Education in French-speaking Sub-Saharan Africa in the context of COVID-19

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Abstract

Several months after the arrival of covid-19 and the closure of classes in French-speaking Sub-Saharan Africa, the epidemiological situation is not always under control. Apart from the loss of income of private education employees, the prolonged closure of classes appears to be detrimental to learners and could negatively impact long-term development. To this end, we are reflecting on the conditions for opening schools so that the cure is not worse than the virus. On the basis of interrupted time series modelling, we show that the total or partial opening of classes does not necessarily translate into an increase in the growth rate of the number of confirmed cases of covid-19 in the countries of the sample. This result shows that if barrier measures are respected in schools, authorities should open classrooms, even when the peak of the epidemic has not yet been reached.

***Keywords*: Education; French-speaking Sub-Saharan Africa; Covid-19; Opening of schools**

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1. Introduction

The covid-19 pandemic has had a profound impact on education by causing the closure of schools and universities. According to the World Bank (2020a), this is the biggest shock ever experienced by education systems worldwide. This policy of school closure is based on work that argues that it limits the spread of epidemics (Tegnell et al. 2009; Jackson et al. 2016; Bin Nafisah et al. 2018). It therefore contradicts the work of Johansen et al. (2020), and Viner et al. (2020), who find no causal link between the opening or closing of schools and the spread of epidemics.

While the theoretical debate focuses on the link between school closures and the circulation of the virus, the consequences for learners are clear. Indeed, they generally range from the loss of short-term learning in children to the long-term loss of human capital. From a geo-spatial point of view, there are certain specificities according to the level of development of countries. Indeed, technological progress in Western countries has made it possible to put in place adaptive structures to reach every child regardless of his or her environment. However, in most countries of the South, poverty has made this adaptation difficult (World Bank, 2020b).

Concerning Africa specifically, despite several months of school closures, the pandemic is gradually gaining ground on this continent. According to the World Health Organization (WHO), the acceleration of the pandemic in Africa is worrying. Indeed, Africa has recorded 100,000 confirmed cases in 98 days since the arrival of the pandemic, and today we record 4,826,891 (in June 2021) according to BBC News. This situation has made it difficult to reopen schools, which have been very scattered during this period of containment between November 2019 and July 2020.

Prolonged interruption of schooling could result in significant loss of learning. It could also widen inequalities in school performance and lead the most vulnerable families to further exploit children for domestic work or income generation (UNESCO, 2020)[4], making it difficult for them to return to school and sometimes even leading to dropout. All this argues in favor of a rapid solution to reopen schools to support the continuity of learning in order to reduce the risk of long-term damage to pupils' educational pathways.

In this context, we propose to reflect on the opening of classes in Africa in times of covid-19, so that the cure is not worse than the virus.

[4] Unesco: https://fr.unesco.org/news/reouverture-ecoles-quand-ou-comment

To do this, we are particularly interested in French-speaking sub-Saharan African countries, for at least two reasons: ***i***) the availability of epidemiological data and data on the socio-economic conditions of schools (WHO and PASEC data (Box 1 Annex)); ***ii***) the difficult and diverse experiences of French-speaking sub-Saharan African countries concerning the opening of classes. In fact, out of the nine[5] countries in the sample, three have opened classes completely and six have opened them partially.

We start from the hypothesis that if the conditions of health and social distancing are met, the opening of classes in French-speaking Sub-Saharan African countries will not result in an outbreak of confirmed cases of covid-19.

To test this working hypothesis, we model the impact of total or partial class openings that have occurred in selected countries of the sample on the dynamics of the growth rate of confirmed covid-19 cases using the interrupted time series method (ISTA). The interest of this method is to make it possible to analyze the effect of the opening of schools on the progression of the pandemic. Thus, the ultimate objective is to see whether or not the partial or total opening of classrooms has led to an upward dynamic in the growth rate of confirmed covid-19 cases. Our working hypothesis is verified if there is no link between the partial or total opening of classes and the dynamics of the growth rate of confirmed cases.

Our results convey two main messages: (i) out of a total of nine sub-Saharan African countries, all of which are LDCs (Least Developed Countries), partial or full school opening has no impact on the dynamics of the growth rate of confirmed cases in eight countries; ii) using the growth rate of the number of confirmed cases in the Democratic Republic of Congo (country whose classrooms remained closed during the study period) as a control variable, there is no statistically significant difference between the dynamics of the growth rate of the number of confirmed cases in the DRC and the dynamics of the growth rate of the number of confirmed cases in 89% of the countries in the sample, as a result of the partial or total opening of classrooms in these countries.

The work is organized as follows. Section 2 is a review of the work on the issue of opening schools in times of pandemic. Section 3 is an overview of the evolution of the pandemic in Africa. Section 4 presents the difficulties linked to the return of pupils to school in Covid-19

[5] *BENIN (total opening of classes on 11/05/2020), BURKINA FASO (partial opening of classes on 01/06/2020), CAMEROON (total opening of classes on 01/06/2020), CHAD (total opening of classes on 01/06/2020), CONGO (partial opening of classes on 02/06/2020), COTE D'IVOIRE (total opening of classes on 02/06/2020), GABON (partial opening of classes on 20/07/2020), SENEGAL (partial opening of classes on 20/07/2020), TOGO (partial opening of classes on 15/06/2020)*

time. Finally, in section 5, an empirical estimation is made of the link between class opening and the dynamics of the growth rate of confirmed cases of covid-19.

2. Literature review

Little work has been done on the issue of opening schools during the spread of a pandemic. However, the conclusions are divergent. The divergence of these positions can be classified into two groups: (***i)*** those advocating for closing schools because opening them could accelerate the spread of the pandemic (Tegnell et al. 2009; Jackson et al. 2016; Bin Nafisah et al. 2018); (***ii)*** those suggesting that schools should not be closed because they would have a minor effect on the spread of the virus (Johansen et al. 2020; Viner et al. 2020).

Among those suggesting school closure is the work of Bin Nafisah et al. (2018) who conclude that implementing school closure before or after the peak of the epidemic reduces the spread of the influenza epidemic. According to these authors, delaying the peak of the epidemic is positively correlated with the duration of school closure. Similarly, work on the relationship between school holidays and influenza transmission in England and Wales suggests that school closures may reduce transmission during influenza outbreaks. These studies highlight the contact parameter for children, estimated to be about 17% lower during school holidays than during the school period. This is consistent with the findings of Tegnell et al. (2009) who conclude that school closure can reduce cumulative rates and peaks of influenza attack (Cauchemez et al. 2009; Jackson et al. 2013). However, its effects on transmission remain unclear, in part because data on how it affects contact patterns are limited (Mossong et al. 2008; Jackson et al. 2011). Similarly, according to the work of Jackson et al. (2014), if pandemic influenza preparations are instituted at the onset of epidemics, school closures can significantly reduce influenza transmission.

However, the evidence for the effectiveness of school closures and other social distancing measures comes almost entirely from influenza epidemics, where transmission of the virus tends to be initiated by children (Mahassin, 2010).

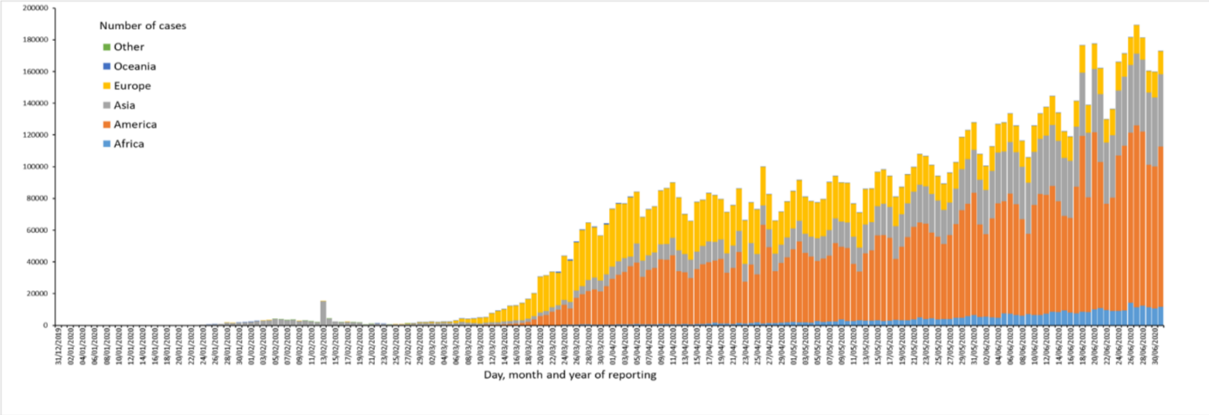
Other authors do not share this position and suggest that schools should not be closed or reopened. This is the case of the work of Johansen et al (2020) on the issue of reopening primary schools in Norway in the context of the Covid-19 pandemic. These authors suggest that most children are able to attend school, and that very few conditions justify preventive home schooling. Moreover, studies by Viner et al (2020) on the epidemiological data of COVID-19 in mainland China conclude that school closures did not contribute to the control of the epidemic. Indeed, their modelling predicts that school closures alone would prevent only 2-4% of deaths, much less than other social distancing interventions. This is consistent with the results of Wong GW et al (2003) who show that in previous coronavirus outbreaks, data suggested that transmission in schools was very low or absent. Similarly, Heavey et al. (2020) argue that reopening schools, with some measures, should be considered safe. Indeed, these authors find no evidence of transmission of Covid-19 by children attending school in Ireland. Therefore, Fantini et al. (2020) show that reopening nursery and primary schools can be considered as a policy to be implemented at an early stage of recovery efforts, by putting in place transmission barrier measures.

Previous studies have been conducted in developed countries where schools are better equipped than those in Africa. In this continent, more particularly in French-speaking Sub-Saharan Africa, no study has been carried out in this sense to our knowledge, which makes our work particularly interesting.

3. Evolution of the pandemic in French-speaking sub-Saharan Africa

Initially spared, Covid-19 is now spreading throughout the African continent (Assoumou Ella, 2020). The explosion of the pandemic that was feared at the beginning of its spread did not occur in the first few months (figure 1). The socio-economic situation in sub-Saharan Africa predicted a rapid spread of Covid-19 with unprecedented mortality (World Bank, 2020). For this part of Africa brings together all the handicaps of development, notably the conjunction of several vulnerability factors including, among others, the fragility of the health system and the economy, inter-individual promiscuity and the extreme poverty of populations living day to day without provisions (Lepira et al. 2020). In addition, there is limited access to safe drinking water and essential medicines, denial of disease due to high illiteracy rates, and trade with highly contagious countries such as China, France, Belgium and Italy (Lai et al. 2019).

***Figure 1**: Temporal distribution of the number of Covid-19 cases worldwide*



Source: https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases consulted on 01/07/2020

In Africa, the official contamination figures were still relatively low. At the beginning of April 2020, according to the Centre for Disease Prevention and Control in Africa,[6]there were **162,673 confirmed cases** and **4,601 deaths** on the continent, while over the same period, France alone reported more than **100,000 confirmed cases** and **more than 15,000 deaths**.

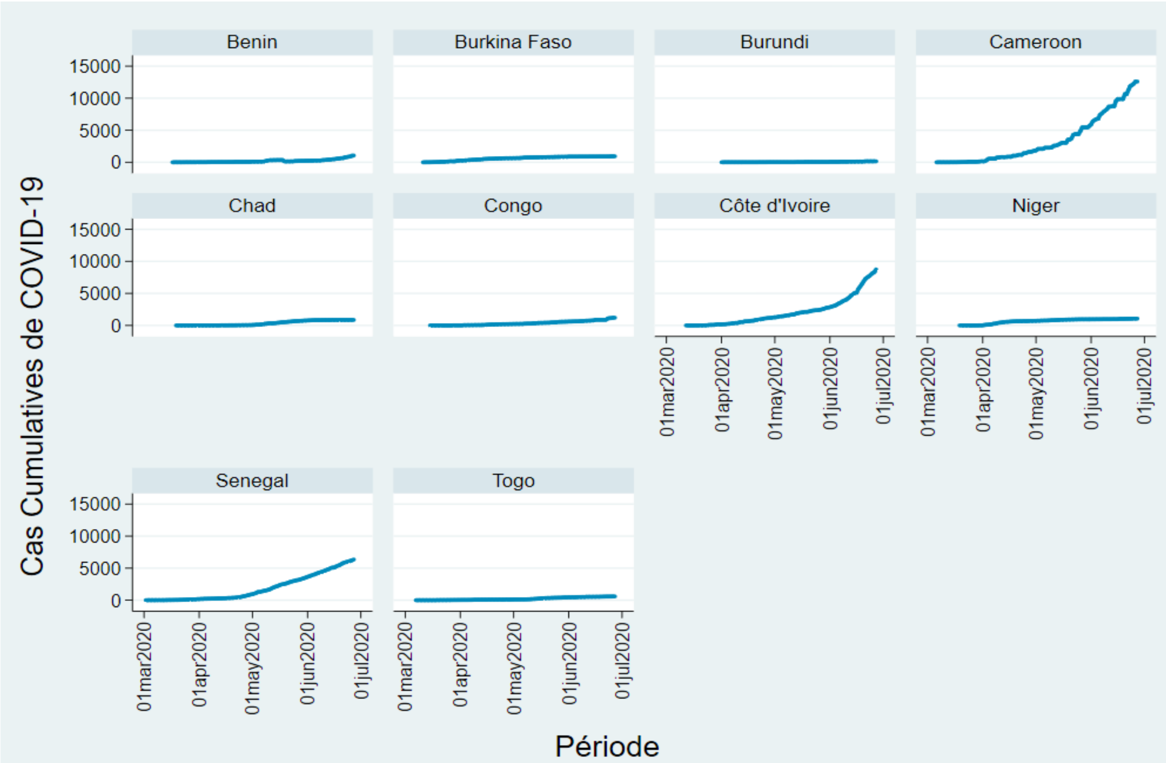
Even if Africa does not have adequate and sufficient health infrastructures to cope with the massive spread of Covid-19, the anticipation in the application of barrier measures would partly explain this slow progression of the epidemic. This confirms that the effective response to Covid-19 would lie in the implementation of barrier measures. Indeed, from the beginning of the pandemic, most French-speaking sub-Saharan African countries have imposed a partial or total halt to the movement and activities of their populations through measures such as the sealing off of major cities, the closure of bars and restaurants, schools and universities and also the closure of borders. Some countries, such as Senegal, Togo, and Côte d'Ivoire, have gone further by instituting states of emergency and curfews. However, the economic cost of this strategy at the population level is pushing authorities to relax these health protocols so as not to jeopardize their livelihoods. The Ebola pandemic is a relevant example with a reduction in the welfare of many households, including those not directly affected by the disease for the affected countries most notably Guinea, Sierra Leone and Liberia (Zafar et al. 2016). The weeks following the relaxation of these measures are marked by a spread of the pandemic with a sharp increase in the number of confirmed cases (over 300,000 cases by mid-June 2020) now due to local transmission.

The remarkable inadequacy of the screening devices required for systematic and large-scale *screening of* affected populations (Rothe et al. 2020), are overall transparency constraints to

[6] The structure attached to the African Union, which coordinates the African Centres for Disease Prevention and Control

be included in the estimate. This suggests that the figures may be higher than current data. Nevertheless, the current figures show that the most affected countries in French-speaking sub-Saharan Africa remain Senegal, Cote d'Ivoire and Cameroon (Table 1).

Figure 2: Trends in the spread of Covid-19 in selected French-speaking African countries



Source: WHO data and authors' calculations.

Therefore, Africa would be more effective by adopting deconfliction strategies that protect people's lives and livelihoods. However, crucial decision-making is fraught with uncertainty.

4. Schools in sub-Saharan Africa facing Covid-19

The Covid-19 pandemic, because of its scale and unique response strategies, triggered a crisis in education unprecedented in its scope, duration and impact. The decision to close schools remains a recognized response as a defensive strategy to deal with the spread of the virus not only to students but also to the entire population. Although infection rates are low among children (Paquette et al. 2020), school closure has been a key pillar of social distancing. However, the repercussions of this closure are already visible mainly due to the prolonged closure. In addition to the disruption of the school year, there is a risk that prolonged out-of-school learning leads to the alienation of learners from school systems and the exacerbation of existing inequalities.

In developed countries (in Europe) home learning has been supported by online tools. In French-speaking sub-Saharan Africa, this option remains inoperable because of the shortcomings relating to limited access to the Internet network, electricity and computer equipment, leading several of these countries to consider reopening schools, while the situation of primary schooling in most of them remains particularly worrying. The general situation of scarcity of resources combined with a rapid growth of its school-age population fundamentally affects schools in this region. Assuming that appropriate hygiene measures are insufficient, a return to school can significantly accelerate the spread of the pandemic. However, sanitation is not present, particularly in schools that are known to be overcrowded, usually in the early grades, where learning is most critical (Ratovondrahona and Normandeau, 2013). This is particularly the case in Democratic Republic of Congo (DRC), Benin, Burundi, Niger, Cote d'Ivoire and Burkina Faso, where over 30% of classes are overcrowded (Figure 2), whereas distancing is a recognized means of limiting the spread of the virus. These reputable schools in Togo, Benin and Burkina Faso are mostly unhealthy. Maintenance is done only once a week, with percentages of 85%, 71% and 52% respectively. Moreover, the current quality of the schools' infrastructure is not conducive to such an approach. Almost all of the community facilities are in poor condition according to the PASEC definition (Figure 3). Faced with the evidence, the insalubrity and poor quality of schools in this part of Africa could lead to an amplification of the Covid-19 contagion if schools are open (Diemer, 2020).

The majority of schools are public (Figure 4) and it is recognized that private schools are better equipped. Only Senegal and Congo have more than 50% of schools that are fenced (Figure 5). However, in the absence of a cadaster or established land tenure rules, the problem of school space delimitation arises. This makes it difficult to respect the rules of distance and hygiene between pupils and the rest of the population and among the pupils themselves.

In order to eradicate the pandemic, the responsible scientific councils urge hand washing with soap and water for at least 20 seconds. This banal prevention gesture is simply out of reach in most schools in French-speaking sub-Saharan Africa. Schools in this region have a low supply of drinking water, with more than 40% of schools having no access to water. The distribution of the rate of access to drinking water by type of school in French-speaking sub-Saharan Africa (figure 6) shows that community schools in Burundi, Burkina Faso, Niger, Chad and Togo have no drinking water at all. Also, more than half of the public schools in Burundi, Cameroon, the Congo and Togo lack drinking water.

All of these essential services for a return of children to school must be effective during this covid-19 period and beyond to maintain preventive hygiene practices and ensure protection against infection. This pandemic highlights the characteristics of the school environment in Africa. The quantity of safe drinking water is also critical for good hygiene practice. Yet more than 65% of latrines or toilets within schools do not have water (Figure 7). This absence of water in latrines would be a real mine of contagion.

In view of this situation, a priori schools in French-speaking sub-Saharan Africa would be less predisposed to receive pupils at risk of encouraging the spread of the virus.

5. Opening of classes and confirmed cases: an empirical modeling

5.1. Modeling

We use the interrupted time series method to analyse the effect of partial or total opening of classes on the dynamics of the growth rate of the number of confirmed cases of covid-19 in nine French-speaking African countries for which data and information on class opening are available. This method, explained by Linden and Arbor (2015; 2017), makes it possible to measure the impact of an intervention on the level and *trend of* a time series, in this case the growth rate of confirmed covid-19 cases (main dependent variable). We use individual country models. Following the example of Huitema and McKean (2000), Linden and Adams (2011) and Simonton (1977a; 1977b) we use the following presentation in a model without control variable (see Equation (1)) and with control variable (see Equation (2)):

$$\mathbf{Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \epsilon_t} \qquad (1)$$

Y_t represents the dynamics of the growth rate of the number of confirmed cases at time ***t***. β_0 represents the level of the growth rate in the number of confirmed cases before the start of classes. T_t is the time elapsed since the beginning of the study period. The coefficient β_1 The white noise is a white noise of null mathematical expectation and constant variance. The white noise, when assocciated, gives an idea of the upward or downward trajectories of the growth rate of the number of confirmed covid-19 cases. $\mathbf{X_t}$ is an indicator variable that takes the value **0** the period before the price resumes and **1** thereafter. The coefficient linked to this matrix represents the changes in the level of the growth rate of the number of confirmed cases on the first day of the resumption of classes. $X_t T_t$ is an interaction term. The coefficient β_3 associated with it represents the difference between the pre-currency and post-currency slopes of the growth rate of the number of confirmed cases. As in Linden and Adams (2011), β_2 significant indicates that there is an immediate effect on the dynamics of the growth rate of the number of confirmed cases on the day of the resumption of trading, and β_3 significant indicates that the total or partial recovery in prices has had an effect on the dynamics of the growth rate of the number of confirmed covid-19 cases. ϵ_t is a white noise of zero mathematical expectation and constant variance.

In a model with the control variable, we have:

$$\mathbf{Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z + \beta_5 Z T_t + \beta_6 Z X_t + \beta_7 Z X_t T_t + \epsilon_t} \qquad (2)$$

Z is a dummy variable that takes the value zero the days before the schools reopen and 1 otherwise. ZT_t , ZX_t and ZX_tT_t are all terms of interaction. The coefficients of β_0 à β_3 represent the control group, and the coefficients in the top row, from β_4 à β_7, represent the values of the processing group. Thus, the coefficient β_4 represents the difference in constant between the growth rate of confirmed covid-19 cases in the country where schools have been fully or partially opened and in the control country where schools remain closed. The coefficient β_5 represents the difference in the slope (trend) of the growth rates of confirmed covid-19 cases before the opening of classes between the countries in the sample and the control country. The coefficient β_6 represents the difference in the level of the growth rate of confirmed covid-19 cases between the countries in the sample and the control country on the day the classes were reopened. Finally, β_7 represents the difference in slope (trend) of growth rates of confirmed covid-19 cases between the sample countries and the control country after the opening of classes. It is the significance or not of this coefficient that is of interest for our analysis.

With regard to the results without control variables, only Chad had a statistically significant increase in the dynamics of the growth rate of confirmed covid-19 cases following the opening of classes ((with highly significant coefficient at 1%). There were no statistically significant results in the other eight countries in the sample.

In terms of the results with control variable, only Togo shows a positive and statistically significant difference in the dynamics of the growth rate of the number of confirmed covid-19 cases compared to DRC. On the other hand, the results show no difference in the growth rates of confirmed covid-19 cases between DRC and the eight other countries in the sample, following the total or partial opening of classes in the latter.

The graphical representations of the results (see Figures 9 and 10 in the appendix) sufficiently show that the dynamics of the growth rate of the number of confirmed cases of covid-19 did not change significantly after the total or partial opening of the classes, whether this opening occurred before or after the peak of the epidemic. Indeed, the results show that this reopening did not result in an outbreak of confirmed cases in 89% of cases. It therefore seems possible to reopen schools provided that the barrier measures in the schools are respected and that teachers are encouraged by a special covid-19 allowance

Table 1: Results without and with control

	GABON		SENEGAL		CAMEROON		COTE D'IVOIRE		TOGO		BENIN		BURKINA FASO		CONGO		CHAD	
	Uncontrolled	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*	*Uncontrolled*	*With control*
Cst	0.158*** (0.051)	0.087*** (0.019)	0.07*** (0.018)	0.079 (0.022)	0.128** (0.055)	0.067*** (0.028)	0.047 (0.033)	0.074*** (0.027)	0.108 (0.057)	0.067** (0.029)	0.05 (0.107)	0.061*** (0.016)	0.047 (0.033)	0.074*** (0.027)	0.108 (0.057)	0.067** (0.029)	0.18*** (0.051)	0.061*** (0.016)
Time	-0.002*** (0.001)	-0.001*** (0.001)	-0.001*** (0.001)	-0.001** (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.001)	0.004 (0.006)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.004 (0.001)	-0.001 (0.001)
Level	0.112* (0.061)	0.071 (0.054)	0.001 (0.011)	-0.018 (.029)	0.014 (0.042)	0.061 (0.062)	0.051 (0.064)	-0.03 (0.036)	0.055 (0.051)	0.041 (0.064)	0.438 (0.736)	0.118** (0.059)	0.051 (0.064)	-0.03 (0.036)	0.055 (0.051)	0.041 (0.064)	0.102 (0.044)	0.118** (0.059)
Trend	-0.001 (0.005)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.001)	0.001 (0.002)	-0.001 (0.001)	-0.014 (0.013)	0.118** (0.059)	0.002 (0.001)	-0.001 (0.001)	0.001 (0.002)	-0.001 (0.001)	0.007*** (0.003)	0.118** (0.059)
DRC		0.02 (0.029)		-0.014 (0.025)		-0.031 (0.022)		-0.028 (0.021)		-0.035 (0.022)		-0.022 (0.025)		-0.028 (0.021)		-0.035 (0.022)		-0.022 (0.025)
*Control*Time*		-0.001 (0.003)		0.001 (0.001)		-0.001 (0.001)		-0.001 (0.001)		-0.001 (0.001)		-0.001 (0.001)		-0.001 (0.001)		-0.001 (0.001)		-0.001 (0.001)
*Level*control*		0.092 (0.068)		0.011 (0.028)		0.045 (0.047)		0.075 (0.061)		0.089 (0.055)		0.123** (0.055)		0.075 (0.061)		0.089 (0.055)		0.123** (0.055)
*Trend*control*		-0.001 (0.006)		0.001 (0.001)		0.002 (0.002)		0.002* (0.001)		0.001 (0.002)		0.007** (0.004)		0.002* (0.001)		0.001 (0.002)		0.007** (0.004)
Difference		-0.001 (0.006)		0.0005 (0.001)		0.0001 (0.0009)		0.0015 (0.0011)		0.002** (0.0009)		0.004 (0.003)		0.0015 (0.0011)		0.0000 (0.0009)		0.004 (0.003)

****** Significant with 1% error, ** significant with 5% error and * significant with 10% error, () standard deviations*

5.2. Recommandations

The above results argue in favor of the opening of classes in the countries in the sample. However, the fact that there is at least one country that shows that it could lead to an upward dynamic in the growth rate of covid-19 cases shows that it must really be accompanied by barrier measures. Thus, for a possible return to the classroom, the governments of the countries concerned must improve the pedagogical and health functioning of their schools. The intervention must act as a catalyst to allow equitable access to education and to strengthen the protection, health and safety of children. A few points below could be crucial for the opening of classrooms:

- In unfenced schools, the suspension of playgrounds would be indispensable in order to control the movement of learners, while prohibiting the crossing of uninvited persons on school grounds;
- To minimize contagion in schools with a reputation for overcrowding, it is imperative that classrooms be subdivided into small groups of no more than 20 students in order to increase spacing between students (WHO). Staggering the start and end of the day times of each sub-group will be the second step for classroom optimization;
- Water and sanitation facilities will be an essential element in the safe reopening of schools. To this end, in view of the sufficient quantity of water required for sanitary hygiene in schools in French-speaking sub-Saharan Africa, the authorities must mobilize funding for interventions in water, sanitation and hygiene services in schools. Hygiene practices at all levels and for all school staff, especially hand washing and respiratory hygiene rules must be in place. A continuous supply of products and services for proper cleaning and disinfection of schools will be essential for the health of learners:
- The personnel in charge of cleaning must also be trained in disinfection and provided with adequate personal protective equipment. Public authorities should assign the hygiene officer to inspect the cleanliness of latrines and the school environment in general in schools that are known to be overcrowded for proper application of barrier measures;
- For better protection against the COVID-19 pandemic, all students and teachers must at least be equipped with masks. The absence of this tool may be a factor in the spread of the virus to all actors in the education system when classes are resumed and, through a snowball effect, spread within families. Being faced with a very young

population, the masks could be of the reusable type. It is preferable that each student and the teaching staff be equipped with several masks that can be renewed for the duration of the pandemic. Checking the condition of the masks (quality and cleanliness) should be done regularly by the school authorities;

- The opening of schools in sub-Saharan Africa would be more effective if the authorities make barrier gestures, a course module integrated into daily teaching to stimulate conditional reflexes in learners;
- E-learning initiatives should be encouraged wherever possible;
- Routine screening should be performed on any student or teacher showing signs of covid19 ;
- A covid-19 allowance should be paid to teachers to reward their efforts to work despite the risk of being infected ;
- The State must provide for damages in the event of contamination of teachers at their place of work, or death of teachers due to covid-19.

6. Conclusion

Finally, several months after the arrival of covid-19 in French-speaking Sub-Saharan Africa and the closure of classes, the epidemic is not always under control. Prolonged class closures could have serious consequences for learners and negatively impact long-term development. This is why it is necessary to reflect on the possibility of reopening schools, so that the resurgence is not worse than the virus. Out of the nine countries in the sample that fully or partially opened schools, the results show that this reopening did not result in an outbreak of confirmed cases in 89% of cases. It therefore seems possible to reopen schools provided that the barrier measures in the schools are respected and that teachers are encouraged by a special covid-19 allowance. But this reopening of schools must be accompanied by a real policy of equipping and reorganizing schools and raising awareness of the coronavirus among students. In addition, countries like Chad must learn from the experience of countries that have been hit by Ebola in the past years to avoid a surge in the number of infected people when schools are opened.

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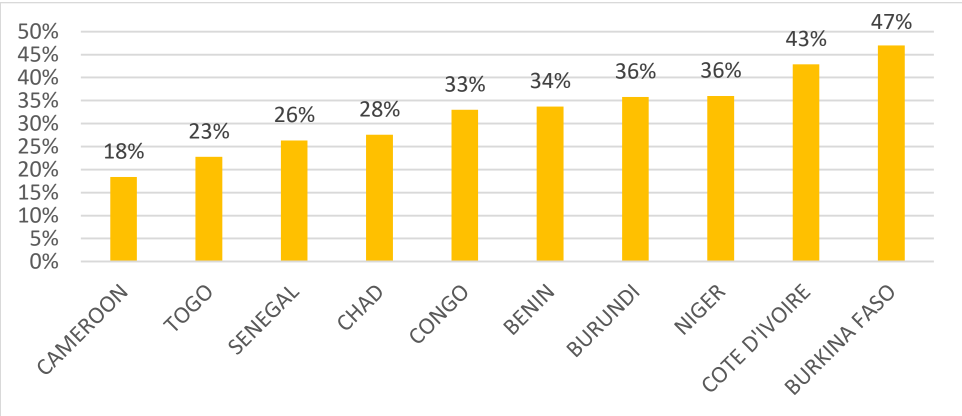
Annexes

Box 1

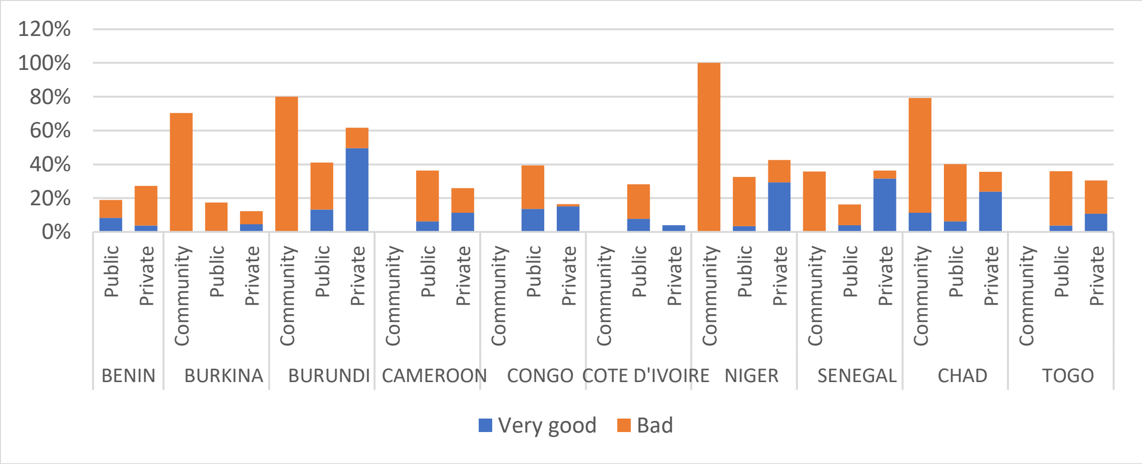
The data used in this work comes from the Programme d'analyse des systèmes éducatifs de la CONFEMEN (PASEC) surveys presented in cross-section between 2014 and 2015.The PASEC surveys mainly concern the French-speaking countries of sub-Saharan Africa, notably Benin, Burkina Faso, Burundi, Cameroon, Côte d'Ivoire, Congo, Gabon, Niger, Senegal, Chad and Togo. This database includes the status of primary school infrastructure, class sizes and data on access to health conditions (water, electricity, unhealthy conditions, etc.).

Figure 3: Overcrowding in schools in French-speaking sub-Saharan Africa



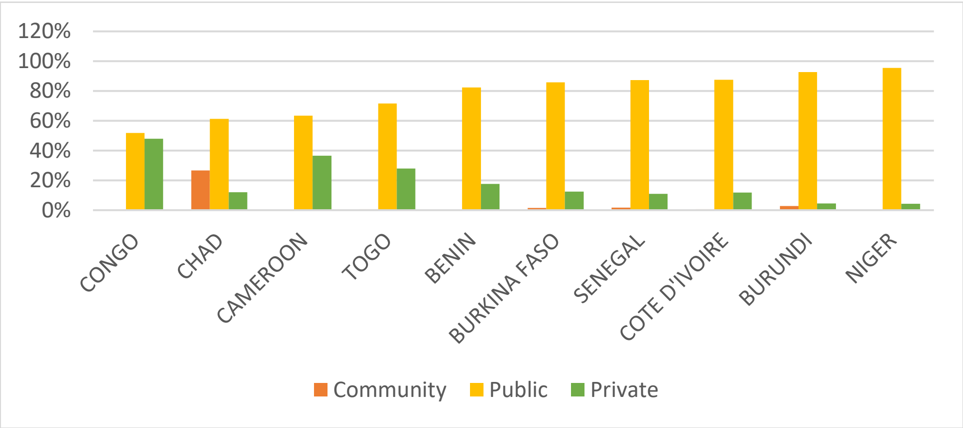
Sources: Authors’ calculations based on PASEC 2014 data.

Figure 4: Quality of schools in French-speaking sub-Saharan Africa



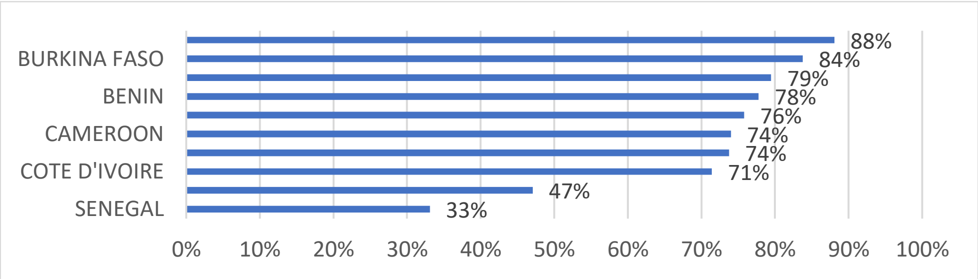
Sources: Authors' calculations based on PASEC 2014 data.

Figure 5: Distribution of institutions in French-speaking sub-Saharan Africa



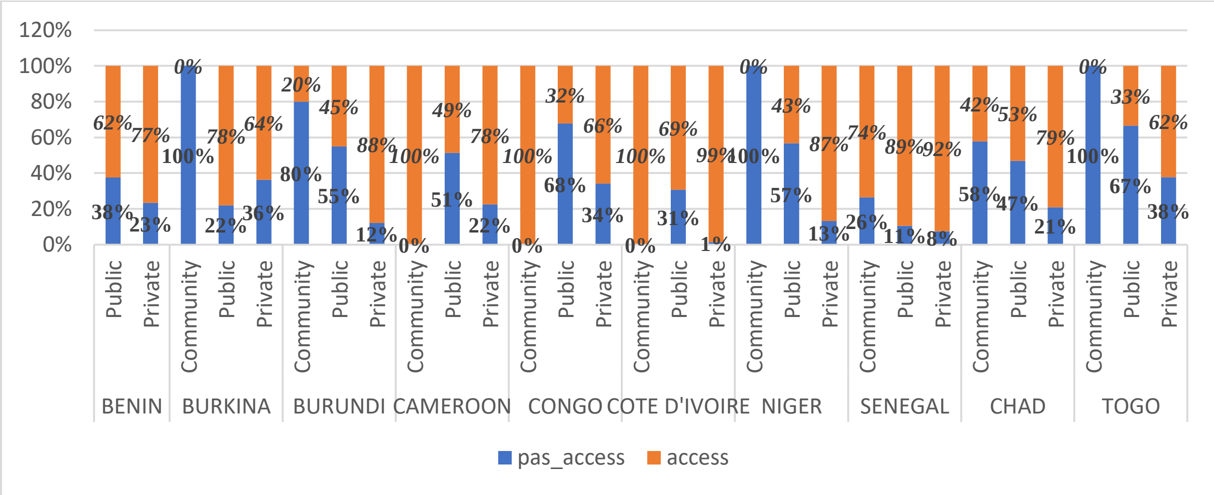
Sources: Authors' calculations based on PASEC 2014 data.

Figure 6: Rate of unfenced schools in French-speaking sub-Saharan Africa



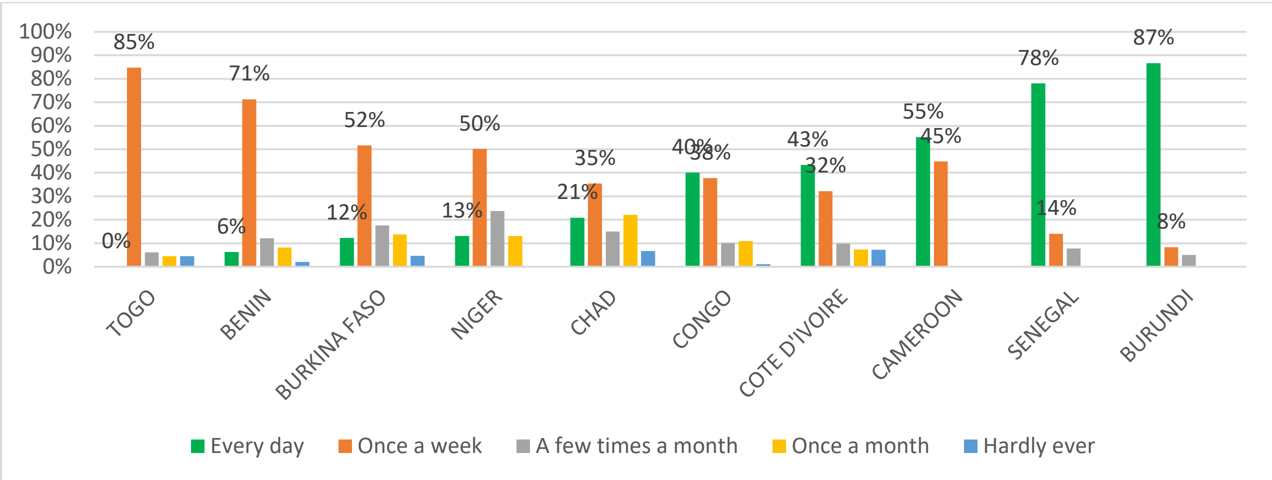
Sources: Authors' calculations based on PASEC 2014 data.

Figure 7: Rate of access to drinking water by type of school in French-speaking sub-Saharan Africa



Sources: Authors' calculations based on PASEC 2014 data.

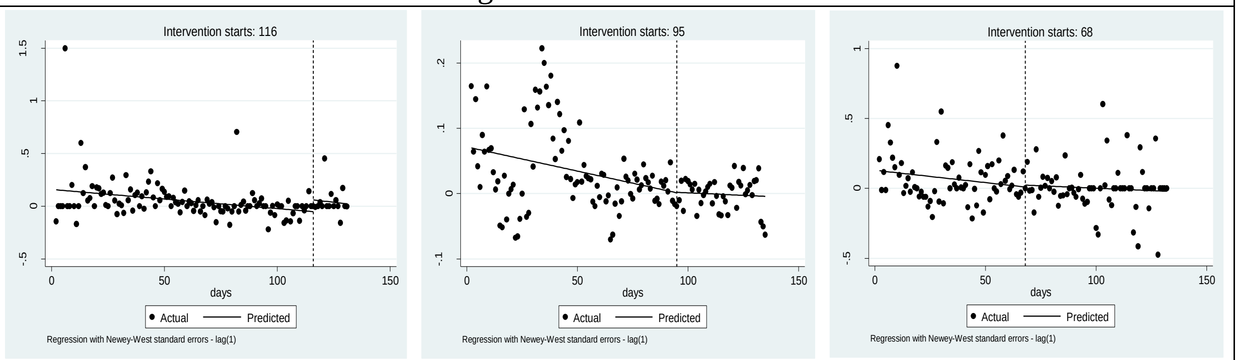
Figure 8: Overcrowding and latrine maintenance in francophone sub-Saharan Africa



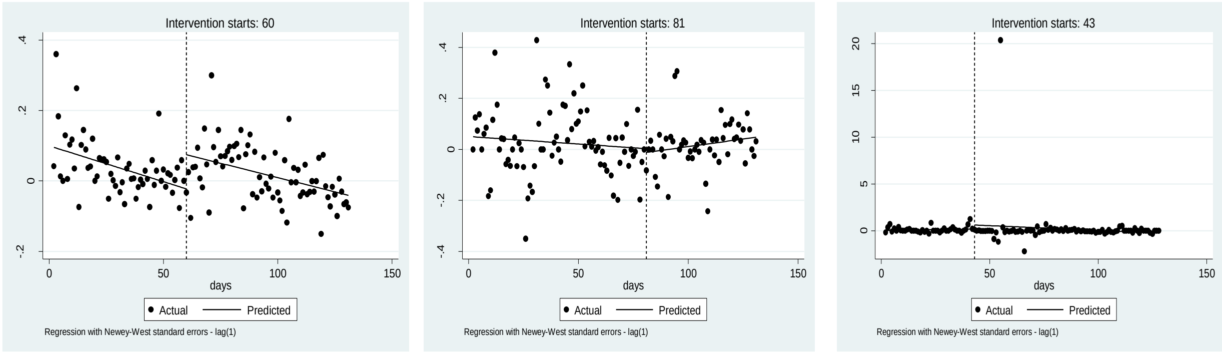
Sources: Authors' calculations based on PASEC 2014 data.

Figure 9: Graphical representation of results without control variable

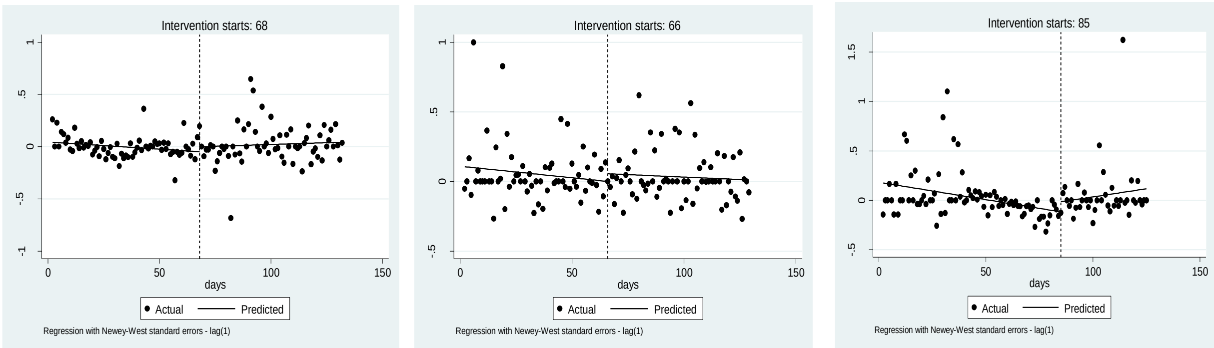
Gabon Senegal Cam eroon



Ivory Coast Togo Benin



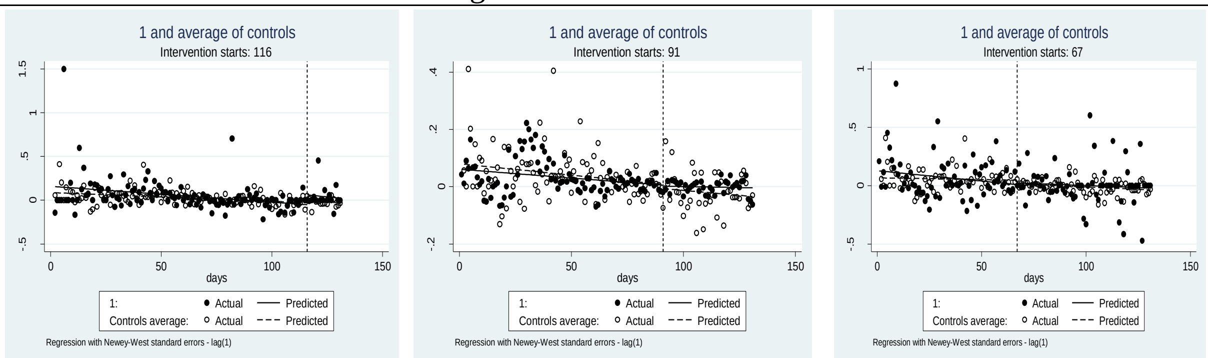
Burkina Faso Congo Chad



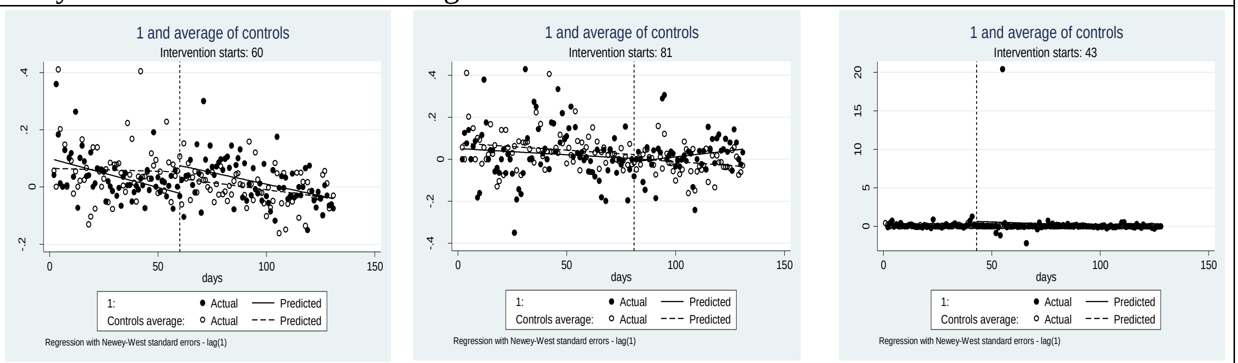
Source: Authors' calculations

Figure 10: Graphical representation of results with control variable

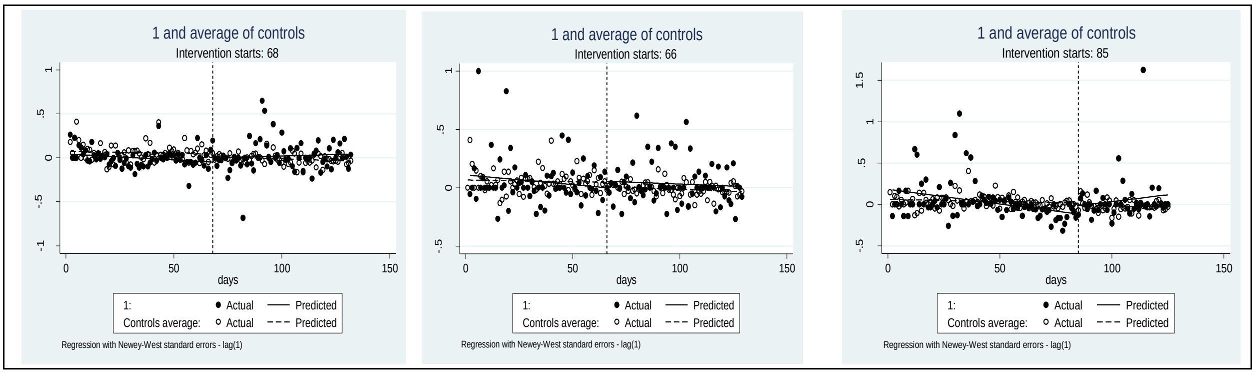
Gabon Senegal Cam eroon



Ivory Coast Togo Benin



Burkina Faso Congo Chad



Source: Authors' calculations