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# Does access to international capital markets affect investment dynamics in Sub-Saharan Africa ?

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## Abstract

This study investigates the influence of government borrowing through international capital markets on investment dynamics in Sub-Saharan Africa (SSA). We apply the synthetic control method to Gabon, Ghana and Senegal to assess whether this kind of government borrowing affects public and private investment and FDI in these countries using annual data for the period 1995-2017. Our results suggest that government borrowings through international capital markets have not affected public and private investment, but that the move may have boosted these countries' capacity to attract foreign direct investment. These results lend support to the hypothesis that these countries' exposure to international capital markets constitutes an opportunity to register on the investors' radar.

Keywords: Investment, synthetic control method, Sub-Saharan Africa

JEL classification: E22, F21, F34, G15, O55

## 1 Introduction

The 21st century has been marked by the resumption of economic growth in Sub-Saharan Africa (SSA)<sup>1</sup> after the Heavily Indebted Poor Countries (HIPC) initiative and the Multilateral Debt Relief Initiative (MDRI) that helped poor countries address the then protracted issue of unsustainable external debt. Up to recently, SSA countries have recorded annual economic growth rates averaging to 4.6% from 1999 to 2016, next to the emerging and developing Asia (7.4%) and above Latin America (2%) and the world average of 3.4% for the same period (IMF, 2017). However, this good momentum of economic development in SSA region was challenged by global financial and European sovereign debt crises of the mid-2000s and early 2010s that led to a sharp reduction in the demand for exports from developing countries and a shrink in FDI and foreign aid from the main development partners (Allena and Giovannetti, 2011). This loss in revenues definitely deprived SSA countries from valuable resources for their economic development and poverty alleviation agenda.

On the other hand, different economic policy responses such as accommodative monetary policies in advanced countries created more liquidity that resulted in unprecedented low interest rates in those countries, thus pushing investors to explore growth possibilities in frontier markets. SSA countries have taken this opportunity to mobilize, for the first time, financial resources through international capital markets. From 2006 to late 2017, 16 SSA countries have mobilized around US\$ 36.5 billion through sovereign and/or government-guaranteed Eurobonds with most of them being hugely oversubscribed - more than 5 times the issue sizes in most cases- only to reveal the high appetite of international investors for debt securities coming from this region. This access to international capital markets

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<sup>1</sup> Our analysis does not include the South African Republic given its difference in economic structure and characteristics with the rest of the SSA region.

constitutes an additional evidence that SSA is indeed experiencing the ‘age of choice’, a term coined by Prizzon et al. (2017) to indicate the expanding access of developing countries to a variety of development finance sources beyond official development assistance (ODA). Although the diversification of funding sources can be deemed favorable for SSA countries, the access to Eurobonds by SSA is viewed with a mixed feeling by critics who associate it to fickle global factors such as low interest rates in developed economies and favorable commodity prices, which casts doubt on the view that the Eurobond market can be considered as a sustainable source of development funding for SSA (Sy, 2013; Gevorkyan and Kvangraven, 2016). Their pessimism is beefed up by the fact that there seems to be close similarities between the current world economic conditions and those of the period before the 1980’s debt crisis (see FDIC, 1997; Eichengreen and Portes, 1986), a crisis that got most of SSA countries mired into a debt-poverty spiral for decades. There are therefore concerns about the risk of a debt crisis resurgence in SSA given the current trends in non-Paris Club and commercial sovereign borrowings (The Economist, 2018).

Despite these criticisms, the proponents of SSA countries’ access to international capital markets consider this move as a way for these countries to broaden their sources of development funding beyond foreign aid and what their domestic markets can offer (Sambira, Jocelyne, 2014). It is also seen as an opportunity ‘to register on the investors’ radar’ in order to boost foreign direct investment (FDI) inflows (Bertin, 2016). Moreover, the move is assumed to relax the public-private competition over the domestically available funds to the advantage of the private sector<sup>2</sup>. For instance, the focus on private sector development has been emphasized in many of SSA Eurobond prospectuses that clearly indicate massive soft and hard infrastructure investments to stimulate private investment as use of proceeds.

Several studies have investigated investment dynamics in SSA. Some of them have analyzed the interactions between public and private investment, FDI as well as other macroeconomic variables, and their impact on economic growth with a regional or country-specific focus (Ndikumana and Verick, 2008; Anyanwu, 2006; Adams, 2009; Boateng et al., 2017). Others have focused on the influence of institutions quality and reforms on these interactions and their ultimate effect on countries’ sustainable growth and development (Fowowe, 2011; Mlambo and Oshikoya, 2001; Farla et al., 2016). The aspect of international capital markets access has also been touched upon by studies that investigate the performance of SSA Eurobonds on secondary markets and its relation to countries’ macroeconomic fundamentals (Senga et al., 2018; Senga and Cassimon, 2019). The possibility of heterogeneous impact of the HIPC initiative on public, private and FDI between SSA market access and non-market access economies has also been investigated (Djimeu, 2018).

To our knowledge, the issue of whether and how sovereign borrowings through international capital markets affect investment dynamics in SSA borrowing countries has not yet been analyzed despite the heated debate about the sustainability of Eurobond borrowings on these economies. In an endeavor to bridge this gap, our paper investigates the impact of this kind of sovereign borrowing on public and private investment, and FDI in SSA countries using yearly data for the period 1995-2017. Our analysis is carried out using the synthetic control (SC) method with the first Eurobond issuance considered as the treatment event of interest. In order to allow for at least a 5 year observation of the potential treatment effects and due to data quality and availability, we restrict our study to Gabon, Ghana and

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<sup>2</sup> This was for instance recognized by the Ghanaian Minister of Finance who stated on June 23rd, 2015 that “Ghana’s planned Eurobond will prevent the government from borrowing from the domestic money market and in turn reduce the chances of crowding out the private sector by ensuring small and medium enterprises can access loans at affordable rates”. See for details <http://afkinsider.com/98707/ghanas-Eurobond-will-help-private-sector-by-containing-local-rates/>

Senegal which have issued their debut Eurobonds before 2012 and whose results have passed the quality check for all of the three investigated variables based on the fit index.

The rest of the paper is organized as follows: we discuss the relevant literature on investment dynamics in Africa in Section 2 and outline our methodology in Section 3. Section 4 is devoted to the description of our data and the presentation of our main results, followed by some concluding remarks and recommendations in Section 5.

## 2 Literature review

An important body of literature has been devoted to investment dynamics in SSA. Oshikoya (1994) investigates the macroeconomic determinants of private investment using a sample of 7 SSA countries for the 1970-1988 period and finds a significant public investment crowding-in effect on private investment. He also highlights a positive effect of real exchange rate and an unambiguous negative impact of macroeconomic instability indicators such as inflation and changes in terms of trade on private investment in the studied countries. Quite similar results are found by Ghura and Goodwin (2010) who also find a significant government investment crowd-in effect for SSA using a sample covering Asia, Latin America and SSA for 1975-1992. Besides, the authors underscore the adverse effects of external shocks and the insignificance of real GDP growth on private investment in the SSA region. The study by Mlambo and Oshikoya (2001) adds an institutional dimension to these traditional determinants of private investment by underscoring the crucial influence of political stability on investment decisions in Africa.

The influence of institutions' quality on the interaction between private investment and its key determinants has also been investigated. Everhart and Sumlinski (2001) analyze investment dynamics in 63 countries for the period 1970-2000 and find that corruption entails public investment crowding-out by lowering the quality of public investment which in turn lowers private investment. Morrissey and Udomkerdmongkol (2011) explore the impact of institutions on the private investment and FDI using 46 developing countries for the period 1996-2009 and find that FDI crowds-out domestic private investment, and this effect is exacerbated in politically stable regimes. However, this finding is objected by Farla et al. (2016) who rather find an FDI crowding-in effect and no evidence of the influence of good governance on domestic investment after improvements in the construction of the proxies and refinements in the estimation methodology used by Morrissey and Udomkerdmongkol (2011).

The linkages between private investment and FDI in developing countries has particularly attracted researchers' curiosity. Ndikumana and Verick (2008) use a sample of 38 SSA countries for the period of 1970-2005 and find a two-way relationship between private investment and FDI. Boateng et al. (2017) explore the complementarity of financial development and FDI on investment in SSA using a panel of 16 SSA countries for the period 1980-2014. Their findings indicate that financial development constitutes an important channel through which FDI influences domestic investment. Asiedu (2002) compares the drivers of FDI across 71 developing countries from 1970 to 1999 and find a significant difference between Africa and other regions regarding the reaction of FDI to some of its key determinants such as the return on investment, infrastructure and openness to trade. In the same vein, Kurul (2017) analyze the linkages between institutional factors and FDI using an extended sample of 126 countries over the period 2002-2012 and find a nonlinear relationship indicating the existence of a minimum threshold for the institutions quality to positively affect FDI.

Close to our research is the study by Djimeu (2018) who investigates the effect of SSA countries' participation in the HIPC initiative and MDRI on growth and investment. He finds that the two phases of the enhanced initiative, i.e. the decision point and post-completion point periods, are positively associated with increases in public and private

investment levels in participatory countries. More importantly, he suggests that these impacts are heterogeneous between SSA market access and non-market access economies using the amounts of net FDI received to categorize countries with low, medium and high access to international markets. We deviate from this literature by considering the issuance of Eurobonds as the demarcation criterion between SSA market and non-market access economies consistent with the definition by IMF (2014). We then try to answer the question of whether government borrowing through international capital markets impacts public and private investment, and FDI in borrowing countries. Therefore, we contribute to the debate about the sustainability of the SSA Eurobonds market by testing the validity of the claim that this move spurs the development of the private sector and, by doing so, creates the conditions for sustainable economic growth in SSA market participant countries.

### 3 Methodology

Our analysis is based on the synthetic control (SC) method. This method has gained popularity in the impact evaluation of social and economic measures and events. To name a few, the method has been used by Abadie and Gardeazabal (2003) to assess the effects of terrorist conflicts on business in the Basque country. It has also been used by Abadie et al. (2010) to estimate the effect of California's tobacco control program, and later to evaluate the economic impact of the 1990 German reunification on West Germany (Abadie et al., 2015). Essers and Ide (2019) have resorted to the same method to evaluate the effects of the IMF flexible credit line arrangements on Mexican, Colombian and Polish external financing costs and capital inflows.

In essence, the SC method evaluates the effects of the measure, intervention or event of interest as the difference in outcomes between the 'treated' unit and a 'synthetic control' during and/or after the treatment (i.e. measure implementation, intervention or event occurrence). The synthetic control is constructed as a weighted combination of potential control units composing the 'donor pool'. Assuming that we observe  $P + 1$  units and only 1 unit is treated, our donor pool is then made of the  $P$  untreated and thus potential control units. As posited in Abadie et al. (2010), assuming the treated unit is uninterruptedly exposed to the intervention of interest and posing  $Y_{it}^N$  the outcome of unit  $i$  at time  $t$  in the absence of intervention, for units  $i = 1, \dots, P + 1$  and  $t = 1, \dots, T$ ,  $T_0$  the number of pre-intervention periods, with  $1 \leq T_0 < T$  and  $Y_{it}^I$  the outcome of unit  $i$  at time  $t$  if  $i$  is exposed to the intervention in periods  $T_0 + 1$  to  $T$ , and assuming that the intervention has no effect on the outcome before the implementation period, we have that  $Y_{it}^I = Y_{it}^N$  for  $t \in \{1, \dots, T_0\}$  and all  $i \in \{1, \dots, N\}$ .

In general, the observed outcome for any unit  $i$  at any time  $t$  is given by

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it}$$

with  $\alpha_{it}$  the effect of the intervention for unit  $i$  at time  $t$  and  $D_{it}$  defined as

$$D_{it} = \begin{cases} 1 & \text{if } i = 1 \text{ and } t > T_0 \\ 0 & \text{otherwise} \end{cases}$$

Since we assume that only unit 1 has been exposed to the intervention and only after  $T_0$  (with  $1 \leq T_0 < T$ ), the intervention effect  $(\alpha_1 T_0, \dots, \alpha_1 T)$  for  $t > T_0$  is given by

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

Abadie et al. (2010) prove that  $\alpha_{1t}$  can be estimated as

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

for  $t \in \{T_0 + 1, \dots, T\}$  with  $w_i^*$  the optimal weights minimizing the root mean squared prediction error (RMSPE) of the outcome variable over the pre-intervention period given by

$$\text{RMSPE} = \sqrt{\frac{1}{T_0} \sum_{t=1}^{T_0} \left( Y_{1t} - \sum_{i=2}^{P+1} w_i Y_{it} \right)^2}$$

In order to assess the quality of the fit, Adhikari and Alm (2016) propose the normalization of the RMSPE using the 'Benchmark RMSPE' defined as the RMSPE obtained from a zero fit model given by

$$\text{Benchmark RMSPE} = \sqrt{\frac{1}{T_0} \sum_{t=1}^{T_0} (Y_{1t})^2}$$

They then define a 'Fit index' given by

$$\text{Fit index} = \frac{\text{RMSPE}}{\text{Benchmark RMSPE}}$$

This index ranges within  $[0, U]$  indicating that the RMSPE is obtained when the treated and the synthetic unit is  $(U \times 100)\%$  on each pretreatment year (Adhikari and Alm, 2016; Essers and Ide, 2019). The fit is deemed perfect if the fit index is 0, i.e. the RMSPE is 0. However, a fit index equal to 1 means that the fit is equal to that created by a zero fit model. Thus, an index of one or more indicates a particularly poor fit (Essers and Ide, 2019).

Moreover, Abadie and Gardeazabal (2003) propose the 'placebo' test where the synthetic control method is applied to every control unit in the sample (the donor pool) to produce a counterfactual of how the treated unit would have behaved in absence of the treatment. This inferential exercise examines whether the estimated effect of the actual intervention is large relative to the distribution of the effects estimated for the units not exposed to the intervention, which would confirm the difference in post-intervention outcomes between the treated and untreated units.

We apply the SC method to SSA market access economies using a pool of 42 countries from the region to evaluate the effect of government external borrowing through sovereign and government-guaranteed Eurobonds on public and private investment, and FDI in the selected SSA countries. For each of these countries, we consider as treatment the debut Eurobond issuance and constitute a donor pool of the maximum possible of SSA countries that had never issued Eurobonds at the time of the treatment.

## 4 Data and empirical results

### 4.1 Data

Our data set is made of annual data from selected SSA countries collected from different sources for the period 1995 to 2017. We consider 42 SSA market access and non-market access economies<sup>3</sup> to allow a richer donor pool for the synthetic control method. Our data on public and private investment have been collected from the Economic Database of the African Development Bank<sup>4</sup> under the labels gross capital formation by the public sector and gross capital formation by the private sector respectively. The same source has been used for data on gross capital formation (total investment), per capita GDP (expressed in purchasing power parity), real GDP growth and real exchange rate (RER) index. The RER index (base year = 2000) represents the price of 1 US\$ in domestic currency (nominal exchange rate) adjusted for relative price movements between the considered country and the USA. It has the advantage of providing a better indication of countries' macroeconomic stability in comparison with the rest of the world as its increase indicates either countries' domestic currency depreciation or higher inflation differential between the considered country and the USA. We proceed as in Ndikumana and Verick (2008) and use the Hodrick-Prescott (HP) filter with 6.25 value parameter (as recommended for annual observations by Ravn and Uhlig (2002)) to decompose the RER variable into cyclical and trend components. This decomposition allows a separate evaluation of the specific influence of the RER level and volatility on private investment.

Data on official development assistance (ODA), external debt stock (public external debt), imports and exports of goods and services and barter terms of trade (TOT) have been collected from the World Development Indicators of the World Bank as updated in October 2018. ODA and public external debt are expressed in percentage of gross national income (GNI) while imports and exports are expressed in percentage of GDP. We construct our proxy of trade openness by summing our imports and exports in their percentage expressions. The indexes of regulatory quality and rule of law have been collected from the World Governance Indicators database<sup>5</sup>. These indexes have values ranging from approximately -2.5 to 2.5 with the lower and upper bounds indicating weak and strong governance performance respectively.

Financial development indicator data have been fetched from the Financial Development Index Database of the IMF<sup>6</sup>. As indicated by its initiators, this composite index summarizes how developed financial institutions and financial markets are in terms of depth (size and liquidity), access (ability of individuals and companies to access financial

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<sup>3</sup> The following countries have been considered: Angola, Cameroon, Congo, Rep., Cote d'Ivoire, Ethiopia, Gabon, Ghana, Rwanda, Senegal, Seychelles, Kenya, Namibia, Nigeria, Tanzania, Mozambique and Zambia as market economies; and Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Djibouti, Gambia, Equatorial Guinea, Eswatini, Guinea, Guinea-Bissau, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Niger, Sierra Leone, Sudan, Togo and Uganda as non(yet)-market economies.

<sup>4</sup> This database is available online at <http://dataportal.opendataforafrica.org/bbkawj/afdb-socio-economic-database-1960-2019>

<sup>5</sup> This database has been developed by Daniel Kaufmann of Natural Resource Governance Institute (NRGI) and Brookings Institution, and Aart Kraay of World Bank Development Research Group. Data and further details are available on <http://info.worldbank.org/governance/WGI/#home>

<sup>6</sup> See <http://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B> for further details.

services) and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues and the level of activity of capital markets). Therefore, it better takes into account the complex multidimensional nature of financial development than the other proxies of financial development commonly used in empirical literature. Finally, we have collected data on foreign direct investment stock (FDI) from the United Nations Conference on Trade and Development (UNCTAD) database<sup>7</sup>. Unlike many other studies that use net FDI inflows, we have used the stock of FDI following the argument by Farla et al. (2016) about the weakness of net FDI inflows to fully account for the growth of physical capital under foreign ownership.

[Table 1: Summary statistics]

[Table 2: Correlations]

The summary statistics and correlation matrix are presented in Table 1 and Table 2 respectively. Firstly, a dominance of private investment over public investment is observed across the two sets of countries indicating the importance of the private sector in the build-up of countries' physical capital. Secondly, there appears to be substantial differences between the non-market and market economies in levels of total, public and private investment, as well as the stock of FDI and the amount of received ODA.

This heterogeneity is also remarkable in the evolution of these variables displayed on Figure 1. Nonetheless, as well as showing the difference between these two set of countries, this figure also shows some trends in the evolution of our variables of interest over the study period. In fact, a steady increase is observed for the overall investment level, public and private investment as well as in the stock of FDI, especially after 2000. Likewise, the figure shows a steady decrease in the stock of public external debt and the flow of ODA to SSA countries.

[Figure 1: Some trends and evolutions]

## 4.2 Comparative statistics

The significance of the difference in means of our key variables between market and non-market economies indicated in the summary statistics has been tested using the Student and Welch's t-tests. The results of the tests presented in Table 3 confirm the superiority of total investment, public investment and foreign direct investment levels in market economies, and inversely for ODA. However, the significance of the difference in private investment and public external debt levels between these two sets of countries is rejected by both the Student and Welch's t-tests. More importantly, these tests indicate significantly different scores in financial development, regulatory quality and rule of law indexes between these two sets suggesting higher level of financial development and institutions quality in SSA market economies compared to their non-market counterparts.

[Table 3: Test of mean equality between SSA market and non-market economies]

## 4.3 Synthetic control method

We have applied the synthetic control (SC) method to SSA market access economies to investigate whether the resort to international capital markets affects the dynamics of private investment, government investment and FDI in the borrowing country. For each of these countries, the first Eurobond issuance has been considered as the treatment

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<sup>7</sup> Data and further details are available on <http://unctadstat.unctad.org/wds>

event of interest. The analysis has been restricted to countries that have had their treatment in 2012 at latest to allow for at least a 5 year observation of the potential treatment effects. Based on this criterion, we considered Angola, Congo Republic, Cote d'Ivoire, Gabon, Ghana, Namibia, Nigeria, Senegal, Seychelles and Zambia which have respectively had their first Eurobond issuance between 2006 and 2012. We have finally focused on Gabon, Ghana and Senegal whose fit results have passed the quality check for all of the three investigated variables based on the fit index defined in Section 3 (see Table 4).

The results of the SC results for Gabon are presented on Figure 2. To start with, Figure 2a shows that private investment was already increasing since two years before the treatment after a drastic shrink since 2000. It also shows that, soon after the treatment, Gabon's private investment started by oscillating before a significant and consistent increase that exceeded the prediction of its SC group. However, this post-treatment difference between Gabon and its SC group, also illustrated on Figure 2d, does not pass the placebo test as indicated on Figure 2g where the performance of Gabon's private sector does not prove exceptional compared to its counterfactuals. Therefore, we do not find unequivocal evidence to attribute the observed increase of private investment in Gabon to the sole access to international capital markets. With respect to government investment, Figure 2b shows a flat evolution of this variable since 2000 and a steady increase for more than five years after the treatment.

[Table 4: Synthetic control results]

[Figure 2: Synthetic control Gabon]

Compared to the prediction of the SC group, this increase has been considerably higher to be deemed significant if we consider the result of the placebo test on Figure 2h, at least until 2013. The latter figure shows that government investment in Gabon consistently outperformed its counterfactuals before the drop of 2014-2015, which makes it reasonable to believe that the treatment of 2007 resulted in an increase in government investment level in Gabon until 2013. As far as FDI is concerned, Figure 2c shows a relatively flat evolution in the whole period before the treatment year and a steady increase since then. This increase appears to be significant compared to prediction of the SC group as shown on Figure 2f. When compared to its counterfactuals, Figure 2i indicate that this effect is substantially bigger to indicate a significant impact of Gabon's exposure to international capital markets on the level of FDI stocks.

The results SC method for Ghana are presented on Figure 3. It can be seen from Figure 3a that private investment was already on an increasing path before the treatment and that, this trend became considerably steeper soon after the treatment. Compared to the prediction of the SC group, it seems that Ghanaian access to international capital markets affected positively private investment levels as illustrated on Figure 3d. However, when compared to its counterfactuals through a placebo test, the evolution of Ghanaian private investment presented on Figure 3g does not appear to be exceptional enough to attribute the observed increase of private investment in Ghana to the sole access to international capital markets. Government investment in Ghana seems to have been rather negatively affected by the treatment as shown on Figure 3b and Figure 3e. But this negative impact is not supported by the results of the placebo test on Figure 3h that does not suggest any exceptional evolution of the Ghanaian government investment vis-a-vis its counterfactuals. With respect to FDI, Figure 3c shows a relatively flat evolution in the whole period before the treatment year and a steady increase since then. This increase appears to be significant compared to trend of the synthetic Ghana as shown on Figure 3f. When compared to its counterfactuals, Figure 3i indicate that the increase in FDI after the treatment is substantial enough to be attributed to the move by Ghana to register on the investors' radar through an exposure to international capital markets.

Finally, we present on Figure 4 the results of the SC application to Senegal. Figure 4a shows that private investment increased considerably and steadily before dropping drastically one period before the country tapped international capital markets in 2009. It can be seen that, after the treatment year, private investment in Senegal has been following an oscillating trend alternating increases and decreases that hardly indicate any significant effect of the treatment. This observation is clearly illustrated on Figure 4d that indicates no substantial difference between Senegalese private investment evolution and its synthetic, and on Figure 4g that shows rather negligible changes in Senegal compared to its counterfactuals. Government investment has also kept increasing quite steadily since some years before the treatment unlike the prediction of the SC group suggesting a monotonic decrease from a year after the treatment (See Figure 4b). Nonetheless, as shown on Figure 4h, this after-treatment performance has not passed the placebo test to substantiate any positive effect of government borrowing through international capital markets on its own investment levels. Quite similar results have been observed for FDI. Figure 4c shows that FDI has been increasing in Senegal some years before the treatment in 2009. However, it is seen that the Senegalese increase was not as steep as the one predicted by its SC group, thus suggesting a slowdown in the private investment increase momentum after the treatment. Though Figure 4f illustrates this shortfall in the private investment after treatment, the results of the placebo test presented on Figure 4i indicate that the case of Senegal is not too exception to substantiate a possible negative impact on FDI due to this country's access to international capital markets.

[Figure 3: Synthetic control Ghana]

[Figure 4: Synthetic control Senegal]

Overall, the results of our SC method to Gabon, Ghana and Senegal indicate that, broadly, government access to international capital markets has not affected the dynamics of public and private investment in these countries. More specifically, private investment presents some indications of consistent increase before and after the first Eurobond issues across these countries but our results do not lend support to the hypothesis that this increase may have been influenced by this access to international capital markets. The case of FDI deserves a particular attention. In fact, in addition to evidences of steady increases after these countries debut Eurobonds, the results of the SC method for Gabon and Ghana have proved sufficiently conclusive to substantiate a positive impact of the exposure to international capital markets on FDI in these countries. Even in the case of Senegal, despite the inconclusiveness of the SC method results, it seems unfair to overlook the tremendous increase of FDI in the period after its first Eurobond issue in 2009. This post-treatment increase in FDI seems to substantiate the assertion by (Bertin, 2016) that the exposure to international capital markets is indeed an opportunity for these countries to register on the investors' radar. However, the inconclusiveness of the SC method results regarding private investment does not substantiate the claim that this move has the potential to boost the domestic private sector.

The absence of evidence in support of a positive impact of government borrowing through international capital markets on private investment across the analyzed countries can be related to the observations made in Section 4.2 about the rejection of any difference in private investment levels between SSA market access and non-market access economies despite unequivocal evidences of relatively significant higher levels of government investment, FDI and financial development, as well as better institutions quality in market access economies. Normally, based on the established evidences of government investment and FDI crowding-in effect on private investment in SSA (Oshikoya, 1994; Ghura and Goodwin, 2010; Farla et al., 2016; Ndikumana and Verick, 2008), it would be logical to expect higher private investment levels in SSA market access economies in accordance to their considerably higher government investment and FDI levels. This paradoxical observation seems not to allow the generalization of the theory of public investment and FDI crowding-in effect on private investment across these two categories of SSA economies. A

comparative analysis of the interactions among public and private investment, and FDI between the two categories is recommended in order to dig deeper into the rationale behind this paradox.

## 5 Conclusion

This paper has investigated the influence of government borrowing through international capital markets on investment dynamics in Sub-Saharan Africa (SSA). Using a pool of 42 SSA countries from this region for the period 1995-2017, we have applied the synthetic control (SC) method to selected SSA market access countries to evaluate whether and how this kind of international borrowing affects public and private investment, and FDI in these countries. We have considered as treatment event the first Eurobond issuance by these countries and restricted the analysis to countries that have had their treatment in 2012 at latest to allow for at least a 5 year observation of the potential treatment effects. We have focused our analysis on Gabon, Ghana and Senegal whose fit results have passed the quality check for all of the three investigated variables based on the fit index.

Our results indicate that, broadly, government access to international capital markets has not affected the dynamics of public and private investment in these countries. More specifically, private investment presents indications of consistent increase before and after the first Eurobond issues across the analyzed countries, but our results do not lend support to the hypothesis that this increase may have been influenced by the access to international capital markets. As concerns FDI, these results have proved sufficiently conclusive to substantiate a positive impact of the exposure to international capital markets on FDI in Gabon and Ghana which issued their respective Eurobonds for the first time in 2007. Even for Senegal, data show a tremendous increase of FDI since 2009, i.e. the period after its first Eurobond issue, an increase that should not be overlooked despite the inconclusive results of the SC method. This post-treatment increase in FDI justifies to a significant extent the assertion by (Bertin, 2016) that the exposure to international capital markets has indeed been an opportunity for these countries to register on the investors' radar. However, the inconclusiveness of the SC method results regarding private investment cast doubt on the potential of this move to boost the domestic private sector as hypothesized by its proponents.

Overall, our findings suggest that public and private investment dynamics have not been affected by governments' borrowing through international capital markets, but that this move may have boosted these countries' capacity to attract FDI as indicates the experience of Gabon and Ghana. The descriptive and comparative statistics have revealed tangible differences between SSA market access and non-market access economies regarding public and foreign direct investment but, surprisingly, the statistically higher investment levels in the market access category have not led to correspondingly higher levels in domestic private investment. Therefore, an investigation into the potential heterogeneity in investment dynamics between SSA market access and non-market access economies constitutes an interesting avenue for future research.

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**Table 1: Summary statistics**

Note: Market economies refers to countries that have issued sovereign Eurobonds to international capital markets. Total, public and private investment expressed in percentage of GDP.

Variables	Non-market economies					Market economies				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Total investment	368	21.32	14.42	1.86	138.88	368	23.13	8.52	0.02	55.36
Public investment	368	6.78	6.14	-11.32	50.01	368	8.79	6.32	-6.84	32.55
Private investment	368	13.86	10.40	0.19	81.90	368	14.37	8.30	0.18	54.74
FDI	368	23.35	21.80	0.22	137.07	368	33.94	35.21	0.65	204.66
ODA	368	10.72	8.62	0.00	71.79	368	7.54	7.90	-0.19	56.96
Public external debt	368	65.73	66.84	0.45	504.48	368	68.17	60.57	4.13	489.30
Real GDP growth	368	5.25	10.61	-27.15	149.97	368	5.25	3.98	-8.94	24.54
Per capita GDP	368	3 151.34	6 247.60	545.69	40 015.82	368	4 940.09	5 573.59	373.44	26 382.29
Real exchange rate	368	368.71	527.00	0.07	3 302.46	368	113.08	129.80	.00	713.35
Trade openness	368	72.70	58.88	14.77	531.74	368	79.16	38.94	20.72	225.02
Terms of trade	368	112.23	38.36	21.40	244.44	368	129.08	47.22	39.20	432.92
Financial development	368	0.09	0.04	0.00	0.28	368	0.15	0.08	0.02	0.46
Regulatory quality	368	-0.79	0.46	-2.30	0.20	368	-0.56	0.44	-1.80	0.52
Rule of law	368	-0.90	0.49	-2.13	0.05	368	-0.63	0.54	-1.70	0.60

**Table 2: Correlations**

Note: \* indicates a 5% significance level. Total, government and private investment expressed in percentage of GDP.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Total investment	1.00													
2 Government investment	0.28*	1.00												
3 Private investment	0.70*	-0.03	1.00											
4 FDI	0.43*	0.16*	0.49*	1.00										
5 ODA	-0.16*	0.06	-0.13*	-0.17*	1.00									
6 Public external debt	-0.15*	0.11*	-0.07	0.06	0.40*	1.00								
7 Real GDP growth	0.46*	0.00	0.27*	0.11*	0.05	-0.13*	1.00							
8 Per capita GDP	0.29*	0.16*	0.37*	0.48*	-0.39*	-0.12*	0.01	1.00						
9 Real exchange rate	-0.06	-0.09*	-0.12*	-0.07	0.07	-0.11*	-0.02	-0.12*	1.00					
10 Trade openness	0.65*	0.02	0.50*	0.62*	-0.22*	0.02	0.40*	0.46*	-0.07	1.00				
11 Terms of trade	0.04	0.22*	-0.02	-0.02	-0.24*	-0.37*	-0.01	0.19*	-0.13*	-0.10	1.00			
12 Financial development	0.32*	-0.02	0.15*	0.27*	-0.39*	-0.28*	-0.01	0.31*	-0.25*	0.23*	0.06	1.00		
13 Regulatory quality	-0.06	-0.07*	0.08*	-0.10*	-0.01	-0.23*	-0.08	-0.02	-0.10	-0.14*	-0.05	0.38*	1.00	
14 Rule of law	0.07*	0.03	0.13*	-0.09*	-0.02	-0.24*	-0.05	0.12*	-0.18*	-0.01	-0.05	0.45*	0.83*	1.00

**Table 3: Test of mean equality between SSA market and non-market economies**

Notes: The test is performed under the null hypothesis if means equality, i.e.  $H_0: \text{Diff} = \text{mean}(\text{Non-market}) - \text{mean}(\text{market}) = 0$ . Both hypotheses of equal (upper side) and unequal (lower side) variances between groups using the Student and Welch's t-tests respectively (See Delacre et al., 2017). \*, \*\* and \*\*\* indicate the probability of the alternative hypothesis  $H_1: \text{Diff} < 0$ ,  $\text{Diff} \neq 0$  and  $\text{Diff} > 0$  respectively.  $H_0$  is rejected in favor of the indicated alternative if  $p(\cdot) < 0.05$ .

		Total investment	Public investment	Private investment	FDI	ODA	Public ext. debt	Financial dev	Regulation quality	Rule of law
Equal variance	Non-market economies	21.32	6.78	13.86	23.35	10.72	65.73	0.09	-0.79	-0.89
	Market economies	23.13	8.79	14.37	33.94	7.54	68.17	0.15	-0.56	-0.63
	Combined	22.23	7.78	14.11	28.65	9.13	66.95	0.12	-0.67	-0.76
	Difference	-1.81	-2.01	-0.51	-10.59	3.18	-2.44	-0.05	-0.23	-0.27
	$p(T < t)^*$	0.02	0.00	0.23	0.00	1.00	0.30	0.00	0.00	0.00
	$p( T  >  t )^{**}$	0.04	0.00	0.46	0.00	0.00	0.60	0.00	0.00	0.00
	$p(T > t)^{***}$	0.98	1.00	0.77	1.00	0.00	0.70	1.00	1.00	1.00
Unequal variance	Non-market economies	21.32	6.78	13.86	23.35	10.71	65.73	0.09	-0.79	-0.89
	Market economies	23.13	8.79	14.37	33.94	7.54	68.17	0.15	-0.56	-0.63
	Combined	22.23	7.78	14.11	28.65	9.13	66.95	0.12	-0.67	-0.76
	Difference	-1.81	-2.01	-0.51	-10.59	3.18	-2.44	-0.05	-0.23	-0.27
	$p(T < t)^*$	0.02	0.00	0.23	0.00	1.00	0.30	0.00	0.00	0.00
	$p( T  >  t )^{**}$	0.04	0.00	0.46	0.00	0.00	0.60	0.00	0.00	0.00
	$p(T > t)^{***}$	0.98	1.00	0.77	1.00	0.00	0.70	1.00	1.00	1.00

Table 4: Synthetic control results

Notes:

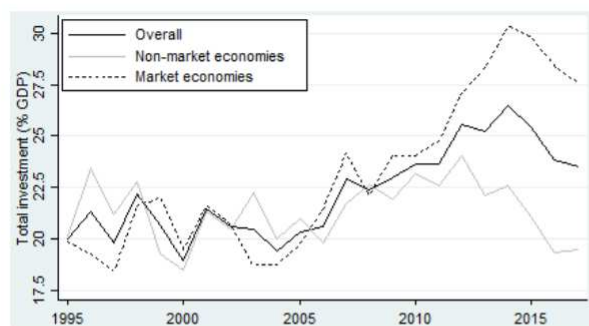
Private investment (PRIVINV) synthetic composition: Gabon: Botswana 0.322, Cabo Verde 0.237, Chad 0.18, Equatorial Guinea 0.028, Eswatini 0.04, Kenya 0.153 and Liberia 0.041; Ghana: Botswana 0.035, Comoros 0.077, Eswatini 0.112, Guinea-Bissau 0.065, Kenya 0.073, Mauritania 0.074, Mauritius 0.037, Mozambique 0.04, Nigeria 0.037, Rwanda 0.106, Senegal 0.139 and Sudan 0.206; Senegal: Botswana 0.054, Chad 0.009, Djibouti 0.336, Kenya 0.151, Madagascar 0.058, Mauritania 0.028, Mauritius 0.175, Mozambique 0.047, Uganda 0.049 and Zambia 0.091.

Government investment (GOVINV) synthetic composition: Gabon: Central African Republic 0.414, Cote d'Ivoire 0.065, DRC 0.231, Equatorial Guinea 0.012, Guinea-Bissau 0.238 and Zambia 0.039; Ghana: Botswana 0.22, DRC 0.05, Gambia 0.052, Guinea-Bissau 0.401, Nigeria 0.036, Rwanda 0.196 and Tanzania 0.045; Senegal: Angola 0.018, Cabo Verde 0.112, Cameroon 0.157, Central African Republic 0.099, Gambia 0.026, Kenya 0.027, Liberia 0.027, Namibia 0.329, Niger 0.019, Sudan 0.186 and Zambia 0.001.

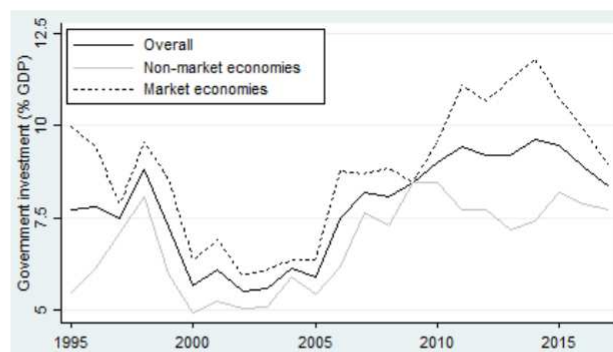
FDI synthetic composition: Gabon: Benin 0.392, Burkina Faso 0.365, Liberia 0.004 and Rwanda 0.24; Ghana: Angola 0.016, Benin 0.47, Botswana 0.119, Guinea-Bissau 0.084, Lesotho 0.091, Mauritius 0.114 and Mozambique(0.107); Senegal: Botswana 0.079, Burkina Faso 0.396, Guinea-Bissau 0.225, Niger 0.255, Sudan 0.028 and Togo 0.016.

	Gabon						Ghana						Senegal					
	PRIVINV		GOVINV		FDI		PRIVINV		GOVINV		FDI		PRIVINV		GOVINV		FDI	
	Gabon	Synth	Gabon	Synth	Gabon	Synth	Ghana	Synth	Ghana	Synth	Ghana	Synth	Senegal	Synth	Senegal	Synth	Senegal	Synth
PRIVINV			20.06	7.23					12.16	10.49	12.16	14.43			14.92	14.51	14.92	10.81
GOVINV	5.93	7.92			5.93	7.19	4.73	5.55			4.73	7.12	5.43	8.57			5.43	6.07
FDI			5.73	14.64			13.15	13.17	13.15	12.60								
ODA							10.18	10.05	10.18	18.49	10.18	10.18	9.56	9.05	9.56	7.75	9.56	15.74
OPEN	90.23	93.95	90.23	51.47					86.72	56.56	86.72	77.14	66.73	84.54	66.73	68.87		
RGDPG			1.56	1.98			5.06	5.07	5.06	4.60	5.06	4.86	4.19	3.67	4.19	4.46	4.19	4.30
CCG			4.57	5.45														
PCGDP (log)	9.80	8.27			9.80	7.12	7.75	7.76	7.75	7.60	7.75	7.76	7.58	8.02	7.58	8.04	7.58	7.19
EXTDEBT	76.81	70.85	76.81	156.34			90.14	90.22			90.14	66.82	59.50	64.10				
TOT (trend)	126.34	100.64									119.14	99.01	111.90	102.17	111.90	110.49	111.90	104.88
TOT (cycle)	-0.22	0.12											-0.16	-0.15	-0.16	-0.21		
RER (trend)	5.31	2.69			5.31	5.17							5.41	3.31				
FINDEV							0.11	0.11	0.11	0.09			0.12	0.16	0.12	0.17		
RULEOFLAW					-0.45	-0.59												
REGQUAL											-0.23	-0.23	-0.21	-0.29				
RMSPE	2.477533		0.675337		2.819905		0.739576		1.816525		1.196837		1.504533		0.193936		0.991501	
Fit index	0.120538		0.097130		0.420667		0.059385		0.313190		0.087710		0.095863		0.035401		0.128283	

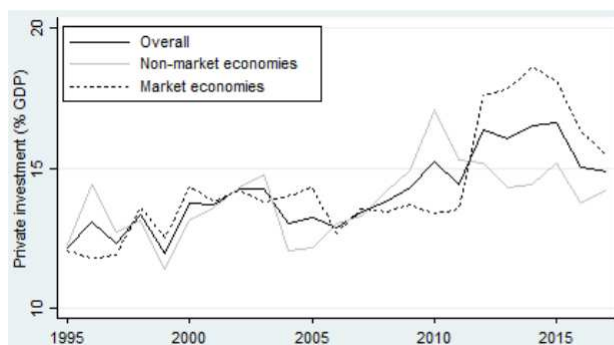
Figure 1: Some trends and evolutions



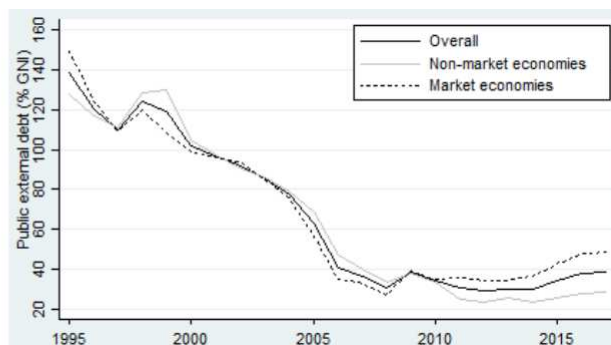
(a) Total investment



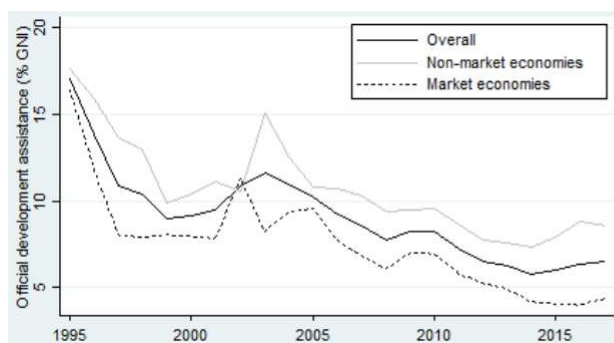
(b) Public investment



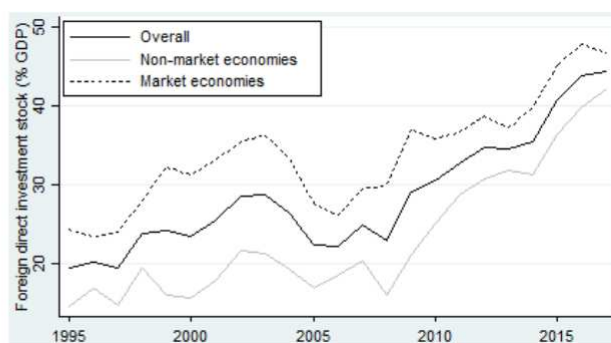
(c) Private investment



(d) Government external debt

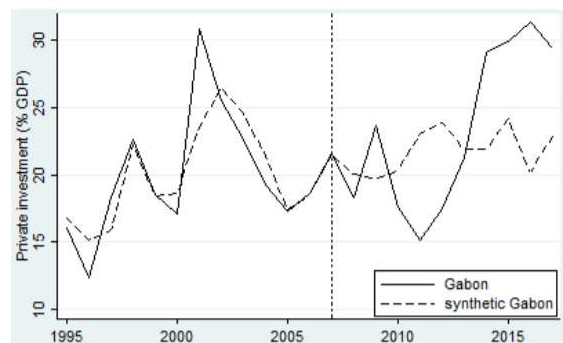


(e) ODA

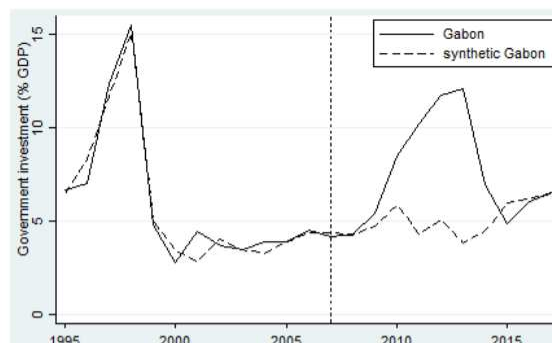


(f) FDI

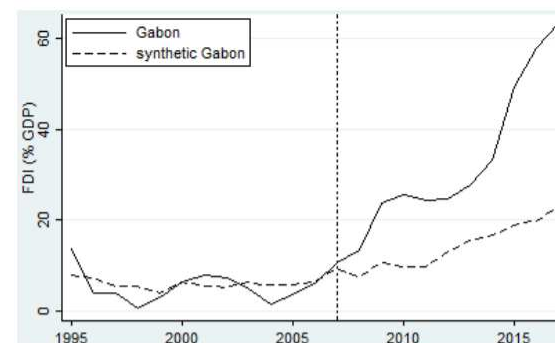
Figure 2: Synthetic control Gabon



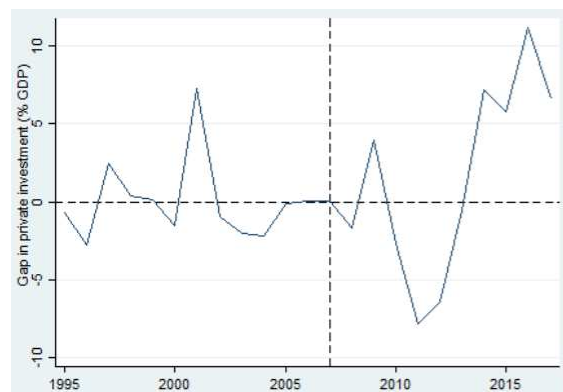
(a) Private investment



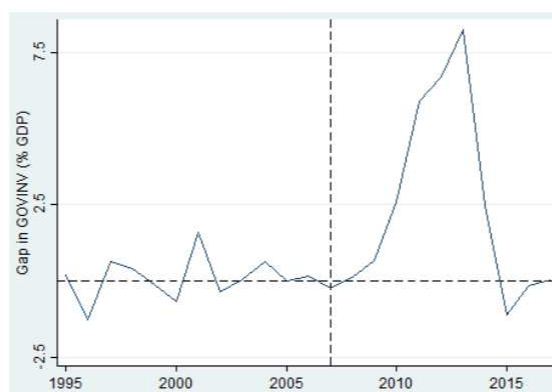
(b) Public investment



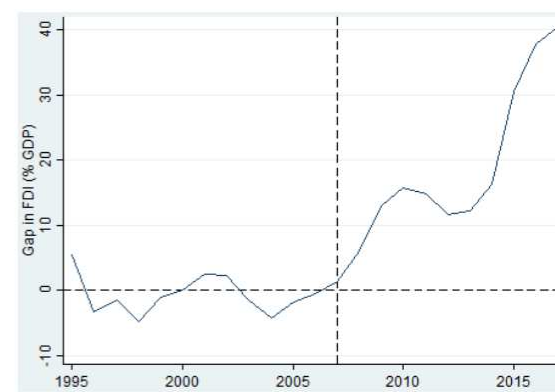
(c) FDI



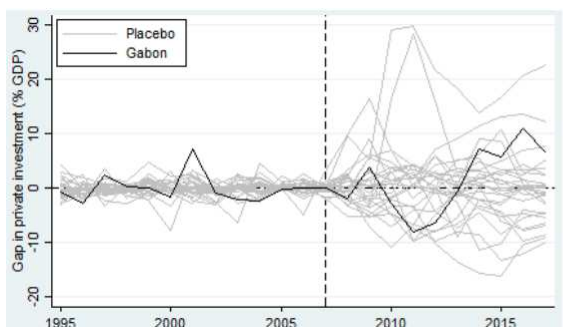
(d) Gap in private investment



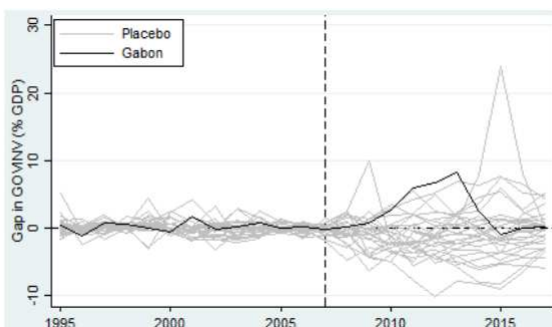
(e) Gap in public investment



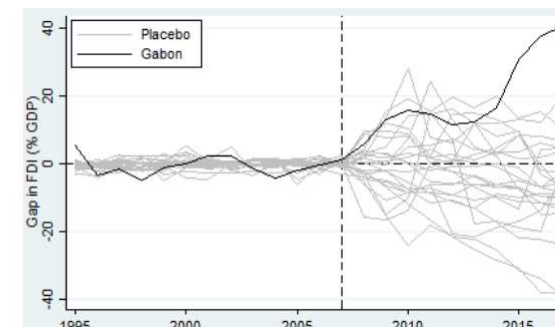
(f) Gap in FDI



(g) Placebo private investment

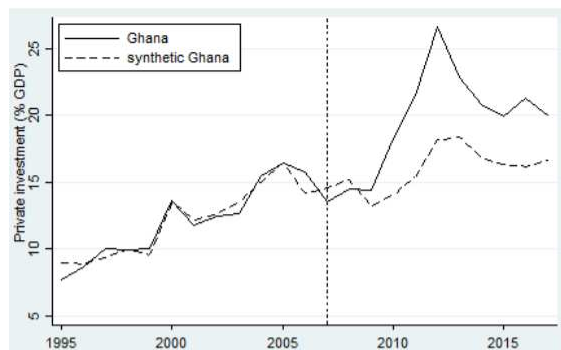


(h) Placebo public investment

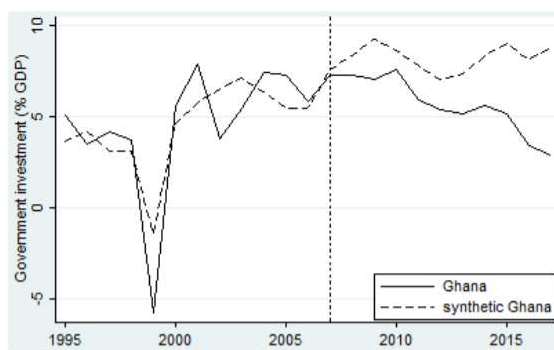


(i) Placebo in FDI

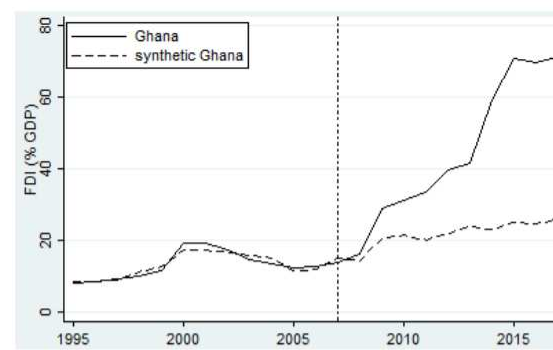
Figure 3: Synthetic control Ghana



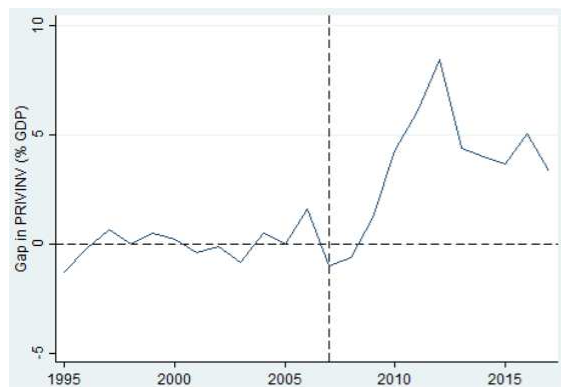
(a) Private investment



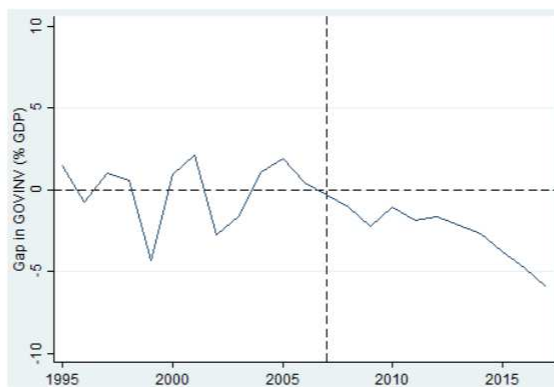
(b) Public investment



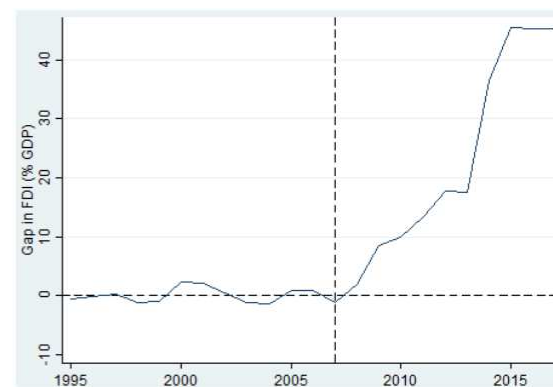
(c) FDI



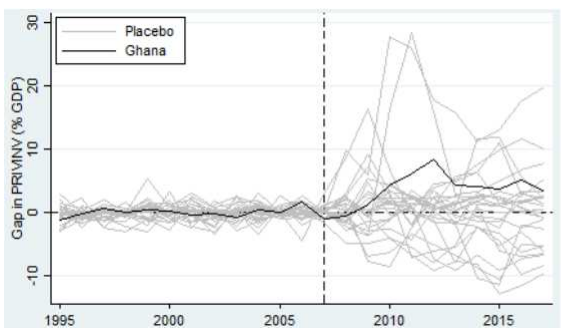
(d) Gap in private investment



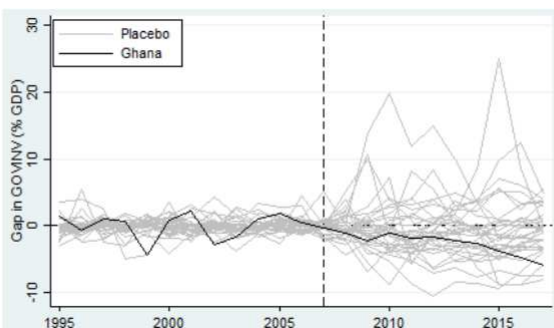
(e) Gap in public investment



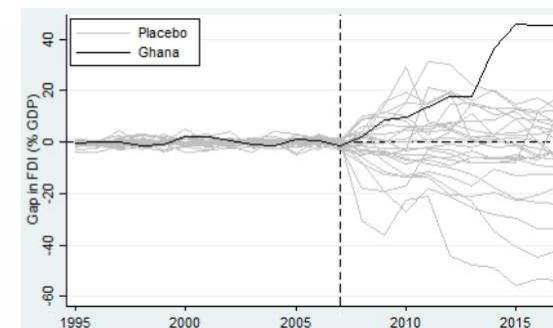
(f) Gap in FDI



(g) Placebo private investment

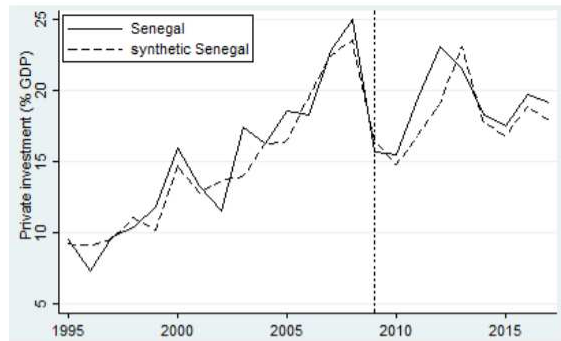


(h) Placebo public investment

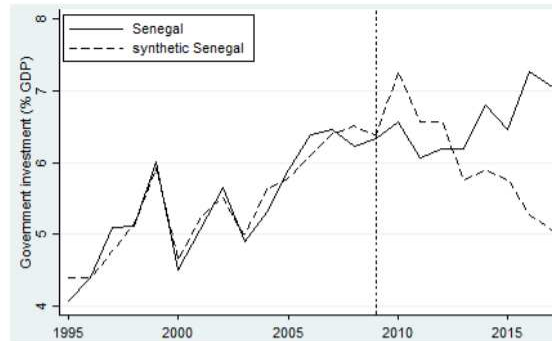


(i) Placebo in FDI

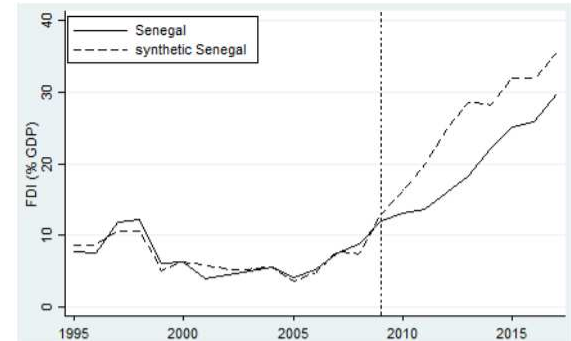
Figure 4: Synthetic control Senegal



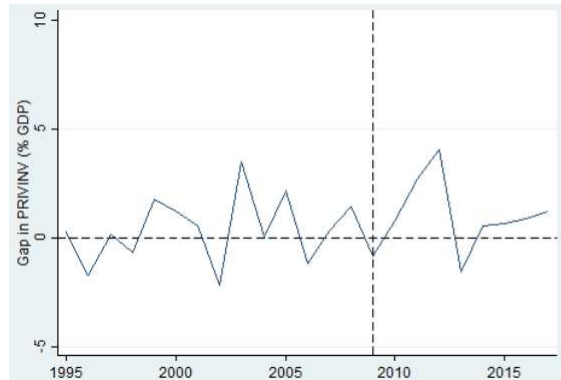
(a) Private investment



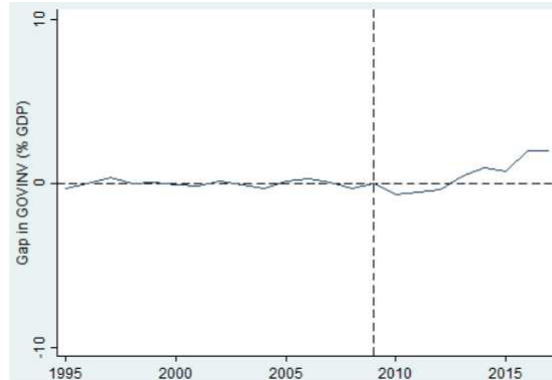
(b) Public investment



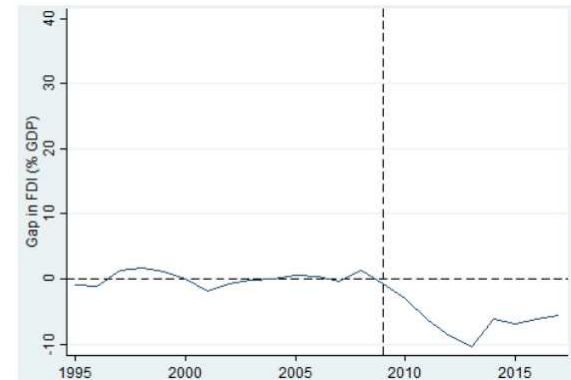
(c) FDI



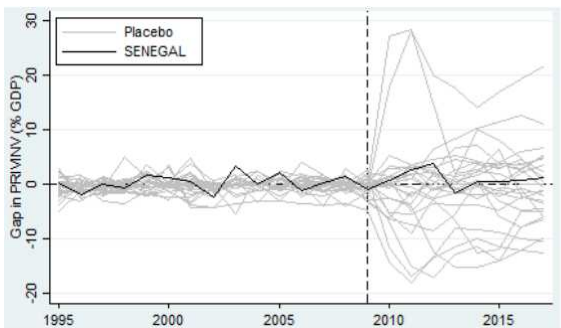
(d) Gap in private investment



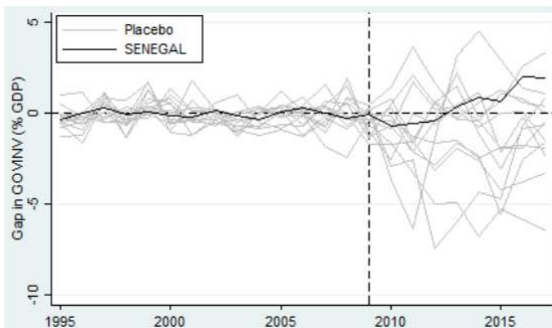
(e) Gap in public investment



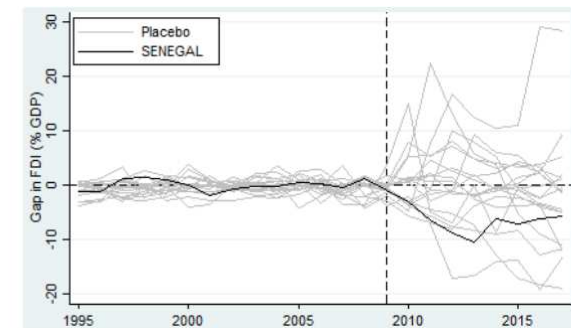
(f) Gap in FDI



(g) Placebo private investment



(h) Placebo public investment



(i) Placebo in FDI

[Figure 1: Some trends and evolutions]

[Figure 2: Synthetic control Gabon]

[Figure 3: Synthetic control Ghana]

[Figure 4: Synthetic control Senegal]