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"It's our turn (not) to learn": The pitfalls of education reform during post-war institutional transformation

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WIDER Working Paper 2023/20

**‘It’s our turn (not) to learn’: the pitfalls of
education reform during post-war institutional
transformation**

Emily Dunlop,^{1,*} Yasmine Bekkouche,² and Philip Verwimp²

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Abstract: In this study, we investigate the relationship between education reform, institutional legacies of inequality, and changing political institutions in a poor, conflict-affected country. Burundi experienced a dramatic change in ethnic power relations after the 1993–2005 civil war. The post-war government prioritized education to previously marginalized regions and ethnic groups, both in access and in attainment. We leverage test score data from four nationwide exams in primary and secondary education from 2006 to 2018. Our difference-in-differences analysis shows a dramatic shift in test scores, with the schools in the north of the country, deprived before the civil war, outperforming schools in the south. Results are robust across datasets. We derive policy implications for understanding how post-conflict governments can build inclusive institutions through education after conflict, and how governments can overcome institutional legacies of educational inequality.

Key words: education reform, difference-in-differences, inclusive institutions, educational inequality, legacies of inequality

JEL classification: C22, I24, I25

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1 Introduction

Education reform is a key component of state-building after violence (Fontana 2018, 2021; King and Samii 2020). Despite its perceived neutrality, the provision (or lack thereof) of state-based formal education is the result of political processes. For example, unequally distributed schooling contributes to social and economic inequalities (Brown 2011), and, in turn, limits human capital accrual for marginalized groups. Studies suggest that such unequal access to education across ethnic and regional lines is a proximal cause of violence (Alcorta et al. 2018). Consequently, addressing unequal education¹ has important peacebuilding implications (UNESCO 2016). However, little empirical work exists on how and to what extent post-conflict governments can overcome legacies of educational inequality and foster more equitable economic growth, particularly in low-income countries. Further, education reforms can take a long time to embed (Fontana 2016), potentially undercutting expected short- and long-term peace dividends of education redistribution (see King and Samii 2020: 70) and economic development of such reforms after conflict. This is important in contexts where political power has changed hands, as groups who were once marginalized gain political power and expect to see such dividends, and quickly (Burgess et al. 2015). Moreover, education access is just one part of human capital accumulation: quality of education matters for outcomes, including as a pathway to employment and development. Thus, education reform post-war is often complex, and goes beyond mandates for equitable access.

In this paper, we explore the relationships between post-war institutional change and education outcomes in post-war Burundi, a low-income country rife with both ethnic and regional inequalities during its post-independence years (1962–93). We investigate whether and how the first post-war government (2005–20) managed to redress the pre-war regional inequalities that existed in the education system. In 2013, Burundi implemented a major reform of its education system. From that year onwards primary school would no longer last 6 years but 9 years and would be re-branded as ‘*école fondamentale*’, or basic school, with 3 years of ‘*post-fondamentale*’, or post-basic schooling, before students continue to tertiary education. The purpose of this reform was to increase student retention in education and prevent dropout after primary school. It followed a 2005 decision to abolish school fees in primary school (Cieslik et al. 2014; Travaglianti 2017), which increased school enrolment significantly. Both decisions originate from the key interest in reforming education by Pierre Nkurunziza, President of Burundi from 2005 to 2020 and a member of the majority Hutu ethnic group, which had been excluded from power pre-war. We discuss and point at the desire of ordinary people for a short-term peace dividend in the form of tangible gains in the education sector, and subsequently employment, coinciding with a need for the new elite to deliver on wartime and election promises.

Throughout, we document a significant improvement in exam test scores and success rates in major state-run, nationwide exams in schools in northern Burundi a few years after the new regime came into power, coinciding with a landslide electoral victory in 2010. Although such improvement corrects the pre-war inequalities, the paper questions whether the improvement is a genuine sign of the underlying human capital accumulation or whether it is the result of political manoeuvring and interference. We argue that, regardless of the tactic, addressing unequal access and unequal

¹ Note that in this paper we use education and schooling interchangeably. However, generally education and schooling are two separate concepts, with education encompassing a broad spectrum of activities—formal (state-based), non-formal, and informal—that constitute learning, and schooling being state-based (generally mandated and state-directed) learning in schools.

outcomes in education along ethnic and regional axes is a necessity for a post-conflict government that vowed to realize quick gains for previously marginalized groups. The redistributive effects of such processes may result in increased employment opportunities, and ultimately, have short-term peacebuilding consequences.

We make several contributions: (i) we document how colonial and post-colonial ethnic and regional imbalances in the education system contributed to inequality in society, which in turn became a source of resentment for the disenfranchised part of the population; (ii) we demonstrate that a new elite, eager to redress these inequalities, embarked on an ambitious reform of the education sector, with quantity trumping quality; (iii) we show that popular pressure, political incentives and impatience have led to political interference in state-run, nationwide exams that serve as bottlenecks and gatekeepers for access to higher levels of education; and (iv) we perform detailed empirical analysis of four education datasets that have, to the best of our knowledge, never been brought together and discussed within the same framework in one paper.

This paper proceeds as follows. First, we review literature on the relationships between political economy and education development after violence and explore how such relationships contribute to both violence and peace. Second, we detail the difference-in-differences method we used to explore changes in mandatory national exam scores across four exams spanning the post-war years. Third, we discuss our findings. Finally, we conclude by highlighting the implications for these findings on the relationship between education and human capital development in post-war Burundi, and indeed for the broader context of education change after violence.

2 Literature review

Education access is important for both peace and conflict (Burde 2014; Bush and Saltarelli 2000; King 2014; Lange 2012). It plays key roles in contributing to economic and social mobility, as well as one's ability to participate in politics and have access to quality health care (Brown 2011). Indeed, a lack of education is associated with fewer employment opportunities (Barakat and Urdal 2009). Moreover, education access also increases opportunity costs for joining rebel groups (Humphreys and Weinstein 2008). As such, unequally distributed education across regional or ethnic lines plays an inherent role in contributing to grievances against the state and is a key component of violence (Omoeva et al. 2015; Østby 2008). Education is often also targeted in wars, not only in the destruction of schools but also with students and teachers targeted in the violence itself (GCPEA 2022; King 2011). As a result, post-conflict governments face immense challenges when rebuilding education systems, in addressing not only pre-war inequalities but also inequalities that were exacerbated by the conflict itself. Yet, Bircan et al. (2016) found that overcoming these legacies of conflict in education can take over 40 years, despite the need for tangible, short-term gains.

Despite this, given the foundational role that unequal access to education plays in violence, a robust body of scholarship and policy argues for education redistribution post-war (Attree et al. 2013; IMF 2015; Novelli et al. 2017). Programmes to increase education access—and do so equitably—have the potential to not only provide short-term signals towards government commitments to their new constituents but also have long-term effects, such as economic development and human capital accrual. Further, education may reduce support for violence (Dyrstad and Hillesund 2020) and violent protests (Dahlum 2019) and increase civic and democratic engagement (Blattman and Annan 2016; Cook and Younis 2012). Thus, there is a 'peace imperative' (Jackson 2000) for post-war governments to promote education access equitably after violence.

One key pathway through which education redistribution may occur is through a change in the ethno-regional power structure of a country leading to changes in education access, particularly at the primary school level. Post-war power-sharing agreements are often associated with the presence of redistributive clauses for education access (Fontana 2018) and peace agreements and post-war constitutions have high rates for including education provisions (Dunlop and King 2021; King and Samii 2020). Further, a robust body of literature showcases that regional and ethnic groups tend to favour their home regions for development and growth, particularly after violence (Alcorta et al. 2020; Asher and Novosad, 2017; Burgess et al. 2015; Cederman et al. 2013; De Luca et al. 2018; Ejdemyr et al. 2017; Hodler and Raschky 2014; Kramon and Posner 2016; Lehne et al. 2018). These are important especially when a co-ethnic is president or the minister of education (Kramon and Posner 2016). Such ethnic and regional favouritism is generally motivated by electoral concerns as groups aim to consolidate power post-war.

Yet, limited work explores how governments address educational inequalities in post-conflict countries. Extant literature points to difficulties in overcoming legacies of inequality in education access. For example, Dunlop (under review) showcases the expansion (rather than reduction) of inequalities in education access for Burundian youth at higher levels of schooling post-war. Ricart-Huguet (2021a, 2021b) further posits that the initial conditions and colonial investments continue to propagate inequalities, including and especially in education, even to this day. More work is needed to understand the implications for post-war education redistribution policies in terms of their short-term effects on post-war development and peace.

Further, the noted literature tends to focus on school access; that is, enrolment rates rather than looking holistically at education programming and outcomes. Although access and quality are not necessarily negatively correlated or a 'trade off' (Kabay 2021), issues surrounding education outcomes themselves are important for understanding not only whether children and youth are in school but also whether and how these children succeed in school. While there are many ways to measure learning outcomes, here we consider test scores as one potential metric. Of course, test scores can change for a variety of reasons and are not necessarily directly related to learning and knowledge/comprehension. In fact, throughout this article we showcase how these two metrics (test scores and learning) are not correlated. However, unlike access to schooling, test scores (whether through greater quality schooling or through other means) may be more readily manipulated and improved as students' complete levels of schooling than achieving goals in equitable education access. Governments may be able to increase test scores, and by consequence actualize gains for those who make it to higher levels of schooling, quickly leading to greater success rates on exams for those in marginalized communities who are able to take end-of-school exams. Ultimately, success on nationally mandated exams allows for students to continue to higher levels of schooling and is a key component for both accreditation and employment beyond schooling. Therefore, such practices may have significantly large peace dividends, even in situations where education resources are scarce. This may also mean that having a robust policy environment targeting different aspects of education may be required to overcome legacies of inequality and conflict in schooling.

In this study, we explore the inter-related notions of the changing post-violence political economy and the importance of post-war education development as an imperative for building peace after violence. We specifically look at these issues as using the case of Burundi's post-violence education change considering its post-war political structure, which we discuss in the next section.

2.1 Scope of the paper

Our primary aim in this paper is to develop an understanding of the changes in mandatory national exam scores in Burundi as a proxy for education access and quality throughout the country. To do so, we first briefly explore policies and programming changes developed by the Burundian government after the war to address educational inequality. Second, the bulk of this paper focuses on changes in national exam participation rates and average scores after the war, which allows us to test whether and how the education policies have, and have not, been successful in addressing some of the underlying inequalities present in the education system before the war. Of note, most education planning and development in Burundi occurs in concert with both multilateral and bilateral international organizations. For example, the Belgium Development Agency (Enabel), has been responsible for aiding in most curriculum and textbook development. Likewise, the World Bank, through its Global Partnership for Education, has committed to building schools throughout the country, with a grant of USD 25.6 million in 2019 (Dibie Ike 2019), with further funds allocated in 2021 to help Burundi implement their Education Sector Plan, which was co-created with the World Bank (Republic of Burundi 2012). Finally, UNICEF-Burundi has helped conduct a systemic analysis on risks and vulnerabilities in the education sector, in addition to helping with education development throughout the country. UNICEF also helped the Ministry of Education procure desks and computers for primary classrooms as part of their initiatives in the country. These do leave open debates regarding the tensions between the national government's objectives and international donor objectives, especially with Enabel as the development department of Burundi's former colonizer, though these are beyond the scope of this paper.

3 Education, conflict, and inequality in Burundi

3.1 Historical and political context

This paper focuses on the important role of education in violence and peace using the case of the East African country of Burundi. Burundi is one of the poorest countries in the world, at 185 of 189 on the Human Development Index (UNDP 2020), with a gross domestic product of USD 2.9 billion (World Bank 2020) and a gross national income of USD 754 in 2019 (UNDP 2020). As of this writing, expected years of schooling was also just 11.1 years (UNDP 2020). Education at the primary level, however, is near universal, with 93 per cent net enrolment rates, although secondary and tertiary enrolment lag at 28 and 5 per cent, respectively (World Bank 2020).

Education in Burundi, as elsewhere, is central to its political economy—both historically and today. Under the Belgian colonial system, education favoured the minority (14 per cent) Tutsis at the expense of the majority (85 per cent) Hutus (Duarte 1995). After a brief post-independence power struggle in 1962, the southern Tutsis from the province of Bururi remained in power from 1966 through successive regimes until 1993. All three presidents diverted resources towards their home province, effectively reducing the political and economic output of other provinces throughout this time.

Indeed, one of the fundamental ways the southern Tutsi elites maintained political and economic power was by controlling education access and resources, excluding Hutus from secondary and university levels of education (Ndikumana 1998; Nkurunziza 2012; Nindorera 2018; Timpson et al. 2015). By 1993, 19.8 per cent of the student body at the University of Burundi, the only pre-war public university, was Hutu, far below the 85 per cent of the population that the Hutus represent (Bakara and Hakizimana 1992; Jackson 2000; Ndimurukundo 1995; Ndikumana 1998). The government also diverted education resources towards the southern provinces, particularly Bururi, the home province of all presidents from this time (Nkurunziza 2012), creating a two-tiered education system, wherein six provinces in the south and centre of the country obtained most of the resources in the country at the expense of the rest (Jackson 2000). By the start of the war, these provinces accounted for almost half of the primary schools and two-third of secondary schools, with one municipality in Bururi responsible for nearly 15 per cent of the enrolment at the University of Burundi (Jackson 2000). Tutsis primarily reside in the south and in the capital, and were the main education beneficiaries, allowing them to obtain jobs in the administration, government, and the higher echelons of the army. The northern part of the country, almost exclusively Hutu, was deprived of educational opportunities (Jackson 2000; Nkurunziza 2012). This situation, with most of the population excluded from education and political and economic institutions, was untenable. In 1993, only a few months after the country's first democratic elections since independence, the country fell into war. The war lasted through 2005 and was fought along ethnoregional lines and resulted in nearly 300,000 deaths and close to 1 million refugees and internally displaced persons.

The war forced a political transition from a single-party autocracy (led by the southern minority Tutsis) to an ethnic power-sharing arrangement. This arrangement mandated 60 and 40 per cent Hutu and Tutsi representation, respectively, across all branches of government, including the executive, legislative, and judicial branches (King and Samii 2020; Vandeginste 2014). Despite the significant regional dimension of the conflict, there are no explicit regional quotas in either the Arusha Peace and Reconciliation Agreement (henceforth Arusha Agreement) or the 2005 Constitution. However, with the advent of the change in political power, northern groups gained considerable power after the war.²

The Arusha Agreement notes that one of the causes of the war was unequal education access between ethnic groups.³ It mentions education reform an additional 24 times (Dunlop and King 2021). While some of the reforms focus on education programming (Dunlop 2022a), many mandate education redistribution, including targeting resources towards previously marginalized provinces. This focus on education reform in the agreement points to both the importance of education as a cause of the conflict and the importance the post-war government has placed on education for building peace after the violence. These reforms aim to increase access to schooling in the marginalized north. Yet, they must contend with the fact that education reforms take a long time to embed. The extent to which these marginalized northern provinces see tangible changes in their education access and outcomes may have implications for the effectiveness of education reforms on building peace. In this paper, we explore the implications of the changing regime and

² The Conseil National pour la Défense de la Démocratie-Forces pour la Défense de la Démocratie (CNDD-FDD), the political party of Pierre Nkurunziza, benefited the most from these reforms, although they were not initially involved in the Arusha negotiations.

³ Protocol III of the APRA (2000) outlines the causes of the war. Chapter I, Article 2.2 states a fundamental cause as 'a discriminatory [education] system which did not offer equal educational access to all Burundian youths from all ethnic groups'.

its priorities on the education system after the war in Burundi. Specifically, we explore the effects of these changes on the mandatory national exams.

Pierre Nkurunziza, a Hutu from the north and a formal rebel leader with the CNDD-FDD, was appointed president after the party won the 2005 legislative elections. He was a primary school teacher before the war and considered education as a key channel in which the Tutsi minority managed to hold onto power in the country. Destined to change that, Nkurunziza implemented a series of education reforms immediately after taking office. For example, one of his first policy measures was to abolish school fees for the primary level (Travaglianti 2017). In 2013, the government reformed the system, shifting from a 6–4–3 (primary, lower secondary, upper secondary) towards a 9–3 (basic/‘*fondamentale*’ and post-basic/‘*post-fondamentale*’) model. The new system mandates a single curriculum through Year 9, where students are streamed into different programmes based on their scores on the national exam. In 2015, the government also significantly reduced school fees to 7,500 Burundian franc per trimester (approximately USD 3) for public secondary schools. It has also established a national exam transparency board, as required under the peace agreement (APRA 2000). These policies would be what Langer et al. (2012) term indirect policies to address inequalities in schooling, in that they are intended to increase education broadly throughout the country and, in doing so, reduce inequality. The government has also developed direct (Langer et al. 2012) or targeted policies that specifically aim to increase school outcomes in the historically marginalized north of the country, including by increasing their overall scores on the national exam (Republic of Burundi 2017a, 2017b).

3.2 National exams in Burundi

We focus our analysis on four national exams in Burundi. The first exam is the *Concours National*. This exam was required to exit primary school in the old system (taken after Year 6) through 2015 and was phased out as the new system was implemented. The second exam is the *Test de Neuvième/Dixième Année* (hereafter Grade 9 exam).⁴ This exam is mandatory for all students at the end of basic schooling. The Grade 9 exam not only serves as a metric for the completion of basic education but also allows students to continue to post-basic schooling and determines whether students can continue, where they are allowed to study, and in which programmes. For example, higher scoring students study math–technology–physics programmes, whereas lower scorers are streamed into language programmes. The third exam, the *Examen d’Etat*, is taken at the end of post-basic schooling. As with the Grade 9 exam, this exam is mandatory for completion of post-basic schooling (in Year 12) and determines tertiary school trajectory. For example, only top-scoring students are allowed to continue to the prestigious University of Burundi and scores also determine programme placement. For these three exams we have data at the individual level for all students who took the exams during the time of analysis.

The fourth exam we consider is the *Programme d’Analyse des Systèmes Éducatifs de la Confemem* (PASEC) exam. This is a nationally representative examination taken in Years 2 and 5 of primary schooling. We use this date because the datasets we have for the *Concours National*, the Grade 9 exam, and the *Examen d’Etat*, do not have detailed information regarding school characteristics and resources. As such, this test allows us to develop a fine-grained mechanisms analysis, as we describe later.

The first three exams serve as ‘bottlenecks’ (UNICEF 2018) for promotion to higher levels of schooling. Success on these exams allow students to continue in schooling, promoting economic

⁴ In the old system, students took this exam at the end of Year 10, or lower secondary schooling. In the new system, this exam has been shifted to occur at the end of Year 9. For simplicity, we refer to this as the Grade 9 exam throughout this paper.

mobility that comes along with credentialization. Such credentialization (either secondary or university diplomas) is often also viewed as a key marker for social success (Uvin 2009) and is important for employment beyond farming in Burundi (World Bank 2012). Yet, in contexts such as Burundi, funding is often limited, particularly beyond primary schooling and there are often few spaces for students in upper secondary and tertiary education. Moreover, poor teacher quality and minimal resources often mean that few students are prepared for the national exams, missing the unit content or lacking the tools necessary for success. Thus, success or failure on these high-stakes national exams may have important consequences for social and economic mobility. We leverage the importance of the national exams throughout this paper as key milestones in the economic and social journey of youth in Burundi.

4 Methods and empirical framework

In this paper, we analyse the political economy of this post-war institutional reform in the education system as well as the consequences of the reform at the micro level. How is the reform of Burundi's education system driven by pre-war inequalities and to what extent will the reform help to cement and perpetuate the hold onto power of the northern Hutu majority? And, more broadly, what are the implications of such transformations on human capital accumulation after violence? In our analysis, the number of students taking the exams can serve as a proxy for access to education in a region. The scores on the exam—when it is organized as an objective test and its outcome is not manipulated—provide information on the quality of education.

4.1 Data sources: PASEC, *Concours National*, Grade 9 exam, and *Examen d'Etat*

We explore changes in exam scores in the post-war era as an important proxy for the changing distribution of educational resources after violence. *Concours National*, Grade 9 exam, and *Examen d'Etat* data are from 2009–12, 2009–18, and 2007–18, respectively. The datasets cover the universe of schools (e.g., 2105 primary schools) and students taking the exams, but, typical for such administrative data in a poor country, they offer limited information per student, containing only student name, year of birth, exam scores, school, and school location, and (post-2014) gender for the Grade 9 exam and the *Examen d'Etat*. We aggregated scores to the school or commune level for each exam, including mean and standard deviations. Combined, these three exams allowed us to see broad trends in the shifts in post-war exam scores over time, though given the dearth in covariate data they provided, it was difficult to run a fine-grained analysis of the mechanisms associated with the change.

To overcome this hurdle, we also use the school survey data from PASEC, administered in 13 countries of Francophone Africa. The PASEC dataset consists of a stratified random sample of 125 schools in Burundi. In sample schools, one class of Grade 2 and one class of Grade 5 were randomly selected. Then, 15 students were randomly drawn from each class to be interviewed and tested. We take advantage of PASEC implementing a survey before and after the 2010 election and thus using both 2009 and 2014 surveys. The PASEC survey also contains socioeconomic characteristics of the pupils, including the literacy of their parents, and questions about the assets present in their household, which we used to construct a wealth index by principal component analysis. The PASEC survey also provides information on class and teacher characteristics. Data on the class include the number of students, the materials in the classroom, the proportion of pupils seated comfortably, and the presence of different equipment (board, chalk, ruler, map, etc.) that we used to build an index of classroom equipment by principal component analysis. Teachers were asked about their education, experience, and salary. Their absenteeism was measured using records held by the principal of the school. Finally, the PASEC survey interviewed school

principals to provide information on school management (parent’s associations, frequency of staff meetings, frequency of inspections, etc.), as well as school equipment (presence of a library, presence of a canteen, etc.) and the infrastructure present in the locality of the school (road, electricity, telephone, etc.). We used principal component analysis to build a school equipment index, a quality of school management index, and an infrastructure index for the locality of the school.

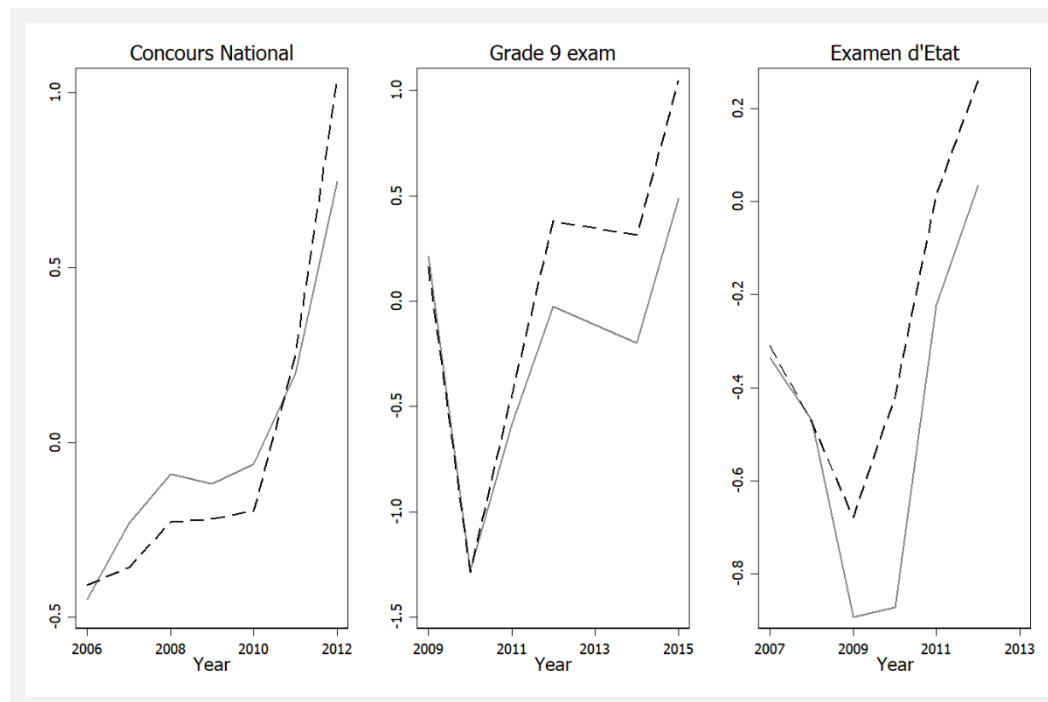
4.2 Description of key variables

In this section, we investigate the changes in exam scores by commune over time since the end of the war. First, we explore changes in education access as proxy by the Grade 9 exam and *Examen d’Etat*. These two exams are the most important for social and economic mobility in the country, with some estimates pointing to the need to achieve at least Year 10 in schooling in Burundi to move out of subsistence agriculture (World Bank 2012). Second, we look at overall changes in exam score distributions after the war overall to get a sense of the changes that may have resulted from changing resources and investments in education beyond just increased access to education—for example, trained teachers and school and classroom infrastructure.

Outcome measure

In this paper, we centre our micro-level analysis on changes in standardized mean scores for each of the three mandatory national exams by commune (or municipality, in English). There are 119 communes across 18 provinces in Burundi. We focus on standardized mean scores by commune because each exam is scored slightly differently each year. In aggregating to the commune level, we showcase trends across small areas, with enough data points to show variation across communes. Figure 1 shows the trends in standardized mean scores for the three main exams of our analysis. Here, we can see clear trends in the standardized scores towards the north, which we explore throughout the difference-in-differences analysis we describe later.

Figure 1: Standardized commune mean scores for the *Concours National*, Grade 9 exam, and *Examen d’Etat*



Note: available data years vary.

Source: authors’ compilation based on study data.

Focus on the 2010 elections

We centre our analysis on the 2010 elections in Burundi, and the consolidation of power that happened because of these elections. The 2010 elections saw Pierre Nkurunziza re-elected for his second mandate. Of note, while there was minimal electoral violence overall, the opposition parties boycotted the elections citing fraud. However, it is important to consider elections as key time periods where promises are made, and incentives given as politicians seek (re-)election. We mention earlier that scholarship points to the importance of elections for redistribution of education resources, particularly at the primary level, as a visible aspect of the state. Harding and Stasavage (2014) also note that education provision is very highly correlated with the home region of the president and the minister of education, and that such promises are kept at higher frequencies than, for example, promises of increased school quality, which are more nebulous and difficult to implement and assess.

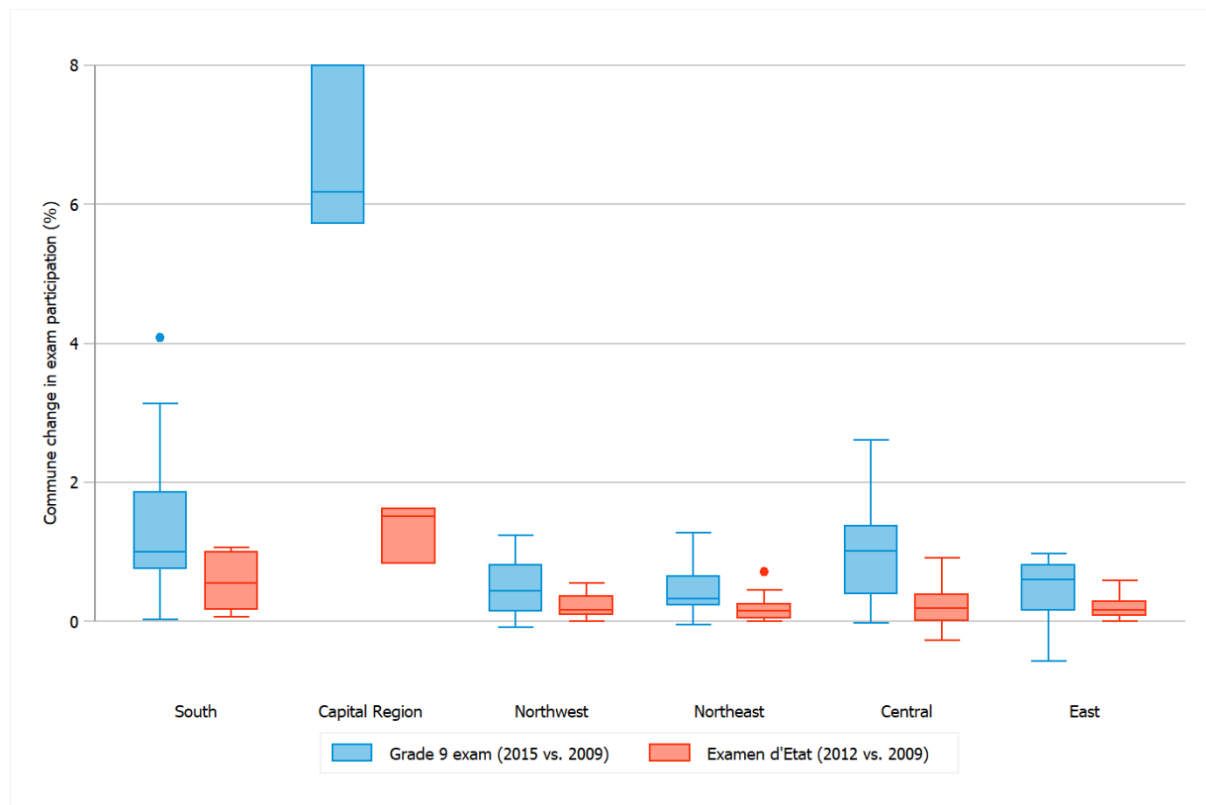
We focus on this 2010 election for two reasons. First, as we mention, studies have pointed to the lagged effect of policies to address post-war educational inequalities. Thus, the 2005 election of President Nkurunziza for his first mandate would be too early to see any meaningful changes to exam participation, as these exams are taken at the end of a cycle (primary, Grade 9 or secondary). In fact, the 2005 elections happened in August, after these end-of-year exams would have taken place, given the school year calendar. The 2010 election, on the other hand, gives enough time for Nkurunziza's policies to begin to be implemented. Second, while we could also look at the 2015 election—which was more contentious than the 2010 election—we only have data for the Grade 9 exam and *Examen d'Etat* after 2015 through 2018. Moreover, the 2016 data contain results from the old and the new systems and the data file does not allow us to distinguish between the two. Thus, the 2010 election is not too soon or too late for us to be able to see trends on either side of the election.

Changes in exam participation in 2009 versus 2012/2015 (Examen d'Etat and Grade 9 exam) and accounting for selection bias

Exam participation has changed in line with policies outlined earlier as the Nkurunziza governments have worked to increase education attainment. In line with other work on these exams (Dunlop, under review), here, we explore exam participation rates as a function of the total youth population (aged 18–24 years) for each commune. Figure 2 shows how exam participation rates have changed over time compared with the participation rates for 2009. The figure shows that those communes with high participation rates in 2009 maintained their high participation rates in 2012 (*Examen d'Etat*) and 2015 (Grade 9 exam) and, indeed, even expanded their rates in comparison. Of note, there are few communes, particularly in the east of the country, whose exam participation rates decreased during the analysis period. That is, despite the presence of both high-level mandates to address educational inequalities throughout the country, northern communes still lag in exam participation.

Thus, exam participation, while improving, continues to vary greatly across the country, even when accounting for population differences across communes (see Dunlop, under review). However, because of the complex nature of education development, increasing access to education, and reducing inequalities in education, is only one piece of the broader puzzle.

Figure 2: Change in Grade 9 exam and *Examen d'Etat* participation rates by commune between the first and last years analysed.



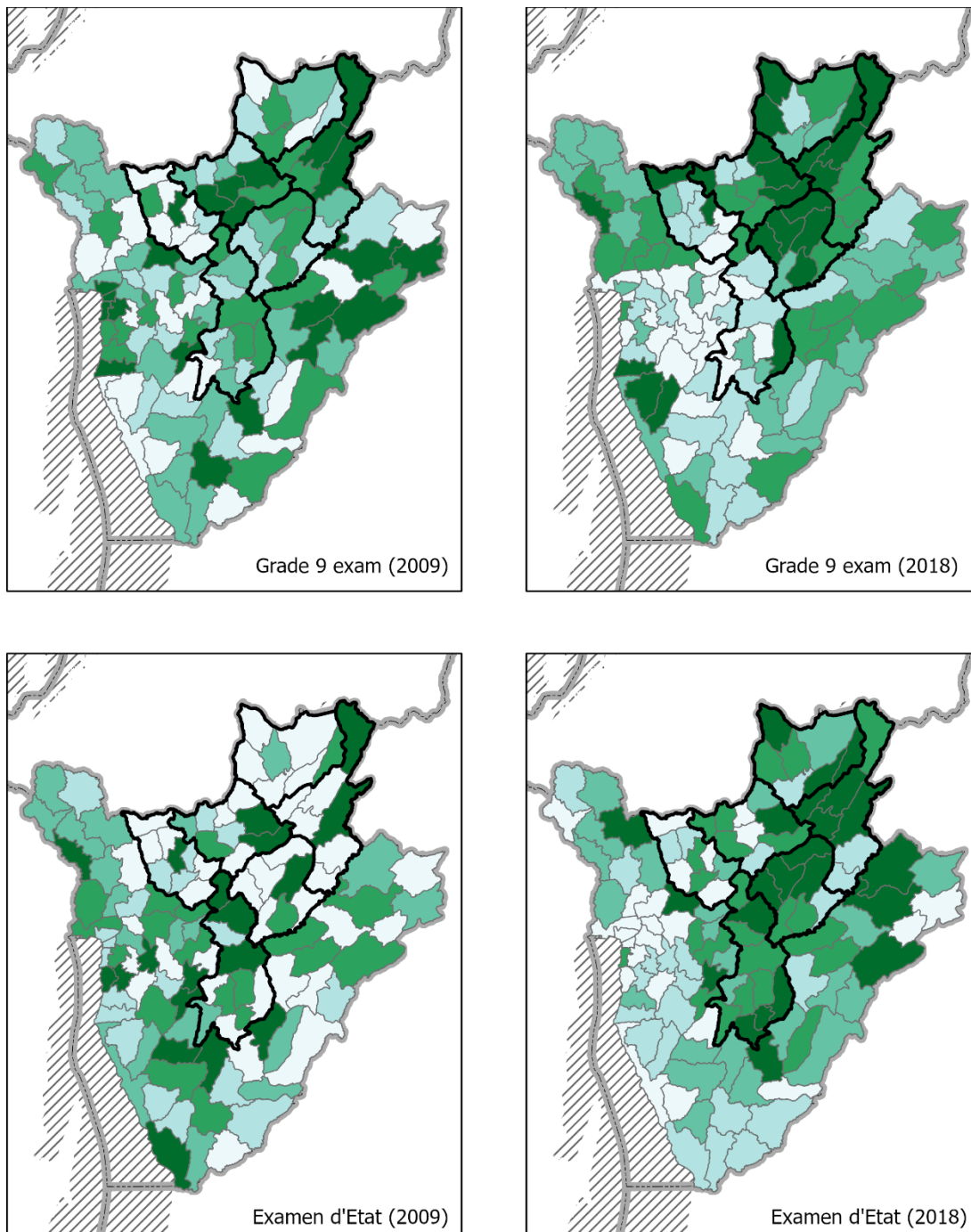
Source: authors' compilation based on study data.

Figure 3 shows the distribution of commune-level mean scores in the exams under study for 2009 and 2018. Here, the darker the commune the higher the mean score on the exam. For each exam, in the earliest year of data collection, the highest scoring communes were evenly distributed throughout the country. Several communes also had no students taking the *Examen d'Etat*, with no secondary schools and little investment in the north so soon after the end of the civil war. Yet, in 2018, we can clearly see that most communes that score in the highest quintile (darkest communes) are in the north and east of the country across the Grade 9 exam and *Examen d'Etat*. Indeed, very few communes in the south, including those in the pre-war power centre in Bururi are even in the top quintile. In fact, Songa commune, in southern Bururi Province, is the highest ranked commune for that year from the province, at just 50th out of 119 communes. Such changes are occurring despite the lack of change in exam participation at these high levels of schooling. Such differences in the trends in exam scores compared with participation merit further exploration and may point to different ways that governments can address post-war educational inequalities. These figures are in line with other work that highlights the direction of these changes for the *Concours National* (Bekkouche and Verwimp 2020; Verwimp 2019) and found a significant shift towards the northern communes, particularly centred around the home commune of President Nkurunziza.

Figures 2 and 3 also mean that it is important to consider selection bias a potential reason for higher scores in the northern communes than in the southern communes. That is, with low participation rates, it is possible that the main reason for high scores on these upper-level exams is that the only students who can take the exams are the best students in the commune; that is, those that have the most resources, greatest potential to score high marks, or those that have invested the most in their education. In comparison, communes with higher exam participation are likely to have a range of student abilities, which may in turn lower the scores of the communes.

This is likely to not be as much of an issue, though still possible, in the *Concours National* and the PASEC exam. Access to primary school is near-universal in Burundi, and has been for some time, as an important imperative for both the post-war government and the international community. Therefore, most, though not all, Burundian children were taking the exam by 2012, our final year of data for that exam. In contrast, the PASEC data are a random sample and selected to be nationally representative, therefore issues surrounding student ability and selection bias likely do not apply.

Figure 3: Grade 9 exam and *Examen d'Etat* commune mean score distributions: (a) Grade 9 exam, 2009; (b) Grade 9 exam, 2018; (c) *Examen d'Etat*, 2009; and (d) *Examen d'Etat*, 2018

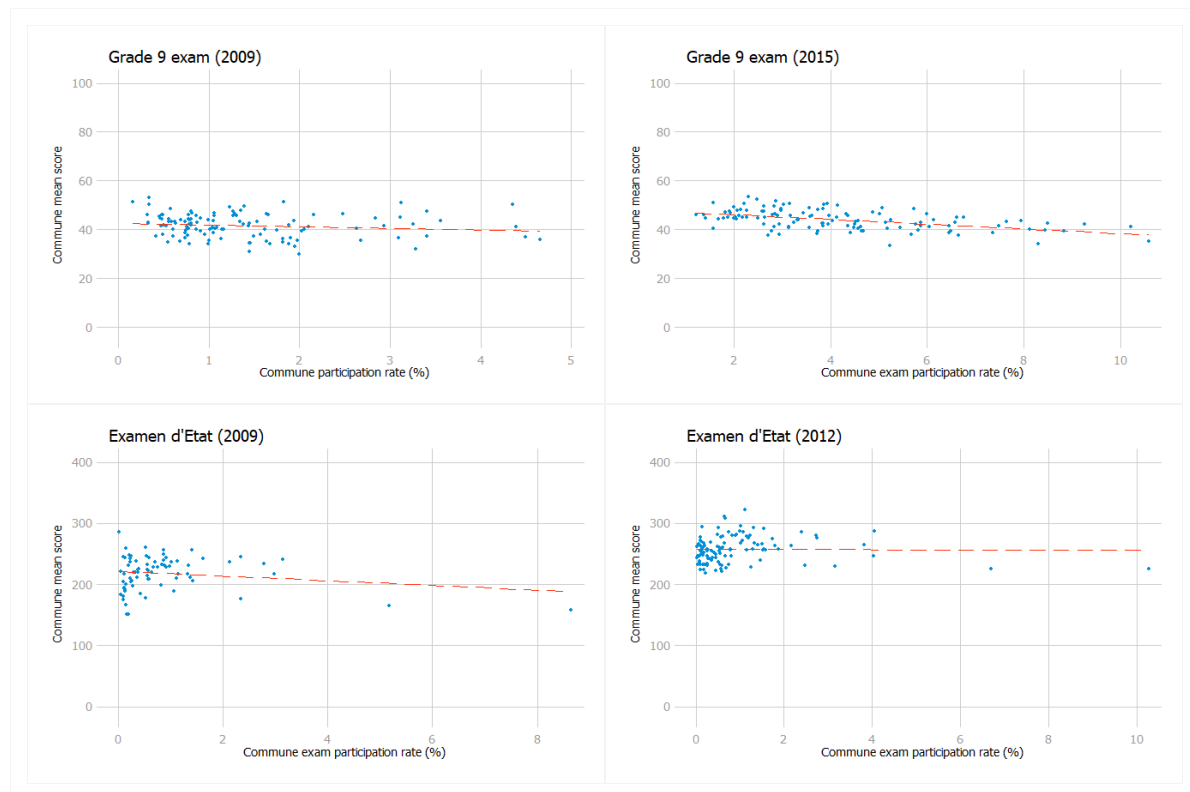


Note: the black outline represents the northern provinces. The darker the region the higher the average exam score. Shading represents quintiles: the darker the shading the higher the score in a municipality/commune.

Source: authors' compilation based on study data.

Figure 4 thus compares exam scores and exam participation rates in a commune for 2009 and 2015 for the Grade 9 exam and 2009 and 2012 for the *Examen d'Etat*. Here, we can see that although there is a slight negative correlation between the average exam score and the participation rates in 2009 for the *Examen d'Etat*, indicating that there is likely some selection bias, this trend is not present in the 2012 exam. For the Grade 9 exam, there is a slight negative correlation for both years, again, indicating a minor selection bias. Dunlop (2022b) uses a different model specification based on the same data analysing these trends controlling for exam participation and finds similar results, leading us to believe that there is minimal selection bias occurring across both exams.

Figure 4: Potential selection bias in commune mean scores: comparing commune mean score and exam participation by region for the Grade 9 exam and *Examen d'Etat* for the first and last years in the analysis



Source: authors' compilation based on study data.

4.3 Empirical specification

In this section, we delve into the empirical thrust of this paper, the difference-in-differences specifications exploring changes in exam scores with reference to those provinces with political power, and specifically centred around the 2010 election. Our empirical strategy aims at identifying the effect of the 2010 political shift on the geographic distribution of educational outcomes, measured with various indicators. We rely on a difference-in-differences estimation strategy that allows us to compare the northern and southern provinces before and after the election. To do so, we use our two-panel dataset (at the commune and at the school level) to estimate the following model:

$$Y_c = \alpha + \beta North_c \times After2010_c + \gamma After2010_c + \delta North_c + \epsilon_c \quad (1)$$

where Y_c stands for the mean in commune c of the indicator studied, namely the end of Grade 9 exam, the *Examen d'Etat* at the end of Grade 12, and the *Concours National* taken at the end of primary school; $After2010_c$ is a dummy equal to 1 if the observation belongs to year 2011 onwards;

and $North_c$ is a dummy equal to one if the observation belongs to a northern province (Ngozi, Kayanza, Karusi, Kirundo, or Muyinga).

In this specification, β estimates the effect, on outcome Y , of belonging to a northern commune, after the election of President Nkurunziza. We estimate Equation 1 separately for each indicator.

We then turn to the school-level data and estimate our effect at the individual/student level. Since we use the two surveys from 2009 and 2014 there are only two data points.

$$Y_{i,c} = \alpha + \beta North_i \times 2014_c + \gamma 2014_c + \delta North_c + \epsilon_{s,c} \quad (2)$$

where $Y_{i,c}$ stands for the end-of-year score of student i , enrolled in school s , and located in commune c . We use standardized test scores since the methodology of the test have changed between the two periods studied; 2014_c is a dummy equal to 1 if the student was tested in year 2014 (after the 2010 election); and $North_c$ if a dummy equal to one if the student is enrolled in a school located in a northern province (Ngozi, Kayanza, Karusi, Kirundo, or Muyinga).

We estimate this model for Grade 2 and Grade 5 separately. Since the outcome is at the individual level and the treatment at the commune level, we cluster standard errors at the commune level.

5 Results

In this section, we describe the results for the difference-in-differences estimation for the *Concours National*, the Grade 9 exam, and the *Examen d'Etat* before turning towards the PASEC results and the results of our mechanism analysis.

5.1 Difference-in-differences estimation for the *Concours National*, the Grade 9 exam, and the *Examen d'Etat*

As seen in Figure 1, exam scores for all three of the exams—the *Concours National*, the Grade 9 exam, and the *Examen d'Etat*—were trending in parallel through 2010, although the earliest year for the Grade 9 exam is only 2009. There is a clear divergence for the *Concours National* and the Grade 9 exam, starting in 2010 for northern and southern provinces. For the *Examen d'Etat*, Figure 1 shows that the scores on the exams started to diverge as early as 2009, which suggests potential targeting for increases in exam scores occurring early for this most important exam for student success and employment opportunities after schooling. Table 1 shows the results of the difference-in-differences estimation for the Grade 9 exam and *Examen d'Etat*, centred around the 2010 election. Across each exam, we can see that after the 2010 elections scores for the exams diverged, with municipalities in northern provinces seeing overall increases in their average scores over time; the northern provinces saw an average Grade 9 exam score of 0.37 per cent higher than the southern provinces, and 0.26 per cent for the *Examen d'Etat*.

The effect is greater for the Grade 9 exam than for the *Examen d'Etat*. This may be because in a resource-poor context such as Burundi, it is likely that students who can attain such a high level of schooling are able to invest the most in their education and thus likely have the highest chance of success on these exams—recall that overall secondary school enrolment in Burundi sat at just 27.5 per cent in 2020. Students with lower test scores may have dropped out before having the opportunity to take this exam, whereas stronger students with greater likelihood of success are taking the *Examen d'Etat* across the country, decreasing any potential effects of differences in quality or other factors. We have shown earlier that the selection bias may not be occurring overall;

however, in each individual commune—given overall low exam participation—this may occur, cancelling out any potential selection bias effects. By contrast, more students can take the Grade 9 exam, which serves as the basic education exit exam, where primary and lower secondary schooling have higher overall enrolment rates. Thus, there is, in theory a broader spread of students taking the Grade 9 exam, with weaker students potentially benefiting from greater investments in teacher training or other metrics to increase student success in the area.

Table 1: Results of the difference-in-differences estimation for Grade 9 exam and *Examen d'Etat*

	(1)	(2)
	Grade 9 exam	<i>Examen d'Etat</i>
North x Year ≥ 2010	0.37* (0.20)	0.26* (0.13)
North	-0.05 (0.19)	0.12 (0.14)
Year ≥ 2010	0.53*** (0.12)	0.78*** (0.05)
Constant	0.21** (0.11)	-0.69*** (0.08)
Observations	714	501
Adjusted R-squared	0.04	0.07

Note: parentheses indicate standard errors. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: authors' compilation based on study data.

Table 2 focuses on the school-level success rate of the *Concours National* (the primary exit exam through 2012). Here, as with the two commune-level regressions above, we see that the exam scores trend towards the north, with schools in the northern area of the country posting higher scores on the exam compared with those in the south of the country after the 2010 election. That all three exams under the period of this study trend in the same direction points to an important overall northward shift across all levels of schooling after the 2010 election. In this case, the success rate for the *Concours National* was 3 per cent higher in the northern provinces than in the southern provinces after the 2010 election. This effect is somewhat lower than the Grade 9 exam and *Examen d'Etat*, although still statistically significant.

Table 2: Results of the difference-in-differences estimation for the *Concours National*

	Success rate
North x Year ≥ 2010	0.03*** (0.07)
North	-0.02*** (0.08)
Year ≥ 2010	0.12*** (0.03)
Constant	0.32*** (0.05)
Observations	8,428
Adjusted R-squared	0.05

Note: parentheses indicate standard errors. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: authors' compilation based on study data.

5.2 Difference-in-differences estimation for the PASEC test (Grade 2/5)

Given that the three exams are administered by the state, we further examined the trends in exam scores for the PASEC test, which is an internationally administered test for a representative sample of students at Grade 2 and Grade 5 years of schooling and less open to government manipulation of final scores. The results of our analysis show that the trend seen in each of the three exams discussed so far is not statistically significant in the Grade 2 scores, although students taking the Grade 5 test scored 0.30 per cent higher on average in the north compared with the south after 2014 (Table 3).

Table 3: Results of the difference-in-differences estimation for the PASEC test scores

	(1)	(2)
	Grade 2	Grade 5
North × Year 2014	0.07 (0.17)	0.30* (0.15)
North	-0.08 (0.11)	-0.17 (0.12)
Year 2014	-0.02 (0.11)	-0.09 (0.10)
Constant	0.03 (0.07)	0.05 (0.08)
Observations	3,246	5,804
Adjusted R-squared	0.00	0.00

Note: parentheses indicate standard errors. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: authors' compilation based on study data.

Mechanisms

The amount of detail in the PASEC data allows us to test different mechanisms that may explain grades apart from the sudden reversal between the north and the south. In Tables 4 and 5 we demonstrate that variables that have been shown to affect student outcomes, such as school budget, class size, number of students per teacher, and class and school infrastructure, indeed affect student grades in the PASEC sample. However, the inclusion of these variables only slightly decreases the magnitude and statistical significance of our (north × after 2014) interaction variable. Also, the effect of the educational control variables increases the credibility of the quality of the PASEC data.

Table 4: Difference-in-differences and mechanisms, Grade 5

	(1)	(2)	(3)	(4)	(5)	(6)
	Total score					
Year 2014	-0.16* (0.09)	-0.15* (0.09)	-0.21** (0.09)	-0.18* (0.10)	-0.07 (0.09)	-0.21** (0.09)
North	-0.16 (0.13)	-0.15 (0.13)	-0.16 (0.12)	-0.10 (0.12)	-0.19 (0.12)	-0.13 (0.11)
North × Year 2014	0.34** (0.15)	0.33** (0.15)	0.24 (0.15)	0.30** (0.15)	0.26* (0.15)	0.25* (0.15)
School budget	0.00*** (0.00)					
Budget per student		0.00*** (0.00)				
Class size (dummy for above median)			-0.01*** (0.00)			

Students per teacher				-0.01*** (0.00)		
School infrastructure					0.19** (0.07)	
Class infrastructure						0.06*** (0.02)
Constant	0.06 (0.08)	0.05 (0.08)	0.53*** (0.14)	0.39*** (0.13)	-0.21* (0.12)	-0.31** (0.12)
Observations	5,321	5,281	5,687	5,732	5,804	5,804
Adjusted R-squared	0.07	0.07	0.03	0.02	0.04	0.02

Note: parentheses indicate standard errors. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: authors' compilation based on study data.

Table 5: Difference-in-difference and mechanisms (dummy variables), Grade 5

	(1)	(2)	(3)	(4)	(5)	(6)
	Total score					
Year 2014	-0.11 (0.10)	-0.13 (0.10)	-0.19** (0.09)	-0.14 (0.10)	-0.08 (0.10)	-0.17* (0.10)
North	-0.15 (0.13)	-0.15 (0.13)	-0.17 (0.12)	-0.13 (0.12)	-0.19 (0.12)	-0.16 (0.11)
North x Year 2014	0.29* (0.16)	0.30* (0.16)	0.25 (0.15)	0.31** (0.15)	0.28* (0.16)	0.27* (0.15)
School budget (dummy for above median)	0.10 (0.07)					
Budget per student (dummy for above median)		0.12* (0.07)				
Class size (dummy for above median)			-0.29*** (0.08)			
Students per teacher (dummy for above median)				-0.16* (0.08)		
School infrastructure (dummy for above median)					0.14 (0.09)	
Class infrastructure (dummy for above median)						0.24*** (0.08)
Constant	0.02 (0.08)	0.01 (0.07)	0.25*** (0.09)	0.14 (0.09)	-0.01 (0.09)	-0.04 (0.07)
Observations	5,321	5,281	5,687	5,732	5,804	5,804
Adjusted R-squared	0.01	0.01	0.02	0.01	0.01	0.02

Note: parentheses indicate standard errors. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: authors' compilation based on study data.

6 Discussion

The results show that the schools and municipalities (commune) in the northern provinces—particularly those of the home province of Pierre Nkurunziza, the president of Burundi during the time of study—increased their scores compared with the rest of the country across all three exams during the time under study. That is, before the 2010 election, we can see that high- and low-scoring schools and municipalities appeared across the country. However, after the 2010 elections, the highest scores began to concentrate in the north of the country across the three main exams. The reform implemented from 2012–13 onwards wanted to address inequalities in enrolment, grade completion, and grades between the northern and southern provinces, addressing

inequalities in these exam scores being a fundamental priority for the Burundi Ministry of Education during this time.

There are several potential reasons for such changes. First, it is most desirable for increases in exam scores to be attributable to teacher and school quality improvements through training and investment. We find such a mechanism unlikely. Such training and investment take time to embed. The new regime, which promised to address the inequalities, lacked both. Indeed, to teach in Burundi at the secondary level, teachers must complete training at the *Ecole Normale Supérieure*, after they have completed secondary school themselves. Of course, high-performing teachers may be shifted towards these northern areas, although, again, we start to see the effects almost immediately, and practices such as this may need a few years to take effect. Moreover, the bulk of all education spending and targeting has focused on the primary, rather than the secondary, level (UNICEF 2018), although these score differences are most noticeable at the end of what is now basic (Year 9) and post-basic (Year 12) schooling. Given Burundi's fiscal constraints, with an overall education budget of USD 175.6 million in 2021–22—and only approximately USD 106.2 million in 2011–12—there is minimal capacity to produce well-trained teachers at the highest levels in our time frame for the analysis (UNICEF 2022). It may be that over the medium term, say 10–15 years, investments and training will pay off, but we observe immediate, short-term effect in grades in northern schools and municipalities, hence hinting at a need for a quick win.

A second potential explanation rests in the notion of cheating. Such cheating may occur through nefarious actions by teachers; for example, teachers being given the answer key ahead of time and forwarding them to their students, or teachers may know what is on the test ahead of time and thus may be 'teaching to the test', or teachers may be taking the tests in place of students. There is anecdotal evidence of such practices occurring in other countries in sub-Saharan Africa. For example, in Liberia, the West African Examination Council exams scores in marginalized areas improved dramatically between 2010 and 2012, and it has been suggested that teachers were likely teaching to the test in those regions (Siaplay and Werker 2013). Similar cheating on the exam has occurred in Sierra Leone (TheOrganizer.net 2022). In Kenya, cheating on the national exam—the Kenya Certificate of Secondary Education—is common (Situma and Wasike 2020). Yet, in Burundi, such cheating may be randomly distributed throughout the country or, potentially, even could occur with the well-trained teachers from the south taking the exam, given the previous dominance of those provinces in both teacher training and education quality before the war. This could counteract cheating from teachers in the north. However, any evidence of teacher cheating in Burundi is anecdotal: a head teacher in Burundi was arrested after trying to disguise himself as a student and sit the national exam on the student's behalf (BBC 2018), for example, and in 2018 the selection test for students in Grade 6 aiming to go to 'Schools of Excellence' was delayed 3 hours in Bujumbura city, with observed instances of cheating occurring (Nininahazwe 2018). There has yet to be any evidence put forward of systemic cheating. Further, in Burundi, students sit for the exams at different schools to the school they attend, decreasing the likelihood that a specific teacher would play favourites with their students directly. Such a practice was suggested to curb cheating in exams in Sierra Leone (TheOrganizer.net 2022). Indeed, our searches for allegations of widespread cheating in these exams turned up no results.

The third, and indeed most likely, potential explanation for such a quick northward trend in the distribution of exam scores rests in the existence of a so-called pseudo-affirmative action policy which adds overall points to the scores of students from provinces that have been historically marginalized, especially the northern provinces of Ngozi, Karusi, and Kayanza. While we were unable to verify the existence of these policies, other studies on education in Burundi point to the existence of this programme. For example, Dunlop (2022b) met with education experts, including high-ranking members in Burundi's exam transparency board, who indicated that this may indeed be an explanation for why the results of the exams have trended towards the north. Appendix

Figure A1 shows histograms from the 2015 and 2018 exam scores for the *Examen d'Etat*. In each case such provinces have notable bumps around the 50 range—the range required for students to be admitted to public universities and programming in technical colleges such as the *Ecole Normale Supérieure*. While this does not provide direct evidence for the policy, it does provide indirect evidence that such a policy may exist. Such a programme would be able to radically shift exam scores towards the north, quickly and without foreseeable lagged effects that would occur through the resource-heavy processes to redistribute (trained) teachers and school resources. Governments opting for policies to meet local demands for education and employment opportunities in previously marginalized areas may consider such ‘pseudo-affirmative action’ policies as a means towards quick results as youth move through higher levels of education without the additional resources needing to be directly delivered to marginalized areas. This may be particularly important surrounding elections, such as the 2010 and 2015 elections in Burundi, as governments seek to incentivize voters and show real gains for the home communities of parties in power.

We argue that, regardless of the tactic, addressing unequal access and unequal outcomes in education along ethnic and regional axes, is a necessity for a post-conflict government that vowed to realize quick gains for previously marginalized groups. The redistributive effects of such processes may result in increased employment opportunities and, ultimately, have short-term peacebuilding consequences. Indeed, it may be that the third mechanism is politically necessary in the short term, given the fiscal constraints in such a low-income context and the need for short-term gains for previously marginalized communities. Of course, the ideal would be that over the long term, as resources increase and teacher training improves in the north and education access and quality become more equitable throughout the system, practices such as this pseudo-affirmative action programme are reduced, and ultimately removed, so as not to promote new systems of inequalities.

7 Conclusion

Addressing inequalities in education is a key mechanism for human capital redistribution after violence. As civil wars and conflict tend to exacerbate educational inequalities (Bush and Saltarelli 2000; King 2014), post-war governments face significant challenges as they seek to rebuild and restructure their institutions, particularly as they strive towards equity and aim to reduce proximal causes of violence. However, evidence suggests that overcoming these legacies of educational inequality is difficult after conflict (Bircan et al. 2016). Given that access to education is only one facet of a complex system, understanding education outputs and outcomes—such as scores on nationally mandated exams—can shed light on the efficacy of government initiatives in the longer term.

Our analysis points to a shifting post-war educational landscape. Studies on education access in post-war Burundi highlight the difficulties the post-war government has had in redressing these inequalities, despite a favourable institutional and policy environment (Dunlop, under review). Yet, the changes that we see in this study on exam scores point to some potentially positive aspects in overall changes in inequality after conflict. That is, while the south still dominates in exam participation rates, the northern provinces score higher; in doing so, regardless of overall mechanism through which these changes have occurred, higher proportions of test takers are able to continue with their education and obtain either a primary or secondary school certificate.

By consequence, despite lower number of exam takers overall, perhaps the northern provinces are able to send similar numbers of youth to the University of Burundi, where they are able to continue their education and acquire certifications necessary for high-skilled employment. Or, with a high

school diploma they have the certification necessary for employment beyond subsistence agriculture (Sommers and Uvin 2012; Uvin 2009). Such equilibration of secondary school certification levels in the country, if paired with the availability for the newly certified youth to find employment, may help to reduce not only economic inequality (Brown 2011) but also perceived inequality (Langer and Mikami 2013). Further research is needed on the long-term consequences of these changes and the mechanisms through which these changes have occurred. For example, how have resource distributions changed after the war? Are more (and better trained) teachers being shifted towards the northern areas? Such redistributive actions may only actualize changes in human capital potential in the long term rather than in the short term, although they may also be necessary.

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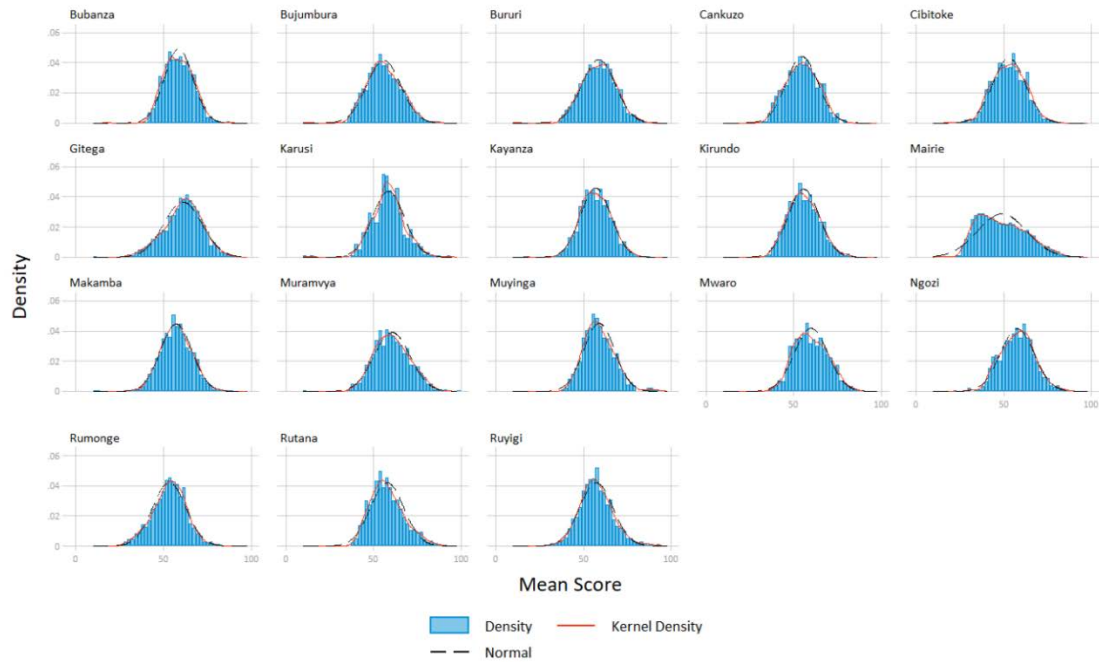
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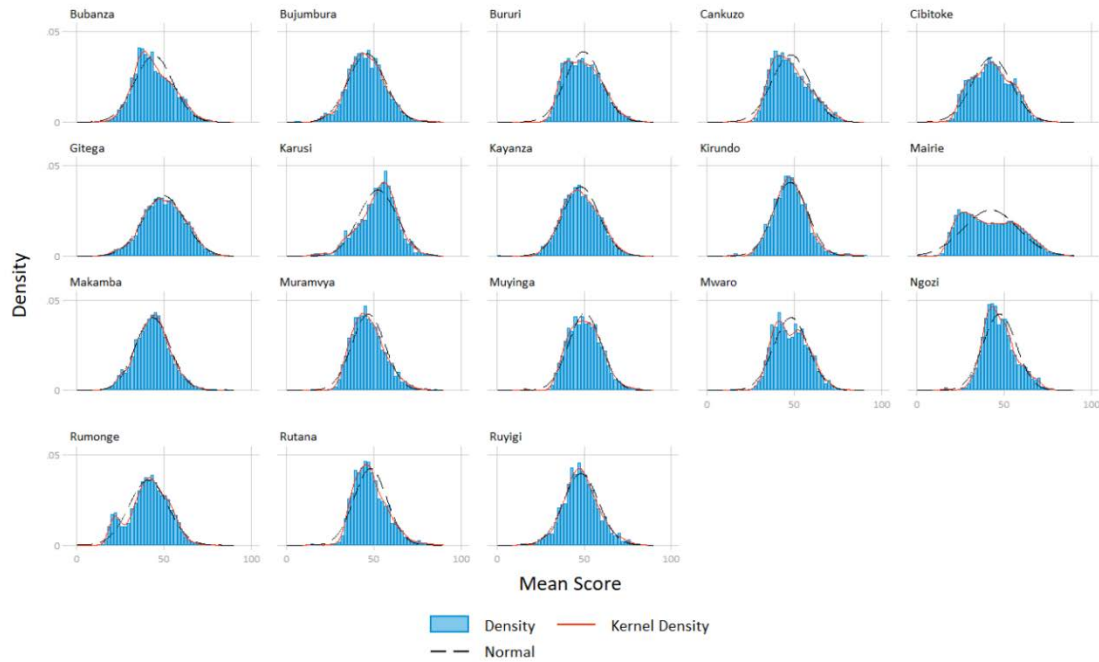
Appendix

Figure A1: *Examen d'Etat* score distributions by province in (a) 2015 and (b) 2018

(a)



(b)



Source: authors' compilation based on study data