way different real GDP per capita outcome path it might affect the results of the estimated treatment effect. Therefore by comparing the results of the two synthetic control models the robustness of the obtained conclusions can be accessed. The results are presented in Appendix 2. To be expected, the regional potential control group does worsen the pretreatment fit and the RMSPE of the controls have increased significantly for the new models. However, with the exception of Ghana, the constructed synthetic controls follow a very similar path as the baseline results. For Ghana, the constructed synthetic control is poor as it does not line up with the pretreatment period well. This could be because Nepal has been given the majority of the weight in the baseline results and was now excluded. This indicates that this model is not robust to changes in the sample of potential control countries as no weighted combination of African countries could present Ghana and the results of the placebo tests also give insignificant results. What is noticeable is that for Benin, although the pretreatment fit is somewhat poorer than the baseline results, there are significant results for all the years (except the last year) after the democratic transition. This could be because African countries have lower placebo treatment effects than the countries outside Africa . Therefore, the calculated p-value will be lower as there are less countries with high placebo treatment effects.

6 Conclusion

The aim of this research was to find out what economic impact democratic transition had on countries in Africa. Four case studies were conducted using the SCM to analyze whether the change to democracy had an impact on the real GDP levels of Benin, Ghana, South Africa and Burkina Faso. For Benin the results show that the year after turning into a democracy have positive and significant effects on their real GDP per capita levels from the 7th year to the 13th year of being a democracy. Ghana has statistically significant positive impact on Ghana's real GDP per capita for the 6th year of being a democracy and from the 9th to 14th year. For, South Africa on the other hand the democratic transition had small negative effects on real GDP per capita however these effects seem to be insignificant after the performance of the placebo tests. It must be noted however that the pretreatment fit of this synthetic control was poorer than the other controls. Lastly, for Burkina Faso it was not possible to construct a synthetic control that followed the pretreatment values and could unfortunately not be accessed properly. The results of the robustness check indicate that when the donor pool is limited to countries of the African continent the constructed synthetic control generally followed a very similar path. However, it did worsen the pretreatment fit , sometimes so much that the constructed synthetic control is poor and unable to obtain credible results indicating that the model is not robust to changes in sample countries. When comparing the results of this research paper with previous literature, the results of Benin and Ghana are both in line with Acemoglu et al. (2019). Although the positive effects differ in sizes, the direction of effects correspond with Acemoglu et al. (2019) as they found significant positive effects on the long run as well. In this research however, South Africa did not have a positive significant result and its results corresponded more with the outcome of Helliwell (1994) who found negative but insignificant outcomes. The difference in results can however be linked to the fact that these studies look at the aggregate effect of democratization on economic growth while in this paper the countries are analysed individually.

Thus, what are the main implications of these results regarding the economic impacts of democratic transitions of countries in Africa? Firstly, democratic transitions can indeed contribute to the economic development of the African continent in some cases as there are significant positive effects found. However, the impacts of democratic transitions are heterogenous as the magnitude of the effect could be different from country to country as well as the significance of the effect. A similarity of the democratic transitions is that the impact of the democratic transition appears to expand over time as the effects in the years just after the

democratic transition are much smaller than for the later years. The implications suggest that there is no guaranteed success when it comes to a democratic transition and even if it brings a positive impact, one might have to be patient for the economic development to be noticeable.

The main limitation of this research is the lack of available data. In order to use a potential control country, there has to be data for all the predictor variables for the synthetic control analysis to work. A lot of countries that were autocratic and were eligible to be a control country did not have data for all predictor variables, significantly decreasing the number of potential control countries that were used in this research paper. The only way to increase the pool would have been to lower the amount of predictor variables, however the constructed synthetic control would then only be matched to the actual treated country by only 2 or 3 variables. This would exclude most of the main variables that influence economic growth such as trade, years of schooling, total investment and government spending and would then produce synthetic controls that would not be representative of the actual treated country. In addition, the amount of pretreatment years could have been larger if there was more data available which could possible better the fit of the synthetic controls. For further research it could be interesting to apply the SCM to more countries in the region and also increase the potential control group when more data will be available in the future. In addition, the SCM only estimated the direct effect and not the determinants of the difference in effects, therefore it would be suggested to look into these effects in further research. For political organizations concerned with the African region, this paper recommends to at least negotiate the implementation of democratic values in a country as it could potentially benefit the economy.

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8 Appendix 1

Figure 1 Gap in real GDP per capita for Benin and Placebo Gaps of all the Potential Control Countries

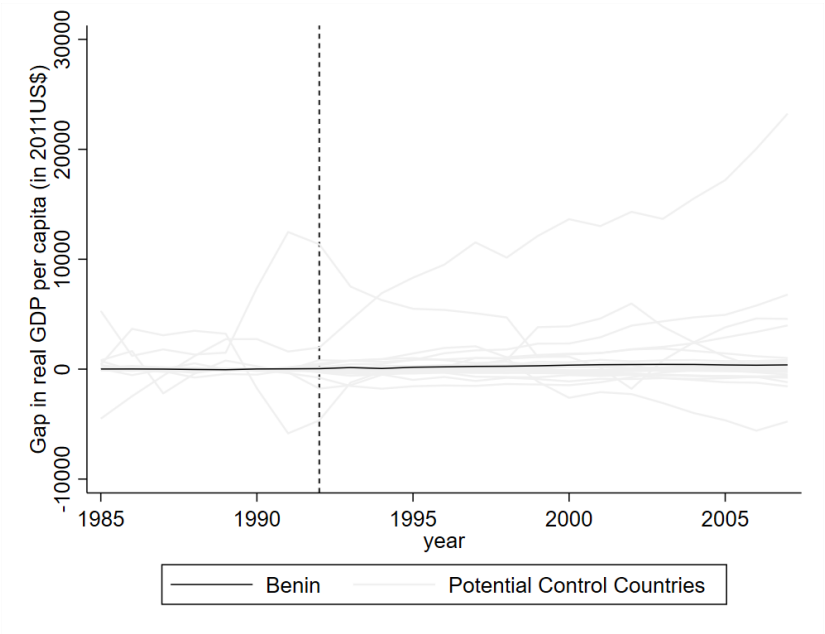


Table 1

Predictor means – Benin

	Actual Benin	Synthetic Benin	Average of Potential Control Countries
Population Growth	3.06%	2.82%	2.83%
Fertility Rate	6.84	6.70	5.39
Life Expectancy	52.30	51.74	59.96
Inflation	0.95%	18.98%	11.63%
Total Investment	10.62%	22.84%	22.85%
Trade	48.15%	53.96%	72.11%
Government Consumption	14.89%	12.92%	15.83%
Years of Schooling	1.41	2.02	3.23
Political Violence 1991	0	.60	0.78
Real GDP per capita 1991	1496	1468.36	9265.44
Real GDP per capita 1989	1402	1451.78	8619.74
Real GDP per capita 1987	1458	1453.85	8386.00
Real GDP per capita 1985	1542	1530.02	8914.22

NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985 - 1991 period. Real GDP per capita is measured in 2011 US$.

Figure 2 Gap in real GDP per capita for Ghana and Placebo Gaps of all the Potential Control Countries

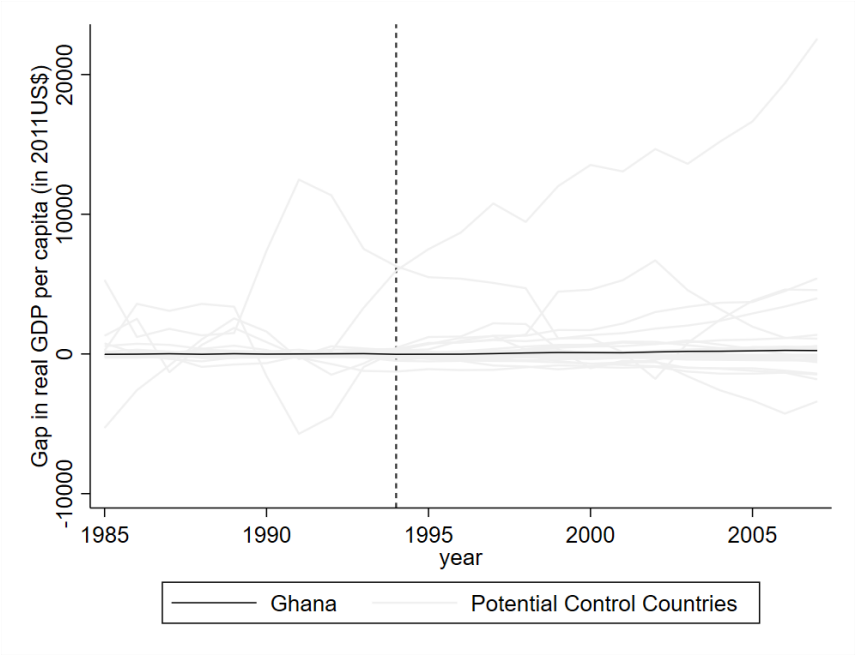


Table 2

Predictor means – Ghana

	Actual Ghana	Synthetic Ghana	Average of Potential Control Countries
Population Growth	2.90%	2.76%	2.68
Fertility Rate	5.72	5.66	5.27
Life Expectancy	56.10	54.48	59.98
Inflation	24.61%	23.00%	11.11%
Total Investment	20.09%	19.25%	22.83%
Trade	42.00%	41.12%	72.25%
Government Consumption	10.67%	11.00%	15.77%
Years of Schooling	4.72	2.44	3.36
Political Violence 1993	0	0.40	1.00
Real GDP per capita 1993	1769	1748.51	9506.87
Real GDP per capita 1990	1668	1679.06	8910.52
Real GDP per capita 1987	1582	1567.68	8386.00
Real GDP per capita 1985	1537	1564.12	8914.22

NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985-1993 period. Real GDP per capita is measured in 2011 US$

Figure 3 Gap in real GDP per capita for South Africa and Placebo Gaps of all the Potential Control Countries

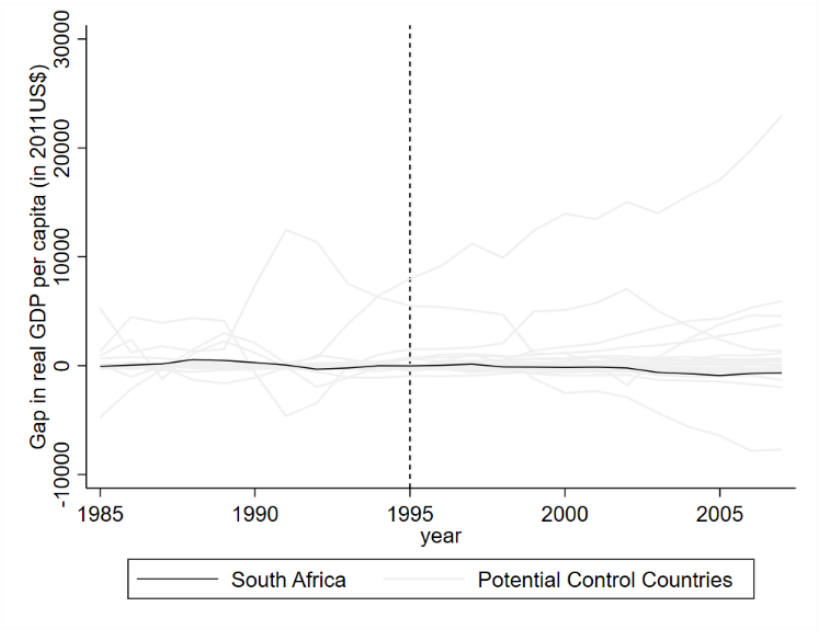


Table 3

Predictor means – South Africa

	Actual South Africa	Synthetic South Africa Extended	Average of Potential Control Countries Extended
Population Growth	2.42%	2.34%	2.62%
Fertility Rate	4.03	4.15	5.21
Life Expectancy	62.54	66.61	60.01
Inflation	14.07%	14.13%	11.59%
Total Investment	19.29%	30.00%	22.82%
Trade	44.58%	47.28%	73.10%
Government Consumption	18.41%	16.61%	15.64%
Years of Schooling	5.14	3.81	3.42
Political Violence 1994	3	2.83	1.04
Real GDP per capita 1994	8519	8524.31	9628.70
Real GDP per capita 1991	8815	8756.79	9265.44
Real GDP per capita 1987	9247	9085.91	8386.00
Real GDP per capita 1985	9506	9569.74	8914.22

NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985-1994 period. Real GDP per capita is measured in 2011 US$.

Figure 4 Gap in real GDP per capita for Burkina Faso and Placebo Gaps of all the Potential Control Countries

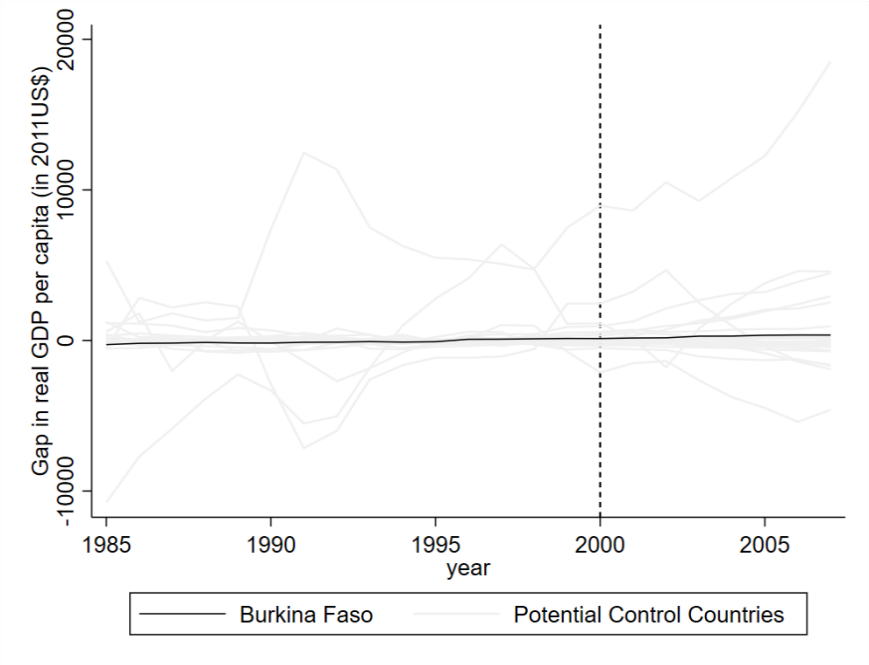


Table 4

Predictor means – Burkina Faso

	Actual Burkina Faso	Synthetic Burkina Faso Extended	Average of Potential Control Countries Extended
Population Growth	2.69%	2.32%	2.55%
Fertility Rate	6.93	6.11	4.94%
Life Expectancy	49.55	47.74	60.32
Inflation	3.40%	4.84%	10.11%
Total Investment	20.21%	16.04%	22.62%
Trade	36.52%	43.46%	75.05%
Government Consumption	21.06%	15.09%	15.10%
Years of Schooling	0.29	1.65	3.75
Political Violence 1999	0	0.98	0.87
Real GDP per capita 1999	1038	905.70	9952.57
Real GDP per capita 1995	865	945.69	9733.96
Real GDP per capita 1988	922	1050.73	8519.87
Real GDP per capita 1985	818	1092.75	8914.22

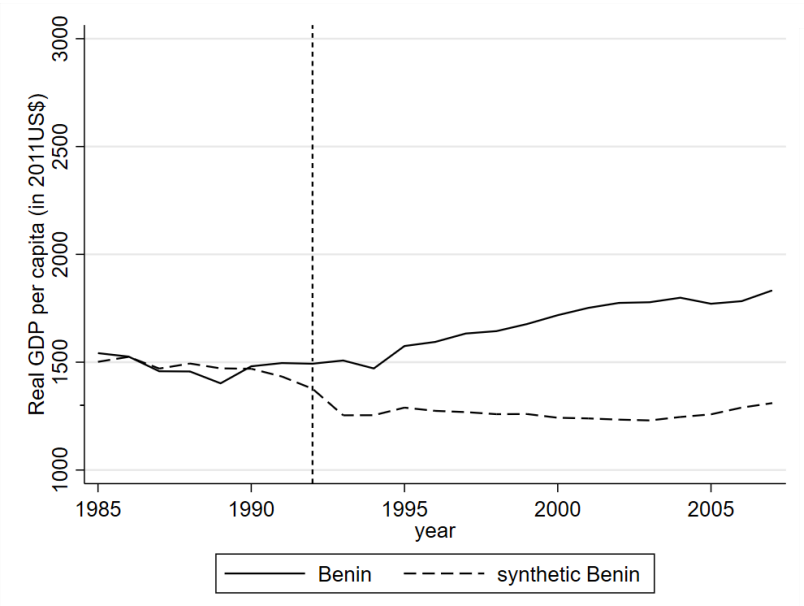
NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985-1999 period. Real GDP per capita is measured in 2011 US$.

Appendix Table 5 – Weights

	Synthetic Control Benin	Synthetic Control Ghana	Synthetic Control South Africa	Synthetic Control Burkina Faso
Algeria	0	0	0.558	0
Bahrain	0	0	0.007	0
Burundi	0.296	0	0	0.246
Cameroon	0.047	0	0	0
Central African Republic	0.165	0	0	0.754
China	0	0	0.298	0
Egypt	0	0	0	0
Gabon	0	0	0	0
Iran	0.01	0	0	0
Ivory Coast	0	0	0	0
Kenya	0	0.161	0.092	0
Malaysia	0	0.009	0	0
Morocco	0	0	0	0
Nepal	0	0.624	0	0
Pakistan	0	0	0	0
Republic of the Congo	0	0	0	0
Rwanda	0	0	0	0
Saudi Arabia	0	0	0.026	0
Singapore	0	0	0.018	0
Syria	0.039	0.053	0	0
Togo	0.311	0.033	0	0
Tunisia	0	0	0	0
Uganda	0.133	0.120	0	0
RMSPE	26.627	17.227	278.519	142.321

9 Appendix 2

Figure 1A Trends in real GDP per capita: Benin vs. synthetic Benin – Africa / Figure 1B Gap in real GDP per capita for Benin and Placebo Gaps of all the Potential Control Countries



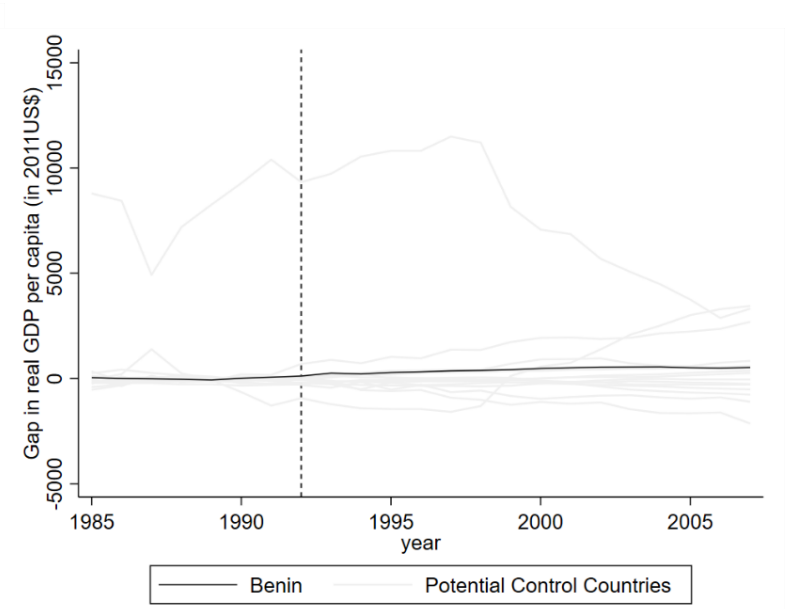


Table 1.1

Predictor means – Benin

	Actual Benin	Synthetic Benin Regional	Average of Potential Control Countries Regional
Population Growth	3.06%	2.83%	2.81%
Fertility Rate	6.84	6.80	5.95
Life Expectancy	52.30	51.09	55.91
Inflation	0.95%	3.97%	13.75%
Total Investment	10.62%	21.53%	21.73%
Trade	48.15%	55.65%	55.85%
Government Consumption	14.89%	13.83%	15.26%
Years of Schooling	1.41	2.17	2.62
Political Violence 1991	0	.88	0.79
Real GDP per capita 1991	1496	1433.58	4816.50
Real GDP per capita 1989	1402	1471.35	4805.21
Real GDP per capita 1987	1458	1470.43	4668.00
Real GDP per capita 1985	1542	1501.78	5160.00

NOTE: All variables except for political violence and political violence and the lagged values of Real GDP per capita are averaged for the 1985-1991 period. Real GDP per capita is measured in 2011 US$

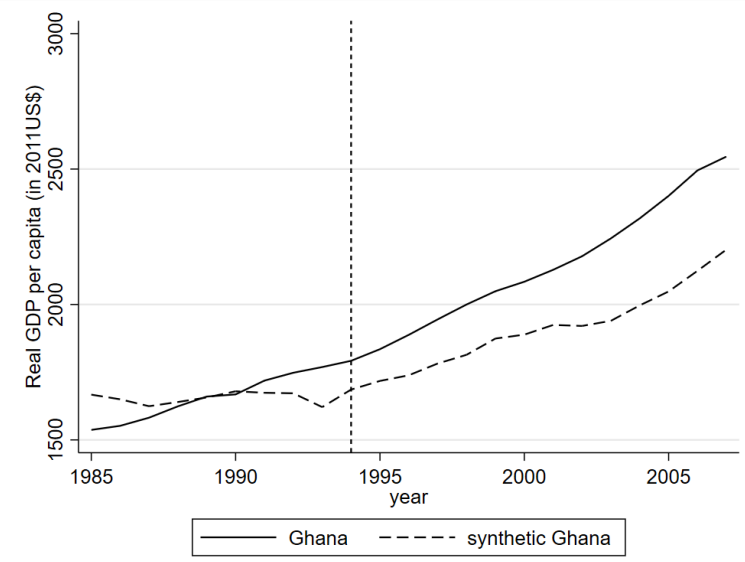
Table 1.2

Treatment Effects – Benin

	Model with Regional Potential Control Countries	Treatment effect (Percentage)
1992	116.29*	8.45*
1993	254.275***	20.28***
1994	216.783***	17.28***
1995	285.657***	22.16***
1996	319.654***	25.08***
1997	364.373***	28.72***
1998	384.999***	30.58***
1999	417.435***	33.14***
2000	475.626***	38.28***
2001	512.734***	41.37***
2002	541.243***	43.87***
2003	547.92***	44.54***
2004	553.12***	44.40***
2005	512.81***	40.76***
2006	493.487*	38.27*
2007	522.739	39.90

*p < .10 **p < .05 ***p < .001

Figure 2A Trends in real GDP per capita: Ghana vs. synthetic Ghana – Africa / Figure 2B Gap in real GDP per capita for Ghana and Placebo Gaps of all the Potential Control Countries



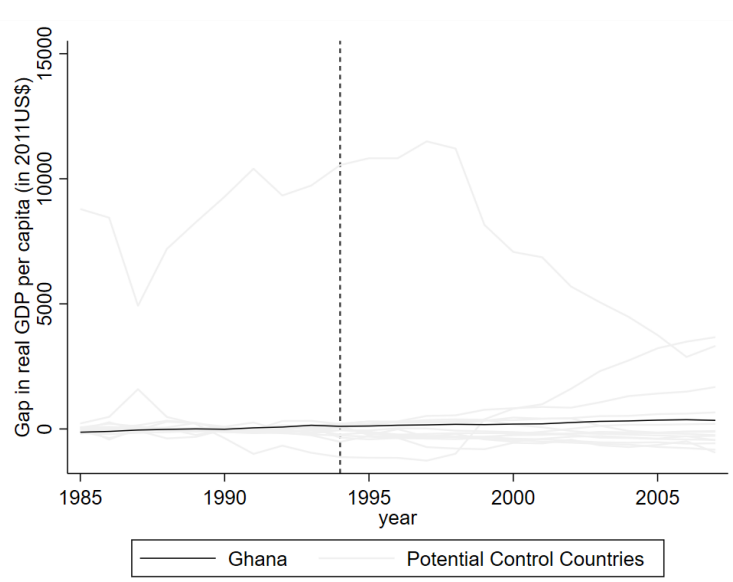


Table 2.1

Predictor means – Ghana

	Actual Ghana	Synthetic Ghana Regional	Average of Potential Control Countries Regional
Population Growth	2.90%	2.69%	2.62%
Fertility Rate	5.72	5.98	5.84
Life Expectancy	56.10	52.30	55.65
Inflation	24.61%	24.42%	12.86%
Total Investment	20.09%	13.40%	20.98%
Trade	42.00%	53.04%	55.13%
Government Consumption	10.67%	14.44%	15.41%
Years of Schooling	4.72	2.36	2.75
Political Violence 1993	0	0.50	1.14
Real GDP per capita 1993	1769	1621.15	4613.50
Real GDP per capita 1990	1668	1679.51	4795.36
Real GDP per capita 1987	1582	1624.53	4668.00
Real GDP per capita 1985	1537	1667.11	5160.00

NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985-1993 period. Real GDP per capita is measured in 2011 US$.

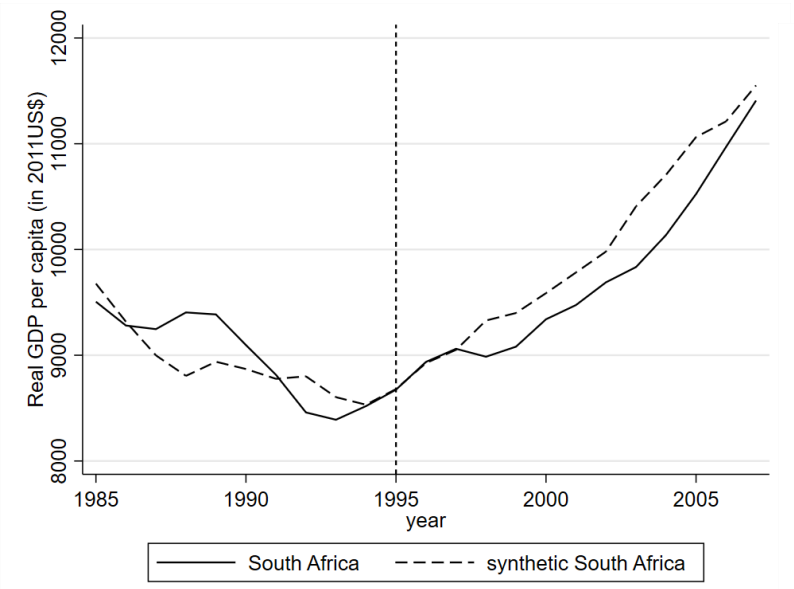
Table 2.2

Treatment Effects – Ghana

	Model with Regional Potential Control Countries	Treatment effect (Percentage)
1994	106.237	6.30
1995	117.171	6.82
1996	149.453	8.60
1997	162.933	9.14
1998	185.743	10.24
1999	174.684	9.32
2000	195.398	10.35
2001	203.62	10.58
2002	257.253	13.39
2003	304.344	15.69
2004	321.335	16.09
2005	352.94	17.23
2006	370.646	17.45
2007	343.338	15.59

*p < .10 **p < .05 ***p < .001

Figure 3A Trends in real GDP per capita: South Africa vs. synthetic South Africa – Regional / Figure 3B Gap in real GDP per capita for South Africa and Placebo Gaps of all the Potential Control Countries



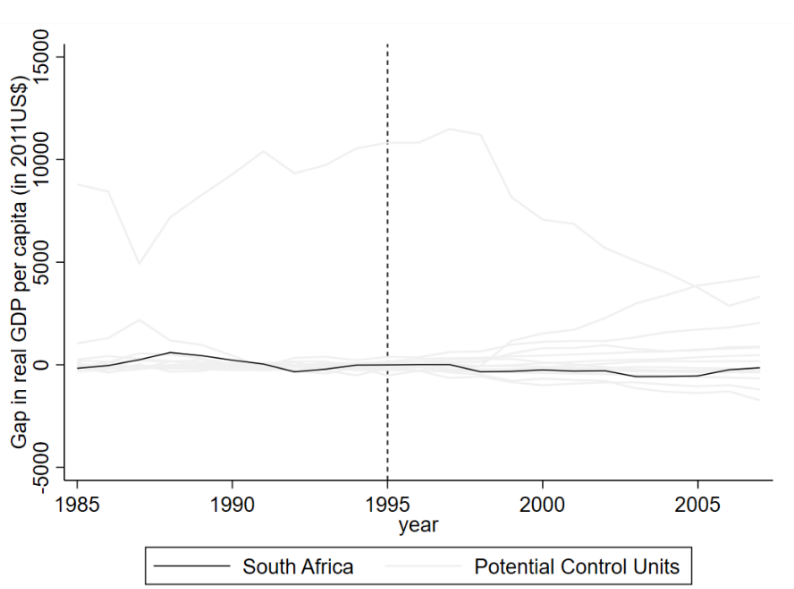


Table 3.1

Predictor means – South Africa

	Actual South Africa	Synthetic South Africa Regional	Average of Potential Control Countries Regional
Population Growth	2.42%	2.48%	2.55%
Fertility Rate	4.03	4.40	5.78
Life Expectancy	62.54	66.37	55.54
Inflation	14.07%	11.82%	13.44%
Total Investment	19.29%	25.94%	20.82%
Trade	44.58%	62.31%	56.07%
Government Consumption	18.41%	16.89%	15.33%
Years of Schooling	5.14	3.31	2.80
Political Violence 1994	3	1.98	1.50
Real GDP per capita 1994	8519	8532.39	4620.79
Real GDP per capita 1991	8815	8776.99	4816.50
Real GDP per capita 1987	9247	8998.74	4668.00
Real GDP per capita 1985	9506	9677.25	5160.00

NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985-1994 period. Real GDP per capita is measured in 2011 US$.

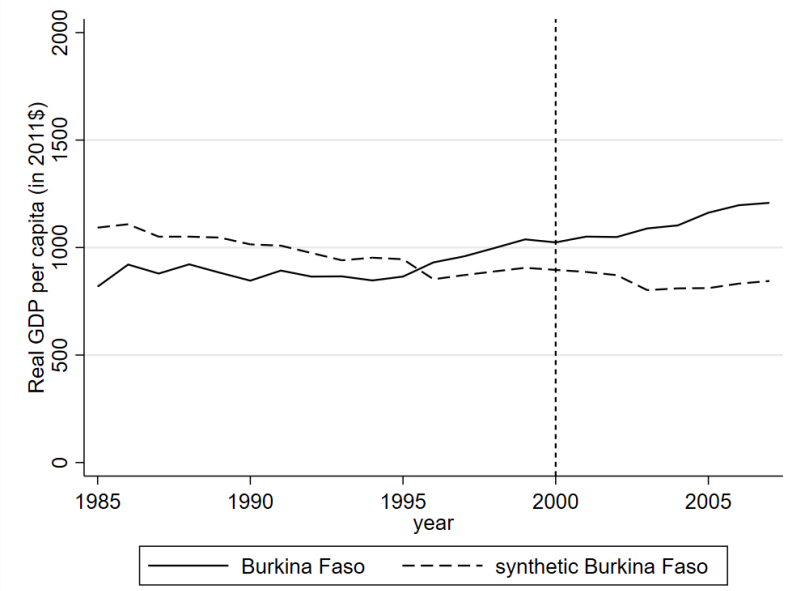
Table 3.2

Treatment Effects – South Africa

	Model with Regional Potential Control Countries	Treatment effect (Percentage)
1995	-6.017	-0.07
1996	10.795	0.12
1997	10.071	0.11
1998	-342.33	-3.67
1999	-318.462	-3.39
2000	-247.278	-2.58
2001	-308.073	-3.15
2002	-290.396	-2.91
2003	-573.373	-5.51
2004	-569.306	-5.32
2005	-538.973	-4.87
2006	-241.49	-2.15
2007	-142.831	-1.24

*p < .10 **p < .05 ***p < .001

Figure 4A Trends in real GDP per capita: Burkina Faso vs. synthetic Burkina Faso – Regional / Figure 4B Gap in real GDP per capita for Burkina Faso and Placebo Gaps of all the Potential Control Countries



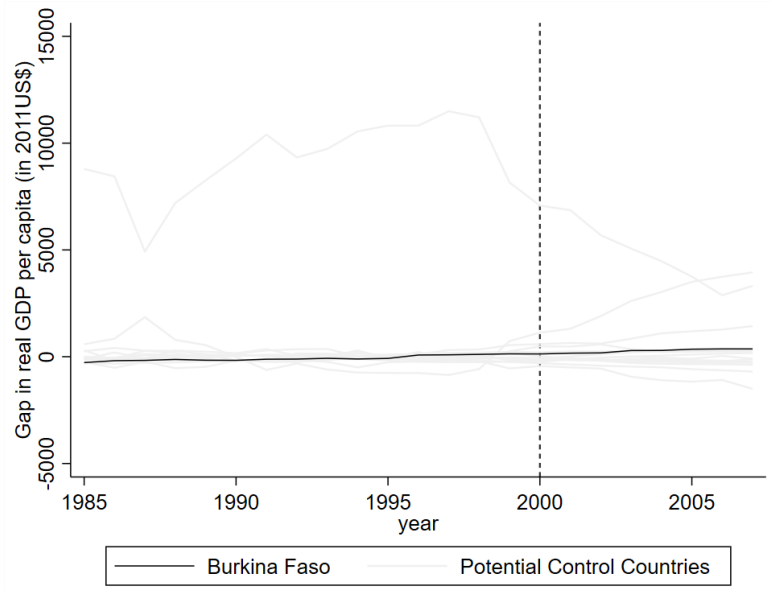


Table 4.1

Predictor means – Burkina Faso

	Actual Burkina Faso	Synthetic Burkina Faso Regional	Average of Potential Control Countries Regional
Population Growth	2.69%	2.31%	2.53%
Fertility Rate	6.93	6.12	5.53
Life Expectancy	49.55	47.74	55.43
Inflation	3.40%	4.91%	11.49%
Total Investment	20.21%	16.24 %	20.17%
Trade	36.52%	43.35%	57.66%
Government Consumption	21.06%	15.09%	14.92%
Years of Schooling	0.29	1.64	3.10
Political Violence 1999	0	1.02	1.21
Real GDP per capita 1999	1038	903.80	4797.5
Real GDP per capita 1995	865	944.81	4690.00
Real GDP per capita 1988	922	1050.27	4748.86
Real GDP per capita 1985	818	1091.25	5160.00

NOTE: All variables except for political violence and the lagged values of Real GDP per capita are averaged for the 1985-1999 period. Real GDP per capita is measured in 2011 US$.

Table 4.2

Treatment Effects – Burkina Faso

	Model with Regional Potential Control Countries	Treatment effect (Percentage)
2000	130.04	14.55
2001	166.516	18.83
2002	179.134	20.59
2003	288.418	36.03
2004	294.164	36.37
2005	352.244	43.50
2006	366.276	44.09
2007	365.086	43.31

*p < .10 **p < .05 ***p < .001

Appendix Table 5 – Weights

	Synthetic Control Benin Regional	Synthetic Control Ghana Regional	Synthetic Control South Africa Regional	Synthetic Control Burkina Faso Regional
Algeria	0	0	0.471	0
Bahrain	-	-	-	-
Burundi	0.207	0	0	0.254
Cameroon	0.058	0	0	0
Central African Republic	0.098	0.418	0	0.746
China	-	-	-	-
Egypt	0	0	0.094	0
Gabon	0.001	0	0.052	0
Iran	-	-	-	-
Ivory Coast	0	0	0	0
Kenya	0.123	0.037	0	0
Malaysia	-	-	-	-
Morocco	0	0.014	0	0
Nepal	-	-	-	-
Pakistan	-	-	-	-
Republic of the Congo	0	0	0.026	0
Rwanda	0.183	0	0	0
Saudi Arabia	-	-	-	-
Singapore	-	-	-	-
Syria	-	-	-	-
Togo	0.330	0.194	0	0
Tunisia	0	0.105	0.357	0
Uganda	0	0.232	0	0
RMSPE	41.337	80.504	293.161	142.189

10 Appendix 3

Table 1 – Data Description

Variable name	Description	Source
Real GDP per capita	The Real GDP per capita in 2011US$, 2011 benchmark.	The Maddison Project (2018)
Trade (% of GDP)	Trade is the proportion of total imports and exports of goods and services to GDP.	World Bank – World Development Indicators (2020)
Population growth (annual %)	Annual population growth rate. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.	World Bank – World Development Indicators (2020)
Fertility rate, total (births per woman)	The total fertility rate indicates the number of children that a woman would have if she were to live to the end of her childbearing year and carry children in accordance with age-specific fertility rates of the specified year.	World Bank – World Development Indicators (2020)
Life expectancy at birth, total (years)	Life expectancy at birth indicates the age at which a baby survives if the mortality rate at birth remains the same throughout his or her life.	World Bank – World Development Indicators (2020)
General government final consumption expenditure (% of GDP)	General government final consumption expenditure (previously called general government consumption) includes all current government expenditures (including compensation of employees) used to purchase goods and services. It also includes most of the expenditures on defense and security, but does not include government military expenditures that are part of government capital formation.	World Bank – World Development Indicators (2020)
Years of schooling	Average years of schooling in the population aged 25 years and older	Penn World Tables (2015)
Inflation, average consumer prices (Percent change)	Annual percentages of average consumer prices are year-on-year changes.	IMF - World Economic Outlook Database (2019)
Total investment	Total investment (% of GDP). Investment or gross capital formation is the total value of the gross fixed capital	IMF - World Economic Outlook Database (2019)

	formation and changes in inventories and acquisitions minus the disposals of valuables for a unit or sector.	
Major episodes of political violence (ACTOTAL)	Total summed magnitudes of all (societal and interstate) major episodes of political violence. Includes the magnitude scores of episode(s) of international violence, international warfare, ethnic violence and ethnic warfare. A ten-point scale is used for assessing the magnitude of a major episode of political violence scaling from 1 (lowest) to 10 (highest).	Center for Systemic Peace (2019)