

The impact of US economic sanctions on the Zimbabwean economy

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Abstract¹

In this paper, I evaluate the effect of US sanctions (ZIDERA) imposed in 2001 on the Zimbabwean per capita GDP. I argue that the US sanctions destabilized Zimbabwe's economy. Furthermore, I argue that the restriction on international credit loans and foreign direct investment by ZIDERA resulted in a decrease in per capita GDP in Zimbabwe. I use the synthetic control method, which allows me to create a counter-factual development of the Zimbabwean per capita GDP in the absence of the sanctions. I estimate that due to US sanction in Zimbabwe, the Zimbabwean per capita GDP decreased by USD 1164.13 on average over the period 2002-2017, which amounts to approximately 60.58% of the 2001 baseline level. The highest effect (USD 1600.41) is seen in 2008. In 2017, per capita GDP in the synthetic Zimbabwe is estimated to be about 67.1% higher than in the actual Zimbabwe.

Keywords: ZIDERA, sanctions, per capita GDP, Zimbabwe, synthetic control method, synthetic

Zimbabwe

¹ #professionalism - Throughout the paper I followed APA guidelines on citations, table formatting and presentation of a professional paper.

Introduction

In 1980 Zimbabwe gained independence from the British, and like many African countries after independence, the country sought out to correct land distribution (Mlambo, 2005). From 1980 to 1999 the process was slow such that by the end of 1999, white people who constituted only 20% of the nation's population still owned 85% of the land (Sachikonye, 2003). In 2002, President Robert Mugabe implemented a fast-track Land Reform Act which saw many white farmers being violently removed from the farms (BlockStaff, 2000). The process has been heavily criticized both in Zimbabwe and abroad as “violent seizures of white-owned land” (Zyl, 2017).

In the United States, senators Bill Frist, Russ Feingold, Jesse Helms, Hillary Clinton, and Joseph Biden introduced a bill on the 8th of March 2001 as a response to the fast-track Land Reform Act ("Zimbabwe Democracy and Economic Recovery Act of 2001", 2001). The bill was signed by President George W Bush on the 21st of December that year and was termed the Zimbabwe Democracy and Economic Recovery Act (ZIDERA)(Bush, 2001). ZIDERA was allegedly introduced to “support the people of Zimbabwe in their struggle to effect peaceful, democratic change, achieve broad-based and equitable economic growth, and restore the rule of law” (Congress, 2001). The bill also stated that through undemocratic practices and economic mismanagement, the Zimbabwean government rendered itself “ineligible to participate in International Bank for Reconstruction and Development and International Monetary Fund programs” (Congress, 2001). The US executive directors of all international financial institutions were instructed to vote against and oppose any extension of loan credit to Zimbabwe by any

institution and to forbid any cancellation or reduction of debt owed by Zimbabwe to the US and any international institution (Bush, 2001). Borrowing and foreign direct investment were fundamental in stabilizing the young country, but ZIDERA made it more difficult even for parties who were interested in helping Zimbabwe at the expense of upsetting the United States government (Murisa & Bloemen, 2018). Instead of helping the Zimbabwean people “achieve broad-based and equitable economic growth” as penned in the bill, ZIDERA had the opposite effects. It forced the country into an economic disaster.

Economic sanctions have been used by many Western countries and international bodies like the United Nations (UN) as a form of punishing governments. Neumeier and Neuenkirch, (2015) found that throughout 1976 -2012, the imposition of UN sanctions decreased the target country’s real per capita GDP growth rate by two percentage points which had an aggregate decline of 25.5% on GDP over the next ten years. The US sanctions decreased the targeted country’s real per capita GDP growth by 0.75 - 1 percentage points with an aggregate decline of 13.4% in GDP over the next seven years (Neuenkirch & Neumeier, 2015). Neumeier and Neuenkirch, (2016) analyzed the effect of US economic sanctions on the target country’s poverty gap. They found that the US-sanctioned-countries had a 3.8 percentage point larger poverty gap compared to the control group. Afesorbor and Mahadevan, (2016) analyzed the impact of economic sanctions on the income inequality of targeted countries and concluded that sanctions, mainly financial and trade sanctions have a “deleterious effect on income inequality.” Just as many studies have explored the effects of sanctions on the economy, many have also shown that economic sanctions worsen the level of democracy in the targeted nations because the economic

hardships caused by the sanctions are used by ruling political parties to consolidate authoritarian rule and win against opposition parties (Afesorbor & Mahadevan, 2016).

The rest of the paper is organized as follows. The next section describes the data and provides summary statistics. I then explain the synthetic control method and its application on studying the economic effects of the 2001 US sanctions in Zimbabwe. The last section concludes. The code I used is provided in an appendix.

Data

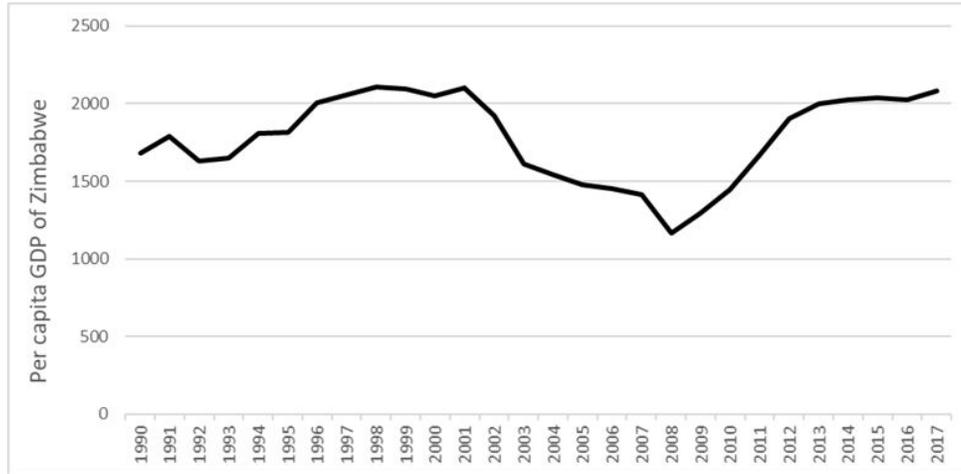
I use annual country-level panel data for the period 1990-2017. ZIDERA was introduced in 2001, giving a pre-intervention period of 10 years. The donor pool includes a sample of 36 African countries. The outcome variable is the real per capita GDP. For the predictors of the outcome variable, I used trade, foreign direct investment (FDI, hereafter), education, inflation, and per capita GDP. Table 1 below provides descriptive data statistics on the predictors.

Table 1: Descriptive statistics of variables

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
GDP	1,064	3,815	5,476	242	38,441
Education	1,064	36.32	23.29	-9.900	116
FDI	1,064	3.954	8.422	-8.600	161.8
Trade	1,064	77.07	45.30	19.70	531.7
Inflation	1,064	20.87	161.3	-131.9	4,145

Figure 1 below shows how the Zimbabwean per capita GDP was doing before and after the introduction of the sanctions.

Figure 1: Zimbabwe – Per capita GDP, 1990–20017



Sources: World Bank, World Development Indicators

Table 2 also shows the economic indicators that reduced significantly after the introduction of ZIDERA. For example, there was a trade surplus of \$322 million in 2001, and after the credit freeze, in 2002 there was a trade deficit of \$18 million which continued to grow in subsequent years (Gunjal, Shiferaw & Dradri, 2008).

Table 2: Zimbabwe - Key economic indicators, 2001–2008

	2001	2002	2003	2004	2005	2006	2007
GDP per head (USD at PPP)	214	204	185	182	174	170	169
Agricultural GDP growth rate (%)	-3.9	-22.7	-1.0	-2.9	-10.0	-4.5	-1.0
Consumer price inflation; avg (%)	75	135	385	381	267	1034	12563
Total Exports (USD m)	2114	1802	1670	1684	1606	1533	1680
Total Imports (USD m)	1791	1821	1778	1989	1994	2000	2200
Trade Deficit in million USD	-323	18	108	305	388	467	520
Total external debt (USD bn)	3.6	3.9	4.5	4.8	4.3	4.7	5.2

Sources: CSO; Economists Intelligence Unit; RBZ and CFSAM.

Methodology

The synthetic control method was first developed in Abadie and Gardeazabal (2003) and further elaborated in Abadie et al., (2010) in a study estimating the effects of California's Tobacco Control Program. The method uses a weighted average of units in the donor pool to produce an optimally estimated counterfactual unit called the "synthetic unit." The synthetic unit shows what would have happened if the treated unit had not received the treatment. The donor pool consists of comparison units that best resemble the characteristics of the treated unit. The

assumptions of the method are as follows; 1) Only the treated country is affected by the change in policy for all years in the pre-treatment period and afterward 2) The policy change has no effect before it is enacted and 3) A combination of donor states can model the treatment unit's counterfactual outcome (McClelland & Gault, 2017). The method has since been mostly used in macro studies (time-series needed) where the outcome variable is affected by some policy change.

The synthetic control method has a few advantages over regular ordinary least squares method (OLS). The first advantage is that it uses interpolation instead of extrapolation because the estimated causal effect is based on the comparison between an outcome in a given year and the counterfactual in the same year (Cunningham, 2018). The second advantage is that it helps researchers from peaking at the results while working on the model. This is because of the construction of the counterfactual which does not require access to the posttreatment outcomes when designing the study. The third advantage is that unlike regression, the weights which are chosen show explicitly how much each unit is contributing to making the counterfactual. The fourth advantage, which I believe is well suited for studies like this paper is that it bridges the gap between quantitative and qualitative analyses. Like any good thing out there, the synthetic model is not without limitations. Abadie et al. (2010) argue that it removes subjective researcher bias, but Cunningham, (2018) argues that through repeated iterations and changes to the matching formula, the researcher can introduce subjective choices into the model even though they do not have total control over the weights which are ultimately optimal for a given set of variables. But overall, Athey and Imbens (2017) argue that “the synthetic control approach

developed by Abadie et al. (2010, 2015) and Abadie and Gardeazabal (2003) is arguably the most important innovation in the policy evaluation literature in the last 15 years.”

In modeling a synthetic Zimbabwe, I use per capita GDP, trade, FDI, education, and inflation as predictors. From the list of African countries, I removed Côte d'Ivoire, Liberia, Congo, Sudan, and Burundi because they are also under US sanctions (U.S. Department of the Treasury. (n.d.), Elmerraji, J, 2018). When Zimbabwean trade was limited, Zimbabwe significantly increased trade between neighboring countries like Mozambique, Malawi, and Zambia (Zimbabwe. n.d.) so I removed them from the donor pool as they would have violated the assumptions mentioned above.

Results

Figure 2² displays the per capita GDP trajectory of the real Zimbabwe and synthetic Zimbabwe for the 1990-2017 period. Synthetic Zimbabwe was created from the weighted countries in Table 3 and almost accurately reproduces the GDP for Zimbabwe before the introduction of the sanctions. This close fit for the pre-sanctions period and the closeness of the synthetic weights in Table 4 demonstrates that it is possible to closely reproduce economic characteristics of Zimbabwe before the sanctions without using support outside of the data in the donor pool (Abadie, Diamond & Hainmueller, 2014).

² #dataviz - Figure 2 shows a detailed data visualization of how the Zimbabwean per capita GDP would have developed without the US sanctions versus the actual development.

Figure 2: Trends in per Capita GDP: Zimbabwe versus Synthetic Zimbabwe

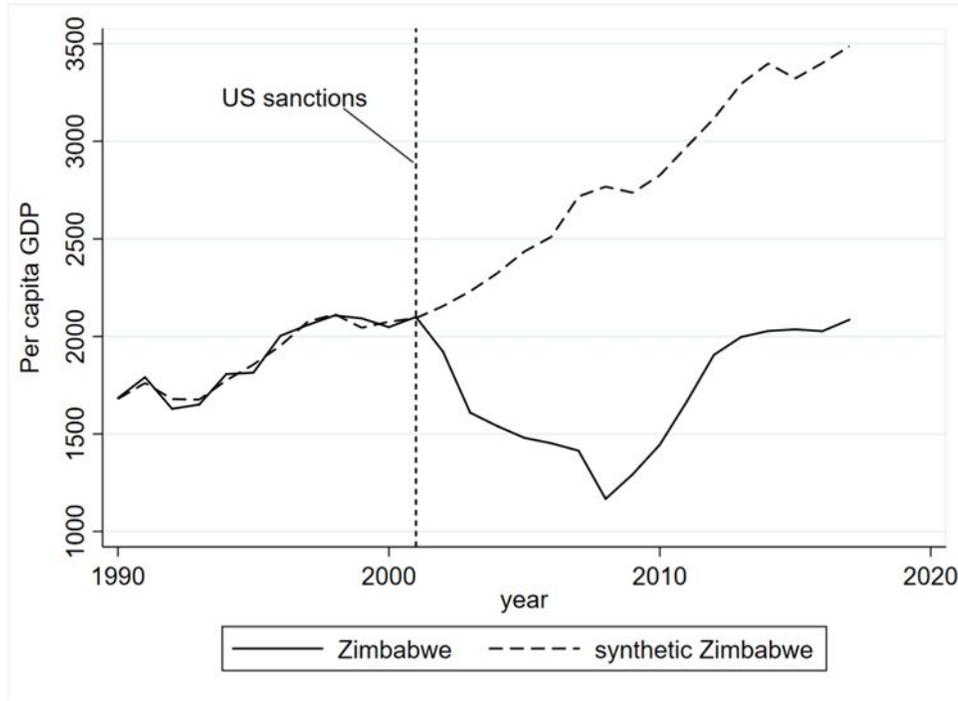


Table 3: Descriptive statistics of variables

Country	Weight
Angola	0.018
Botswana	0.011
Cabo Verde	0.099
Equatorial Guinea	0.002
Gabon	0.068
Mali	0.007
Mozambique	0.097
Sierra Leone	0.315
Togo	0.383

Table 4: Descriptive statistics of variables

Covariate	Zimbabwe	Synthetic Zimbabwe	African Sample mean
GDP	1880.545	1882.302	3,870
Education	43.16818	43.90209	36.12
FDI	1.209091	1.224527	4.024
Trade	69.25455	59.00646	77.13
Inflation	-4.5	-5.892109	21.47

The estimate of the effect of US sanctions on Zimbabwe’s real per capita GDP is given by the difference between the real Zimbabwe and synthetic Zimbabwe, visualized in Figure 3. Table 5 shows the treatment effects and the average of the period 2002-2017. The estimated treatment effect shows that due to US sanction in Zimbabwe, the Zimbabwean per capita GDP decreased by USD 1164.13 on average over the period 2002-2017, which amounts to approximately 60.58% of the 2001 baseline level. The highest effect (USD 1600.41) is seen in 2008. In 2017, per capita GDP in the synthetic Zimbabwe is estimated to be about 67.1% higher than in the actual Zimbabwe. It is also important to note that in 2008, Zimbabwe went through one of the worst economic meltdowns ever recorded in the world with an inflation rate of 231 million percent (Palmer, R. H, 1990).

Figure 3: Per Capita GDP Gap between Zimbabwe and Synthetic Zimbabwe

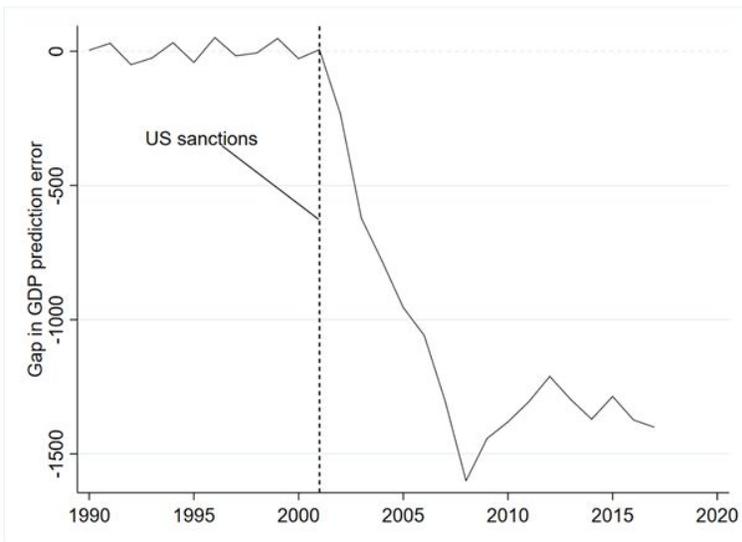


Table 5: Difference of per capita GDP values between Zimbabwe and synthetic Zimbabwe for the period 2002-2017

Year	Per capita GDP of Zimbabwe	Treatment effect
2002	1921.570793	233.737
2003	1609.629926	621.6283
2004	1540.330466	783.6838
2005	1480.264691	955.009
2006	1452.252285	1058.579
2007	1414.274063	1302.829
2008	1167.213966	1600.41
2009	1293.38613	1443.206
2010	1445.042386	1380.998
2011	1667.137943	1305.627
2012	1905.837872	1211.311
2013	1997.052199	1297.331
2014	2028.019248	1370.83
2015	2036.319256	1286.058
2016	2027.084915	1373.761
2017	2085.676925	1401.049
Average	1691.943316	1164.128

One concern of this study is the potential existence of spillover effects. In particular, it is possible that the US sanctions had effects on GDP in other African countries other than Zimbabwe in the donor pool. However, Abadie et al. (2015) argue that the limited number of units in the synthetic control allows for the evaluation of any potential spillover biases. For example, if the US sanctions had negative spillover effects on the GDP of other countries in the donor pool, then synthetic Zimbabwe would provide an underestimated treatment effect. The opposite is true if the sanctions had positive spillover effects. So even though I removed countries that I estimated to have been affected by the treatment (sanctions) from the donor pool, there might be some that I still did not account for.³

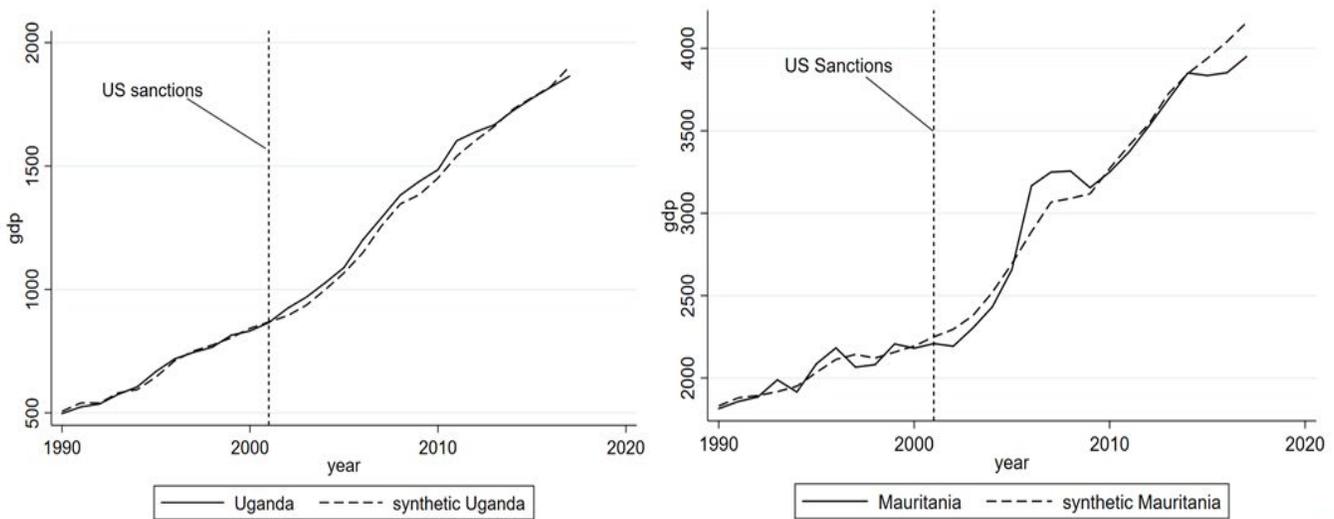
In the synthetic control method, there are no confidence intervals and significance tests. So the statistical significance of the treatment effect is determined by running placebo tests (Abadie et al, 2010)

Placebo in space

One of the synthetic control methods assumptions as mentioned above is that the treatment (sanctions) only affects the treated state (Zimbabwe) and not any country in the donor states both pre and post treatment (before and after 2001). So I ran the same model used in making synthetic Zimbabwe on other countries in the donor pool to see if they were affected, as shown in Figure 4. There seemed to be no effect.

³ #modelling - Throughout the paper I explained how the synthetic control model can be used to test the effectiveness of policies, here I also evaluated the effectiveness of the model and provided a well-supported concern (a concern that I also tried to improve)

**Figure 4: Placebo Sanctions: 2001 - Trends
in per Capita GDP: Uganda and Mauritania**



Placebo in time

Another assumption of the method is that the policy change does not have an effect on the treated unit before it is enacted. If this holds, I expect to see no change when I move the treatment period on the model back to say 1995. Figure 5 shows that moving the treatment period back does not have an effect. Hence I assume the sanctions did not affect the Zimbabwean per capita GDP before they were enacted.

Figure 5: Placebo Sanctions: 1995 - Trends in per Capita GDP: Zimbabwe versus Synthetic Zimbabwe

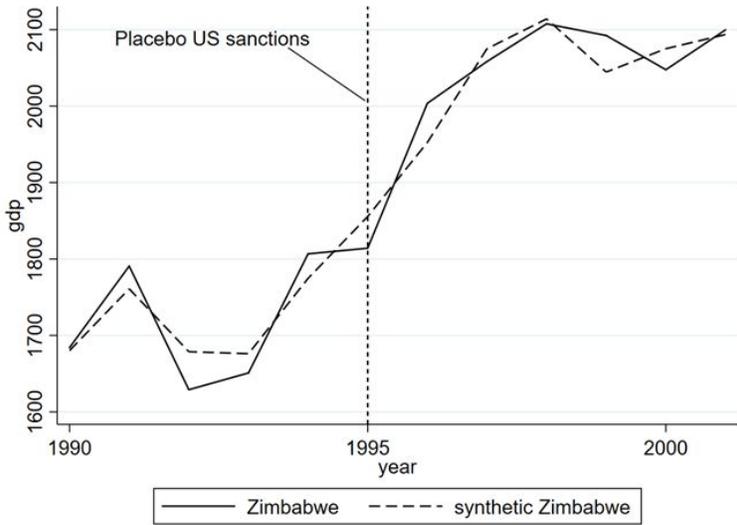
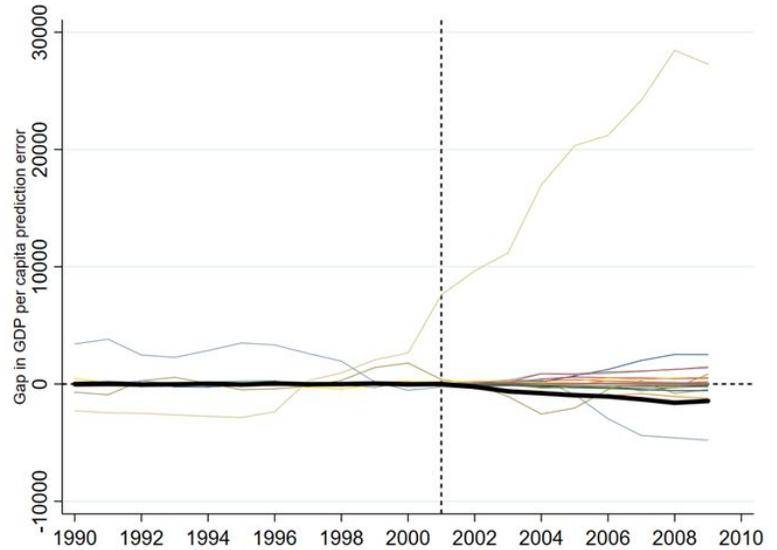


Figure 6: Placebo Sanctions: 2001 - Gap in per Capita GDP: All states in donor pool



Placebo in space

Figure 6 shows the difference in synthetic and actual per capita GDP for Zimbabwe and 39 placebo countries before and after ZIDERA. The figure demonstrates that before 2001, the gap between Zimbabwe and its synthetic control is smaller than a similar gap for most placebo states. The lines far from the others in the pretreatment period could be countries with very high per capita GDP like South Africa. After 2001, the gap between per capita GDP of the real Zimbabwe and synthetic Zimbabwe is larger than for most placebo states. If this is so, Abadie et al. (2015) argue that it suggests that the per capita GDP gap is because of the treatment, in this case, US sanctions.

Conclusion

In 2001 the US Congress passed the Zimbabwe Democracy and Economic Recovery Act (ZIDERA) which limited Zimbabwe's ability to get funding from international institutions like the International Monetary Fund. The sanctions also reduced the nation's ability to trade and thereby crippling its economy. In this paper, I used the synthetic control method developed by Abadie & Gardeazabal (2003) to estimate the effect of ZIDERA on the per capita GDP of Zimbabwe. I find that over the period of 2002-2017, per capita GDP of Zimbabwe was reduced by about USD 164.13 per year on average, which amounts to over 60% of the 2001 baseline level. In 2017, per capita GDP in the synthetic Zimbabwe is estimated to be about 67% higher than the actual Zimbabwe.

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Appendix

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