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Effects of Productive Capacity on Social Inclusion

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Abstract

This paper assesses the effect of productive capacity on social inclusion with a particular focus on the level of security and protection of goods and people in Sub-Saharan Africa. Using a sample of 46 sub-Saharan African countries, we estimate a panel data model using the Generalized Methods of Moments in System (GMM-System) over the period 2007-2018. Our results show that the low level of productive capacities does not reduce security and protection in these countries, but contributes to its improvement. However, an improvement in productive capacities in sub-Saharan Africa, coupled with the implementation of appropriate development policies, would lead to high levels of security and protection. Furthermore, the decomposition analysis of productive capacities shows that the productive capacity of the private sector in human capital, transport, institutions, and information and communication technologies (ICTs) improves security and protection. In contrast to these sectors that promote security and protection, the productive capacity in natural resources is the sector that promotes insecurity. Finally, our analysis shows that structural change and energy have no effect. This decomposition allows us to target the major sectors that contribute to security and protection in order to achieve a more inclusive and prosperous society.

Keywords: Productive capacity, security and protection, social inclusion, GMM-System

Introduction

Does productive capacity contribute to improved social inclusion? This article, essentially an empirical exercise, aims to answer this question. This concern is highly relevant in the current context. For example, the COVID-19 health pandemic has highlighted the vulnerabilities not only of developing economies, but also of least developed countries (LDCs). It has also highlighted the need for a range of stakeholders to explore ways to build productive capacity. This will lead to inclusive and sustainable economic growth and more resilient and prosperous economies. The United Nations Conference on Trade and Development (UNCTAD) has called for the strengthening of productive capacities in developing countries, and in particular in LDCs, with a view to promoting structural transformation of economies and sustainable growth and development. A first definition of the concept of "productive capacities" was provided by UNCTAD in its 2006 report on LDCs, entitled "The Least Developed Countries Report 2006: The importance of fostering productive capacities for sustainable development in developing countries has been highlighted in the 2030 Agenda for Sustainable Development, the Istanbul Agenda for Action, the Vienna Agenda for Action, the Nairobi Azimio and the Nairobi Maafikiano.capacities are "the productive resources, entrepreneurial capabilities and production linkages that together determine a country's ability to produce goods and services and enable it to grow and develop".

Since 2006, a great deal of analytical work (rather than evidence-based studies) has been undertaken on the question of "how to foster productive capacities in developing countries", including on the challenges faced by developing countries and LDCs in building productive capacities, and on appropriate policies to address them (e.g. Cornia and Scognamillo, 2016; UNCTAD, 2016, 2020). Building productive capacities has also been intensively discussed at several international conferences, for example the Fourth United Nations Conference on LDCs in 2011, the Second United Nations Conference on Landlocked Developing Countries in 2014 and UNCTAD XIV in 2016.

The main missing element in the studies undertaken so far on the question of "how to foster productive capacities in developing countries" was the availability of data on productive capacities to help conduct relevant

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evidence-based analyses. Such evidence-based analyses would help identify the challenges related to the development of productive capacities in developing countries and how to address them, including with the support of donors and the international community, in order to ensure that these economies embark on a path of economic growth and prosperity (Hidalgo, 2009).To facilitate the formulation and implementation of evidence-based policies related to the issue of productive capacities, UNCTAD developed a Productive Capacity Index in 2020 (covering the period 2000-2008) based on the definition of the concept of "productive capacities" (UNCTAD, 2006). UNCTAD's LDC Report 2020: Productive Capacities for the New Decade (see UNCTAD, 2020) examines in detail the methodologies used to construct this index, presents its evolution over time and across countries, for example, for developed countries, developing countries and LDCs (see UNCTAD, 2020: Chapter 3). It also explores policies that could be implemented by LDCs to develop productive capacities in the new decade (see UNCTAD, 2020: Chapter 5).

In addition, countless social scientists have reflected on the question of what determines the prosperity of countries. In doing so, they have proposed possible answers, ranging from comprehensive public planning to self-governance and an infinite combination of public and private governance arrangements. In political terms, prosperity is largely associated with economic growth and measured by rising GDP. However, new forms of citizen research are challenging this narrow framing of prosperity as material wealth, offering diverse perspectives on what it means to live a prosperous life that encompasses freedom, autonomy, security, social and economic inclusion, healthy environments, belonging and participation (Moore, 2015; Mintchev and al, 2019; Moore and Woodcraft, 2019). Recognising prosperity as a diversity and specific context presents a challenge to conventional ways of understanding the economy and the relationship between economic and social life.

For the Legatum Institute (2021), true prosperity is about more than wealth: it is about more than the financial, political, judicial, welfare and character of a nation. It is about creating an environment in which a person is able to reach their full potential. The conceptual framework captures prosperity through three areas, which are the essential foundations of prosperity: inclusive societies, open economies and empowered people. The inclusive societies discussed here are an essential condition for prosperity, where social and legal institutions protect people's basic freedoms and their ability to flourish. This area explores the relational structures that exist within a society and the extent to which they enable or inhibit societal cohesion and collective development.

The pillars of social inclusion range from the relationship between the citizen and the state, to the extent to which violence permeates societal norms, to the interaction of the freedoms of different groups and individuals, to the way in which individuals interact with each other, their community, institutions, and nation. These issues have been both a practical consideration for much of modern human experience, as well as a subject of academic study (Locke, 1947; Galtung, 1969; De Toqueville, 2003). Inclusive societies include the pillars of Security and Protection, Personal Freedom, Governance and Social Capital. The Legatum Institute's Prosperity Index 2021 reveals that sub-Saharan Africa has been the stagnant bright spot in the world in terms of prosperity with its modest but steady progress, despite a deterioration in the security and protection of the continent.For a society or community to be truly secure and protected, there must be an absence of internal and national security risks. The effects of war, civil conflict and terrorism can be pervasive. The damage caused by such events goes far beyond the event itself; communities must rebuild, cope with grief and deal with the psychological trauma resulting from the atmosphere created. For this reason, the Terrorism element and the War and Civil Conflict element capture the extent to which these events have destabilised societies over the past five years. The effect of crime on economic growth and subjective well-being is widely explored in the literature. Crime impedes economic growth by discouraging investment and capital accumulation, undermining property rights (Josten, 2003).

In addition to the economic impacts, crime affects the well-being of individuals and communities in many ways. The impact of the trauma of crime on direct victims and their loved ones can be profound and devastating, and Graham (2011) concluded that being a victim of crime always has a negative effect on happiness. Researchers such as Cohen argue that, crime has relatively little effect on the total well-being of a community due to 'adaptation to adversity' where individuals effectively 'get used to' higher levels of crime. The 'risk-fear paradox' as coined by Farral, Gray and Jackson shows that the direct relationship between crime and individual well-being is not straightforward. Those who are more at risk of committing a crime are likely to exhibit and experience less fear.

Based on this analysis, it is noted that Africa has become the region with the highest number of victims of armed conflict in the world, although conflict has declined internationally. It is noted that the association between fragility and conflict is an increasingly salient feature of global poverty. Carranza and al (2020) report that the 43

economies with the highest poverty rates are all either located in sub-Saharan Africa or included in the World Bank's Fragility and Conflict Situations (FCS) list.

In 2020, the 37 economies officially classified as affected by fragility, conflict and violence are home to only about 10% of the world's population, but account for over 40% of the world's poor.Referring to the above definitions, it can be seen at the same time that at the heart of productive capacity is the knowledge endowment of a country which affects its ability to produce goods and services. According to UNCTAD (Chapter 2, p 31), greater productive capacities make an economy dense and complex. It seems natural, therefore, to assume that increased productive capacity would lead to greater economic prosperity, i.e. social inclusion. How then can building productive capacity help to promote social inclusion?

The objective of this paper is to analyse the effects of productive capacities in sub-Saharan African countries through security and protection. The choice of the security and protection pillar as a measure of inclusion is justified by two arguments. First, the security and protection pillar represents a major challenge facing the world today and sub-Saharan African countries in particular. Another reason is based on the work of Budsaratragoon and al (2021) who, using a four-step methodology. These authors show that in order to build a roadmap for prosperity reform priorities, policy makers need to follow the top-down approach which involves hierarchical decisions on critical drivers at the sub-index level and then at the variable level. The importance of performance analysis conducted by its authors suggests that policy makers should prioritise those sub-indices that have a relatively high total effect, but relatively low performance, namely: security and protection, entrepreneurship and opportunity, personal freedom and social capital.

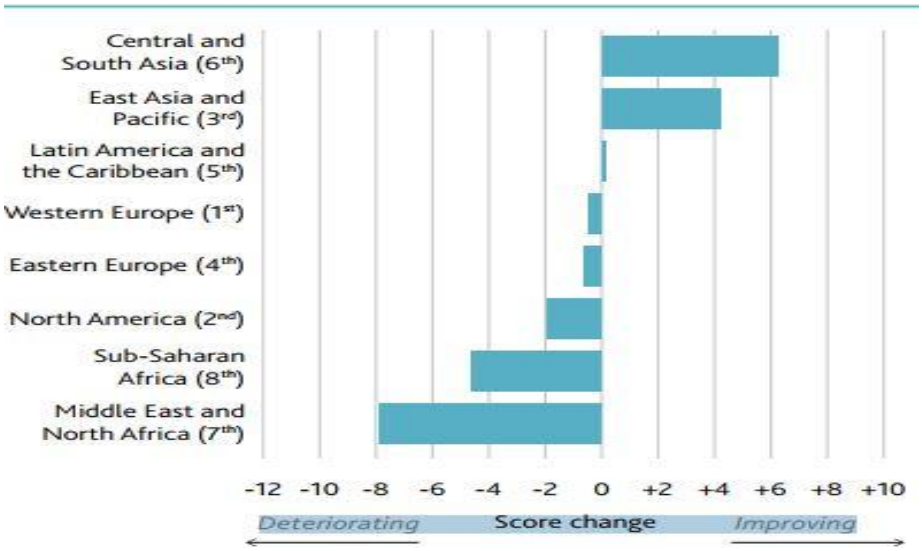
The rest of this work is organised as follows: in the first section we present some stylised facts, followed by the review of theoretical and empirical literature in the second section. The methodology of this work is presented in section three. Finally, the fourth section of this study presents the results.

1. Productive Capacity, Security and Protection in Sub-Saharan Africa: Some Stylised Facts

Sub-Saharan African countries have experienced a sharp decline in Security and Protection since 2010, as it continues to be affected by internal conflicts and an increase in terrorism (Legatum Institut, 2023). In 2016, of the 259 conflicts identified by the Uppsala Conflict Data Programme, 159 recurred (Gates and al, 2016). Insecurity takes many forms, the extremes of which are armed conflicts. These are distinguished by their intensity, duration and territorial extent.

Figure 1 shows the levels of insecurity and protection in different regions of the world. An improvement can be seen in Asia, Latin America and the Caribbean. While a strong deterioration can be observed in the regions of East Africa, North Africa and Sub-Saharan Africa. However, less severe deteriorations are seen in Eastern Europe, Western Europe and the Americas. However, it is still the case that despite the deterioration in safety and protection in North and East Africa, which occupies the seventh position in the ranking, Sub-Saharan Africa remains the last region in terms of overall improvement in safety and protection according to the Legatum Institute Index (2023).

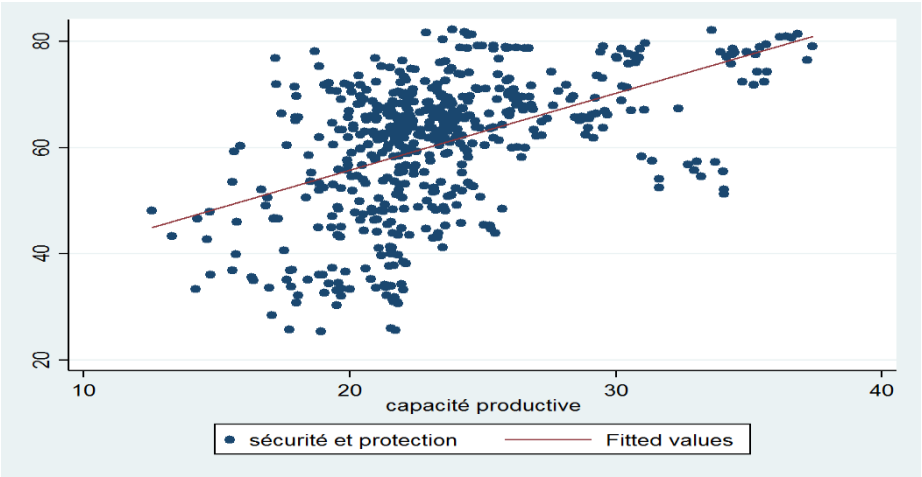
Figure 1: Safety and protection level ranking by region



Source : Legatum Institute Global Prosperity Report (2023)

Data on security and protection in Sub-Saharan Africa show that the region's security and protection scores have been increasingly declining since 2007-2018, as presented in Figure 2. This shows that the weakened level of security and protection in the region is giving way to growing insecurity in the region, which can be caused by either the level of civil conflict, terrorism, civil war, or crimes against property or people. Of the elements that make up the Security and Protection pillar, the level of violent crime and the prosperity of crime have shown small improvements, while terror and political violence have shown significant improvements (Legatum Institut, 2023). However, the element of war and civil conflict is increasingly deteriorating, while terrorism is deteriorating in all regions of the world.

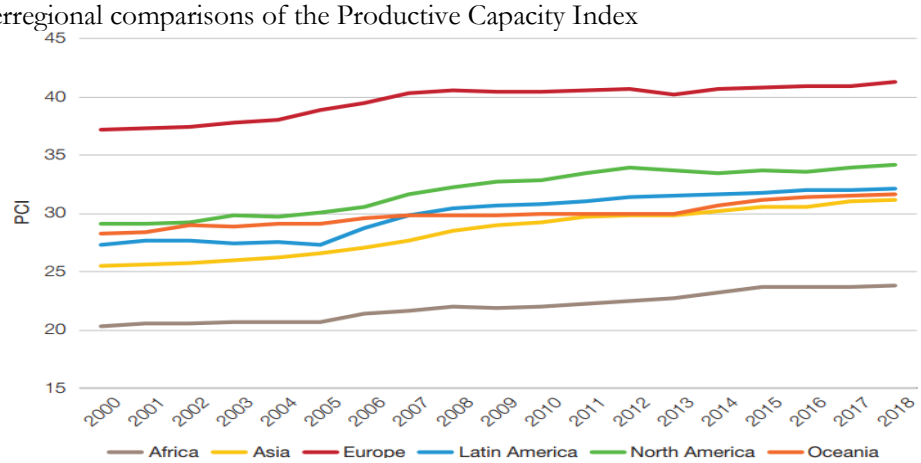
Figure 2: Evolution of the global security and protection score in Sub-Saharan Africa 2007-2018



Source : Authors based on data from the Legatum Institute's Prosperity Index (2023)

The deterioration of security and protection in sub-Saharan Africa is taking place in a context of low productive capacity. According to Figure 3, the trends in the PCI for the period 2000-2018 across the 193 countries show that the simple arithmetic mean of the index is 26.76, and the median value is 27.81 (UNCTAD, 2020). As expected, the developed countries of North America, i.e. Canada and the United States, have high values of 50.51 and 42.30 respectively followed by the European countries, which have a median score of 41.27. Among developing countries, Latin American countries have the highest median value (32.14), followed by Oceania (31.67), Asia (31.18) and Africa (23.84). These broad regional groupings mask considerable variation. For example, the median score for East Asian economies is 40.00, close to that of developed countries, while the median scores for South Asia and West Asia are 28.48 and 33.94 respectively. Similarly, the median score for North African countries is 29.39, while the median score for Sub-Saharan African countries is 23.63. In general, countries or regions with a low PCI are characterised by underdevelopment, high levels of poverty and unemployment, and high vulnerability to external shocks, including those related to the economic, financial and health crisis such as COVID-19 (UNCTAD, 2020).

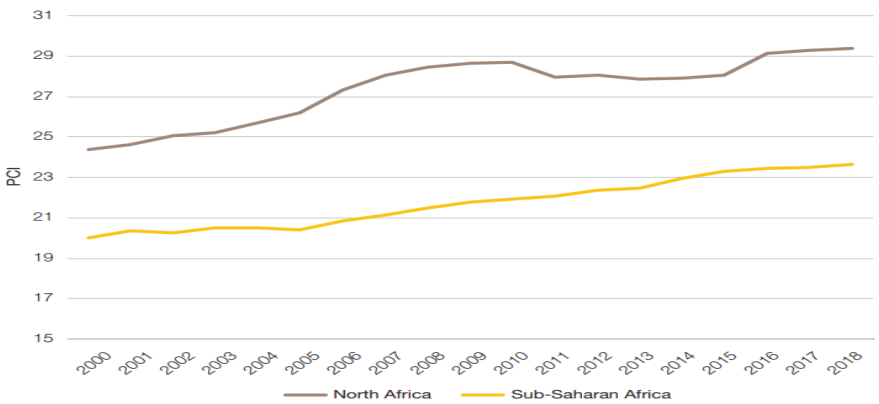
Figure 3: Interregional comparisons of the Productive Capacity Index



Source : UNCTAD(2020)

Low productive capacities in Africa are the causes and consequences of the region's persistent socio-economic vulnerabilities to adverse external shocks, although this overall performance masks considerable variation in country-specific performance. The weak productive capacities of these countries weaken their economies and make them more vulnerable to the vagaries of external shocks. The performance gap between North Africa and sub-Saharan Africa is evident (see Figure 4). North Africa's productive capacity is higher than that of sub-Saharan Africa. Moreover, the group average masks considerable intra-regional variation. It is therefore useful to compare the performance of North Africa with that of sub-Saharan Africa.

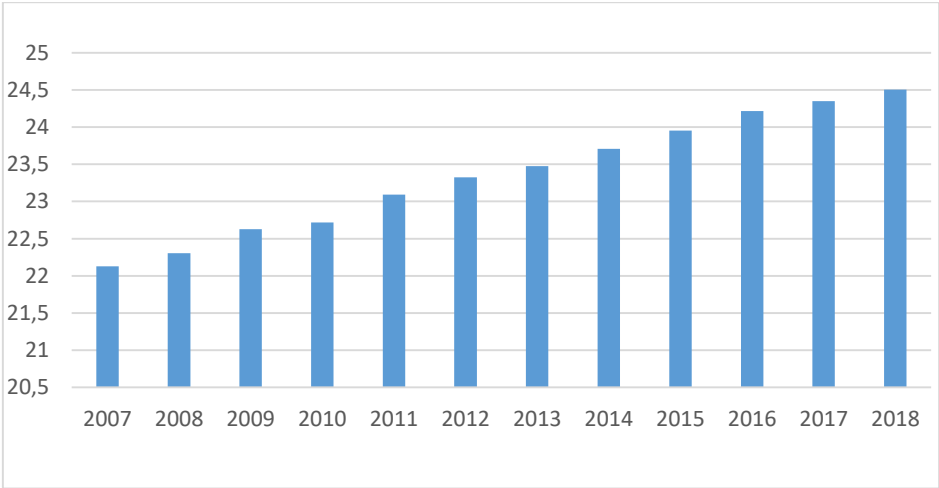
Figure 4: Evolution of the Productive Capacity Index in Africa



Source : UNCTAD(2020)

However, it should be noted that despite the low level of production capacity in sub-Saharan African countries, they are increasingly growing. According to Figure 5, the productive capacity of sub-Saharan African countries has been growing since 2007-2018, although it is ranked among the lowest in the overall regional ranking.

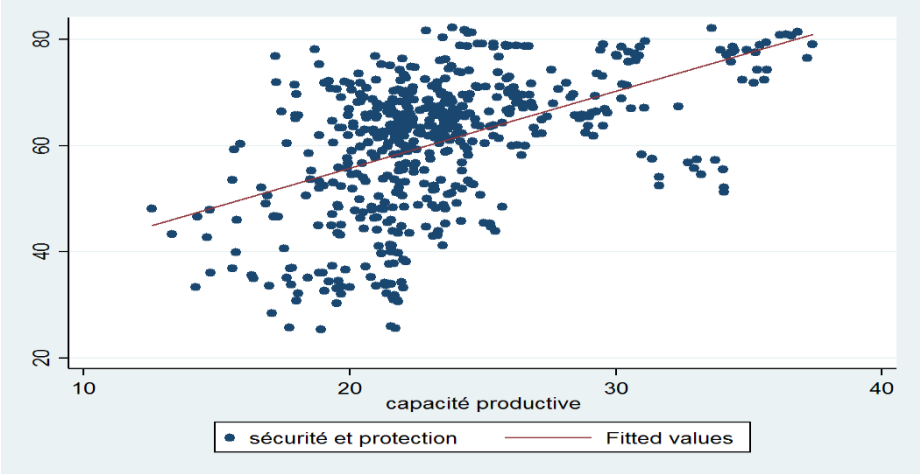
Figure 5: Evolution of global production capacity in Sub-Saharan Africa 2007-2018



Source : Authors using UNCTAD data

1.1. Correlation between productive capacity and security and protection

Figure 6: Correlation graph between Productive Capacity and Security and Protection



Source : Authors

Figure 6 shows a large clustering of the points around the line, as the points do not show a strong dispersion. This graph shows a positive relationship between the variables, i.e. there would be a correlation between the productive capacities variables and the security and protection variable. Building productive capacities is essential for accelerating structural transformation in order to promote inclusive economic growth and achieve sustainable development. Economies can improve their capacity to grow, develop and reduce their vulnerability to external shocks, whether economic, political or health-related, if and only if they develop their productive resources, entrepreneurial skills and production linkages (UNCTAD, 2020).

2. Effects of Productive Capacity on Security and Protection: A Review of the Literature

As noted earlier in this paper, to facilitate the formulation and implementation of evidence-based policies related to the issue of productive capacities, UNCTAD developed a Productive Capacity Index in 2020 (covering the period 2000-2018) based on the UNCTAD (2006) definition of the concept of "productive capacities". UNCTAD identifies eight broad dimensions defined on a number of indicators that reflect the main channels through which a country could develop its productive capacities (UNCTAD, 2020). These categories include: the institutional sector; energy; transport infrastructure; information and communication technology (ICT); natural resources; human capital; establishments; the private sector; and structural change in production.Therefore, discussing the effects of productive capacities on security and protection implies discussing how each main dimension of this concept affects the security and protection of people and property.

- **Effects of institutions on security and protection**

Arguments based on 'national security' are becoming increasingly important, and anyone who opposes 'national security' is by definition labelled a 'terrorist' or 'rebel'. Following this logic, policymakers have always argued that terrorism emerges from authoritarian regimes and that the promotion of more open and economically prosperous systems of governance will eliminate the use of terrorism (Dalacoura, 2011). Until now, researchers have tended to ask a central question: is terrorism more common in democracies or authoritarian regimes (Eubank and al, 1994)? The research revealed the puzzling finding that democracies were the most common targets of terrorism (Eubank and al, 1994; Young and al, 2011), although there was, at this stage, little effort to differentiate between levels or types of democracies or different types of terrorism. The clear implication of this research was simple: the more democratic a country is, the more terrorism it should experience.Development in the context of weak and contested institutions can lead to violence. A feminist perspective traces the impact of neoliberal development on women to the combined in-formalisation of the economy and the state, alongside a growing approach to state capacity to address human rights violations (Engelhart, 2009). Thus, weak democracies, corruption and male-biased institutions lead to a deficit of legitimate security forces to provide social order and protection from domestic and street violence for women in poorly governed urban areas, while cultural and class biases in poorly trained and supervised police and judicial institutions produce a propensity for impunity for private individuals. Poor

governance and corruption can also increase abuses by state agents and diminish their accountability, through police collaboration with gangs and traffickers, abuse of police and military power to perpetrate and condone domestic violence and sexual assault, and post-conflict incorporation of abusive members of the military (Engelhart, 2009).

Conflicts are fuelled by economic underdevelopment, youth unemployment, poverty and the inability of states to provide regional security functions (Hugon, 2006). In their theoretical model on which their empirical data is based, Collier and Hoeffler (2001) place themselves in Grossman's (1991) utilitarian framework. They contrast rebellion, a form of organised crime characterised by greed, with the supposedly legitimate and grievance-receiving government. The most significant variables are economic. Easterly and al (2002) find that ethnic divisions make it difficult, but not impossible, to develop the social cohesion necessary to build good institutions.

Moreover, democratic representation, by facilitating a redistribution of resources that can reduce the grievances of different social groups and by limiting executive power, is intuitively a potential bulwark against the emergence of violence. However, compared to autocratic regimes, democracy is associated with a degree of individual and collective freedom that facilitates mobilisation Calvo and Mercier (2022). Its overall effect is therefore theoretically ambiguous, as the lower motives for mobilisation associated with democratisation may be offset by the greater feasibility of insurgency. Empirically, analyses of large panels of countries show that these two channels lead to a non-linear, inverted-U-shaped relationship between democratic quality and war risk (Fearon and Laitin, 2003). Autocratic or semi-democratic regimes thus seem to be the most conflict-prone.Reynal-Querol's (2002) work emphasises the importance of the representation system of voters in government rather than democracy per se. His theoretical model suggests that a more inclusive proportional representation system increases the opportunity costs associated with conflict and is characterised by a lower probability of war than the majoritarian system (Calvo and Mercier, 2022). This prediction of the theoretical model is verified by empirical results from a panel of 138 countries between 1960 and 1995, which indicate a negative correlation between the degree of institutional inclusion and the level of ethnic conflict incidence, regardless of the degree of democracy. Saideman and al (2002), who take a more disaggregated perspective and collect data at the level of ethnic groups (264 groups observed between 1985 and 1998), report similar results. Not only do they show that, other things being equal, proportional representation is negatively associated with the risk of political violence, but they also highlight the negative correlation between federalism and the risk of war.

- **Effects of energy resources on security and protection**

Energy resources and supply chains are said to increase the risk of conflict across a variety of relationships (Månsson, 2014). For example, power struggles can arise when actors disagree on who should control and access globally scarce but locally abundant resources. Johansson (2013) has conceptualised and assessed the relationship between renewable energy and security. Some studies have also analysed specific links between increased renewable energy use and conflict. For example Lilliastam and al (2011) analyses the risk of a renewable energy weapon. Eisgrube (2013) analyses the risk of a renewable resource curse, the co-evolution of global low-carbon energy systems and inter-state collaboration was analysed by Andrews-Speed and al (2014). Lagi and al (2011) study the interactions between biofuels and food riots.

Indeed, authors have shown that energy systems, in combination with contextual social conditions, can increase the conflict risk in an area (Månsson, 2014). Access to energy is vital for the security of a state, for running the military (Umbach, 2010) and for developing the economy (Kümmel, 2011). However, energy resources are not evenly distributed around the world and are often concentrated in specific geographical locations. Infrastructure designed to transport energy can experience geographical bottlenecks (Månsson, 2014). Due to the inherent value of energy, actors may attempt to capture infrastructure in order to gain power or influence.The Second World War saw major initiatives around energy. At that time, the United States produced about two-thirds of the world's oil and Russia produced about ten per cent (Murray and al, 2009). The Germans attacked Russia in 1941 in an attempt to seize Russian oil resources (Jensen, 1968). In an attempt to alleviate some of the oil concern, Germany built synthetic gas plants that produced fuel from coal, although production from these was insufficient to meet demand (Jensen, 1968).

Some work (Esmaeili and al, 2011) has shown that energy and food prices are often linked, and as energy prices rise, so do food prices. The relationship between energy and food prices affects the number of malnourished people in the world. Energy can influence the price of food, as modern large-scale agricultural enterprises need energy to operate, and energy is needed for transporting or processing food (Baffes J, 2013). If food becomes scarce or too expensive to buy, people will experience civil unrest, leading to conflict.

- **The effect of human capital on security and protection**

Education as a component of human capital can undoubtedly teach children the necessary pro-social skills and preventive practices that will prepare young people to deal with fear, uncertainty and danger (Hamburg and al, 2004). Of great importance, the school is a major place where children learn to live cooperatively with each other. Hamburg and al (2004) point out that there are experimental programmes that teach children how to prevent or minimise violence through novels and peaceful conflict resolution strategies based on constructive and respectful dialogue. The emphasis on citizenship education and peace education is taken seriously.Selman's (1980) theory of interpersonal understanding provides guidance on how, through different stages of development with increasing cognitive abilities, individuals manage their relationships. Although the lack of interpersonal understanding that can lead to conflict is an integral part of the conditions for both adults and children. These conflicts can usually lead to serious violence. What becomes important is the extent of people's negotiation skills that include problem solving and their ability to resolve conflicts peacefully through appropriate communication skills or dealing with conflict situations.

Transitional coping theory (Lazarus and Folkman, 1984) reported by Hunter and al (2004) provides a useful psychological framework for examining coping processes. The theories detailed both coping strategies and factors influencing the choice of one strategy over another. These and other theories provide an understanding of the guiding principles that should be taken into account in discussions of peace education pedagogy. In the context of peace education geared towards changing mindsets, Rotter's (1966) locus of control theory provides a major framework for change to come from internal rather than external factors. Mohamedbhai (2003) has conducted research to illustrate how, through teaching, in particular research and community service activities, higher education institutions in Africa can help create a culture of peace. He also highlights ongoing peace-related activities such as conflict resolution and peace education in various institutions.

The economic effects of conflict on human health and security have also been examined (Organski and al, 1980; Rasler and al, 1985). Human security involves the ability of people to maintain a quality of life that does not fall below the level at which they feel safe. Adequate public health services are important to enable people to achieve an acceptable quality of life and to be sufficiently functional to maintain their lifestyle. Ghobarah and al (2003) conduct a cross-country analysis using political and economic variables to assess the relationship between conflict and public health, focusing on the role of public health in human security.

They find that the burden of death and disability in 1999 resulting from the effects of conflict between 1991 and 1997 was almost the same as the direct fatal and non-fatal health effects that occurred immediately after all violent conflicts in 1999. Similarly, Davis and al (2002) find that sub-Saharan countries involved in military conflict between 1968 and 1999 experienced lower life expectancy and higher infant mortality rates than sub-Saharan countries not involved in conflict during this period. Ghobarah and al (2004) extend this emerging literature on war and health by examining the determinants of public health expenditure and some influences on the health performance of states.

- **Effects of ICT on security and protection**

According to Buzan, because nuclear deterrence relied on the anticipated performance of weapons, it became sensitive to technical innovation, which meant that the state had to respond to technological change by investing in defence research to maintain the credibility of its deterrence (Barry Buzan, 1996). Technological innovation played an important role in the defence field, which extended the role of the state in military research (Lyall, 2010). Dunne and al (2006) develop a game theoretic model that attempts to capture the main features treating asymmetric warfare as involving either different technologies, types of weapons, or different tactics, ways of fighting, although in practice it can often involve both.The presence of new technologies in some countries has made possible organised and externally supported resistance movements, terrorism, which could also achieve strategic objectives of uncertainty and institutional damage without violence (Chekinov and al, 2013). Thus, hybrid warfare is a high-tech conflict. It is a continuation of the politics of a state or coalitions, political groups, transnational corporations and non-state actors (Danyk and al, 2017). David Keen highlights the powerful economic functions performed by the war on terror, which he argues explain the persistence of a war based on counterproductive strategy and tactics (Keen, 2006).

The effects of new communication technologies on conflict are more indirect than conventional weapons. Specifically, new technologies influence the dissemination of information, which is crucial to leaders and challengers. For example, the advent of the printing press enabled Martin Luther and his followers to challenge the importance of the Catholic Church. Technological innovations played an important role during the Thirty Years' Wars (1618 to 1648), killing between 25 and 40 per cent of the German population (Parker and al, 1997). Leaders have continually recognised the importance of controlling communication technology. Vladimir Lenin and the Bolsheviks in 1917

saw the seizure of the telegraph, telephones and railways as a key objective to cement their revolutionary gains (Pethybridge 1967).

While much of the attention on advances in information and communication technologies, including social media, has focused on popular protests, insurgent groups have also embraced these technologies (Dafoe and Lyall 2015). Shapiro and al (2015) used mobile phone data in Iraq and found that this increase in mobile phone activity actually reduced insurgent violence against coalition forces. They argue that this is due to increased reporting of IEDs by insurgents. Conversely, Pierskalla and al (2013) examine the effect of increased mobile phone coverage in Africa on political conflict, and find that increased coverage has led to increased violence. They argue that increased mobile phone coverage has reduced the cost of collective action by insurgents. However, Weidmann (2016) challenged their interpretation and argues that increased mobile phone coverage correlates with increased newspaper coverage of violent events and not an actual increase in their volume.

- **Effects of the private sector on security and protection**

The end of the Cold War led to a significant decline in defence spending. Equally important, the state reduced its involvement in supporting defence research and allowed the private sector to play a greater role in defence production. In the UK, where the nationalised defence industries had already been privatised in the 1980s, this process has been extended to include the sale of the state's defence research and development arm. This change in industrial and technological policy reflected a wider adjustment, with the state losing its position at the forefront of the technological revolution. Since the beginning of the Cold War, US government-funded defence research has produced technologies such as the Internet, virtual reality, air travel, data linkage, closed-circuit television, global positioning, rockets, remote control, microwaves, radar, global positioning, networked computers, wireless communications and satellite surveillance (Graham, 2010).

The subsequent exploitation of these technologies by the private sector reflected a deliberate policy choice by most Western governments to promote the technological spin-offs of defence research into the wider economy in order to generate wealth (Luchsinger and al, 1989). Once the technology was created, the civilian and commercial sector was able to adapt and modify the new capabilities.

The critical difference between innovation in the defence market and its civilian counterpart was that in the latter, high rates of consumption led to product and process innovation by firms. As a result, civilian technology providers have increasingly taken the lead in the information revolution.

Given this new dynamism, military power has increasingly relied on the pool of technological knowledge within the wider economy. The growing emphasis on quality in warfare has also led to greater complexity during operations. This trend has facilitated the rise of private military companies in the post-Cold War era and has led Western states to increasingly outsource the provision of internal and external security to the private sector (Singer, 2003). On the other hand, the role of the state is vital, as it can provide the essential financial resources needed to take embryonic technologies and develop them at a speed that would not be matched by the civilian market. This facilitates a profound change in the relationship between the state and private industry, thereby undermining the operation of the free market, so that the state can support defence contractors capable of conducting large and complex forms of research and development (R&D).The literature on private military security companies has rarely investigated their involvement in armed conflict. While some studies have shed light on why and under what conditions mercenaries are hired in civil wars (Chojnacki and al, 2009), others have produced case studies of the impact of private military security services on armed conflict (Vines, 1999; Fitzsimmons, 2013). The literature has begun to develop theories to describe the involvement of private military security services in conflict and to study the consequences of such involvement in quantitative ways. For example, Akcinaroglu and al (2013) showed that military and private security companies had a significant impact on the course of civil wars in Africa, while Petersohn (2014) studied how mercenaries and military private security companies had a significant impact on the severity of civil wars from 1947 to 2007.

- **Effects of natural resources on security and protection**

Natural resource abundance is often associated with poor economic performance (Sachs and Warner, 1995). This conventional wisdom is used in the first approach in the literature, explained in the work of Collier and Hoeffler (2001). For Collier and Hoeffler, in countries with low economic growth and low per capita income, the presence of a natural resource increases the risk of civil war. Due to the availability of finance for war, natural resource wealth makes armed conflict more likely and profitable. Agents who are deprived are therefore more likely to launch a rebellion to gain access to its natural resources. This correlation would be more pronounced in oil producing countries. Thus, Ross (2004) observes that a regularity in the literature is that oil increases the probability of civil war.Developing a theory based on such commitment problems, Fearon (2005) finds that financing rebels through

smuggling is associated with longer civil wars. Doyle and al (2000) conclude that commodity exports hinder the chances of peacebuilding, while Stedman (2001) shows that the presence of collapsible resources undermines the prospects for peace agreements, leading to longer conflicts. Using case studies, Ross (2004) finds support for the idea that natural resources can increase conflict duration, but only if they are controlled by the minority of people. An important work is that of Fearon (2005), who collected data on rebel incomes from a few prominent resources. Lujala and al (2005) find that diamonds only have an impact on the onset and incidence of conflict when they are easily extractable. Similarly, Lujala (2010) finds that oil only has an impact on the onset of conflict when it is located within the state. Conrad and al (2019) show that when rebels smuggle natural resources, civil conflicts last much longer.Collier and Hoeffler (2004) use the share of exports in GDP to measure the importance of natural resources in a country's economy. Their results show that relatively low primary resource endowments may increase the risk of conflict, which can be explained by a higher expectation of victory or a higher feasibility of rebellion. Fearon (2005) also finds a non-linear relationship, not an 'inverted U' but an increasing concave relationship, between primary commodity exports and conflict. The result indicates that there is a marginally decreasing positive effect of natural resources on the risk of war. A high level of available resources in a given country is associated with a significantly higher risk of conflict than a low-resource country. While the observed non-linear relationship between resource endowment and conflict risk is a striking result of this pioneering literature, the work that constitutes it faces two main difficulties (Calvo and Mercier, 2022).

Focusing on deposit discoveries, Lei and Michaels (2014) find that there is a positive relationship between oil wealth and the risk of war, which would confirm the causality between resources and conflict. Using international price movements for fifteen different minerals, Berman and al (2017) estimate the impact of mining activity, geo-located in a precise way, on the emergence of local violence in Africa. They show that an increase in the global price of a mineral increases the risk of conflict in productive areas and also in neighbouring localities. According to their results, when a rebel group appropriates a mining area, it increases the likelihood of violence in other parts of the country, and on average triples the risk of violence in areas other than the appropriation area.

- **Effects of structural change and the transport sector on security and protection**

To understand what aspects of structural change can produce violence, we turn first to the sociological literature on crime, which associates chronic non-state violence with inequality, corruption and overcrowding. This literature is useful because higher overall levels of lethal violence are associated with more gender-based killings of women. Morrison and al (2007) review numerous studies showing that lack of economic opportunities for men, cultural norms, high crime rates in neighbourhoods are risk factors for domestic violence. The increase in crime despite economic development is strongly associated with lagging human development and social inequality. Gun violence is positively correlated with corruption and gender inequality (Richard Florida, 2014).

However, feminist theorists point out that structural changes associated with economic modernisation are often perversely linked to gender disparities that challenge men's economic and social status, threatening both 'breadwinner and recreational' masculinities. At the micro level, countries around the world report links between the killing of women and factors such as male unemployment and male dominance in households (World Bank, 2012). Brysk and Mehta (2017) using the ANOVA method find that development-related conflicts resulting from disruptive structural changes and weak institutions affect women's physical security. They also show that urbanisation is not necessarily positive for women and has a marked interaction with population density. This is particularly important, as rapid and dense urban growth is characteristic of uneven development and structural change in middle-income countries, and is expected to accelerate. Promoting democracy, controlling corruption and reducing political violence, which are already known to be associated with human rights in the public sphere, are also associated with greater security for women.

Furthermore, the literature has shown that subversion groups in Colombia have ended up administering justice, security by granting a network of country roads, which a new group of allies will join and reinforce first. Through the creation of its roads, the inhabitants became the target of criminal actions; under the concept of disrupting the logistics of the supply chain assuming that the citizens were active actors in the armed conflict violating the international protocols on human rights (IHR) and the rights of international conflicts (Miranda and al, 2017). The construction of transport routes in 1980 in countries such as Peru and Bolivia helped to resettle coca crops in Colombia while preventing illegal drug production at the time (Octava Conferencia de Las Fuerzas Armadas Revolucionarias de Colombia, 1982) cited by Miranda and al (2017).

3. Methodology

3.1 Empirical Model

There is a large body of work on the determinants of security and protection in a country or region (Hugon, 2003; Collier and Hoeffler, 2004; Mehlum and al, 2006; Gaham and al, 2010; Gate and al, 2016; Legatum Institut, 2021). In order to determine the effect of productive capacity on the level of security and protection in sub-Saharan African countries, we use an empirical model. The specification of the benchmark model presented below draws on these studies and includes, in addition to our main variable of interest, indicators of productive capacity (i.e. overall productive capacity and its components).

Model 1

$$Sec_pro_{it} = \alpha_0 + Sec_pro_{it-1} + \alpha_1 ProdCap_{it} + \alpha_2 Demo_{it} + \alpha_3 Auto_{it} + \alpha_4 frag_{it} + \alpha_5 OUV_{it} + \alpha_6 Chom + v_t + \mu_i + \varepsilon_{it}$$

The main explanatory variable of the model is and protection (denoted "sec_pro_{it}") and Sec_pro_{it-1} is its lagged variable. The safety and protection variable was compiled by the Legatum Institute (2021). This variable ranges from 0 to 100. A value of 0 indicates the absence of safety and protection, while a value of 100 indicates a high level of it. This variable is influenced by the presence of factors such as: war, civil conflict, terrorism, terror and politically related violence, violent crime, property crime. Indeed, the choice of this variable for this analysis in the social inclusion dimension is justified by the Budsaratragoon and al. (2021).

The first key regressor of interest "ProdCap" is the measure of the level of productive capacity, which can be either overall productive capacity or each of the eight components of productive capacity. The index of overall productive capacity is denoted "ICP". Its components include human capital (denoted as "HUMCAP"), natural capital (denoted as "NATURAL"), energy (denoted as "ENERG"), transport (denoted as "TRANSP"), ICT (denoted as "ICT"), private sector (denoted as "PRIVATE"), institutions (denoted as "INST") and the extent of structural change in production (denoted as "SCI").

This is a variable that is expressed as a percentage and varies between 0 and 100. A value of 0 indicates the absence of productive capacity, while a value of 100 indicates a high level of productive capacity. This indicator was made available to the public some time ago and has been used in a number of economic and econometric studies (Giombini and al, 2022; Gnangnon, 2021; Shiferaw, 2017).

The other variables in the model are: the variable "Demo" measures the level of democracy. It ranges from 0 (no democracy) to 10 (highest level of democracy). The variable "Frag" determines the level of ethnic fragmentation in the country and takes the value 0 (low fragmentation) to 3 (high fragmentation). The variable "Auto" represents the level of autocracy that may exist in the country and ranges from 0 (no autocracy) to 9 (highest autocratic level). The variables "OUV" and "Chom" represent the degree of economic openness and unemployment respectively. i and t denote a country and a period respectively. The panel dataset used to conduct the empirical exercise covers 46 countries in Sub-Saharan Africa and the period runs from 2007-2018. Following its variables, we have v_t and μ_i that capture the time-invariant specificities for each country in the model and ε_{it} represents the normally distributed error term.

3.1.1. Estimation technique

Aisen and Veiga (2013) discussed the limitations of estimating the dynamic model (Eq. (1)) using OLS. To address this problem, Arellano and Bond (1991) suggest the use of first differences of variables to eliminate fixed effects, with a method known as difference GMM.However, the problem of correlation between the lagged dependent variable and the error term remains, which requires the use of instruments. To solve this problem, Arellano and Bond (1991) use appropriate lags of dependent and independent variables as instruments. The lagged levels of the regressors, independent variables, can be weak instruments for differentiated variables that cannot be treated in the difference estimator. Specifically, the GMM first difference estimator behaves poorly and leads to large sample biases when the independent variables are persistent over time (Blundell and Bond, 1998). Finally, the absence of information on the target variables in the level form can lead to the loss of a substantial part of the total variance of the data (Arellano and Bover, 1995).

To solve these problems discussed above with the GMM in difference, Arellano and Bover (1995) and Blundell and Bond (1998) proposed the GMM in System estimator. This estimator is combined in a system with first difference regression and with level regression. To calculate the system estimator, the variables in differences are instrumented with the lags of their own levels, while the variables in levels are instrumented with the lags of

their own differences (Bond and al, 2001). In other words, the first difference moment conditions in the difference GMM are augmented by level moment conditions in the GMM System for more efficient estimation (Blundell and Bond, 1998).In the system GMM, although the levels of the explanatory variables are essentially correlated with the country-specific fixed effect, the differences are uncorrelated. In addition to this, time indicator variables can be included to control for time-specific effects and to eliminate cross-sectional dependence in the data and country or unit indicator variables can be used to control for country or unit specific effects. Another argument in favour of using the GMM in system is that for unbalanced panel data, as in our case, it is better to use the GMM system and avoid estimation by the GMM in difference, which has the weakness of magnification differences (Roodman, 2009).

The GMM technique has the advantage of solving several endogeneity problems. One of these problems arises from the presence of the lagged dependent variable as a repressor in the model. The validity of the GMM estimator of the two-stage system is assessed on the basis of three tests, including the AR (1) test, which is the ArellanoBond test of the presence of first-order serialization correlation in the residuals of the level equations; the AR (2) test, which is the ArellanoBond test of the absence of second-order autocorrelation in the residual of the differentiated equation; and Hansen's Sargan Test of over-identifying restrictions. The null hypothesis of the latter test is the joint validity of the instruments used in the system of equations. The GMM estimator of the two-step system is valid for conducting the empirical analysis if the null hypothesis of each of these tests is not rejected (Roodman, 2009).

3.2. Data source

As mentioned above, the objective of this essay is to test the effect of productive capacity on the security and protection of goods and people in Sub-Saharan Africa. Productive capacity is captured here by the productive capacity index proposed by UNCTAD in February 2021. The security and protection variable comes from the Legatum Institute index (2021). As for the other political variables of the model, they have been extracted from the Polity IV Project Online data. The fragmentation variable was extracted from the Ethnic fragmentation Dataset. The rest of the variables were extracted from the Wold Bank Database (2021).

4. Presentation of results

4.1. Statistical analysis and results of the basic model

In this section, we first present the descriptive statistics and the correlation table of the model variables, and then we present the results of the basic model 1 by the Generalized Method of Moments-System (GMM-System) estimation.

4.1.1.1. Statistical table and correlation matrix

The descriptive statistics presented in Table 1 show that there are no strong fluctuations between the variables. However, we observe that the overall means of our variables are respectively in the order of 60.627 for the explained variable security and protection, then 23.367 for the explanatory variable productive capacity. With a standard deviation of 12.688 for the first variable and 4.286 for the second. These results show that the average level of productive capacity of Sub-Saharan African countries is low and below average and is around 23.367. As for security and protection, its value is above average at 60.627, which shows an improvement in this variable in these countries.Table 2 analyses the correlation that can exist between different variables in the model. As a result, we observe that there is a positive correlation at the 1% threshold between productive capacity and the variable security and protection. Similarly, we observe a positive correlation between the variables democracy, trade openness and the explained variable security and protection at the 1% threshold. On the other hand, the autocratic political regime variable presents a negative correlation at the 1% threshold with the level of security and protection.

Table 1: Descriptive statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
Sec-Pro	552	60.627	12.688	25.439	82.17
CPI	552	23.367	4.286	12.577	37.389
Frag	509	.096	.407	0	3

Demo	496	4.375	3.313	0	10
Autoc	496	1.863	2.205	0	9
OUV	499	72.581	35.868	1.295	225.023
Chom	540	8.144	6.723	.32	28.24

Source: Authors

Table 2: Correlation

Variables	Sec-Pro	CPI	Frag	Democ	Autoc	OUV	Chom
Sec-Pro	1.000						
CPI	0.489*	1.000					
	(0.000)						
Frag	-0.409*	-0.298*	1.000				
	(0.000)	(0.000)					
Democ	0.298*	0.489*	0.062	1.000			
	(0.000)	(0.000)	(0.169)				
Autoc	-0.209*	-0.238*	-0.058	-0.803*	1.000		
	(0.000)	(0.000)	(0.194)	(0.000)			
OUV	0.370*	0.486*	-0.038	0.096*	0.038	1.000	
	(0.000)	(0.000)	(0.411)	(0.039)	(0.416)		
Chom	0.084	0.447*	0.106*	0.009	0.128*	0.417*	1.000
	(0.050)	(0.000)	(0.017)	(0.841)	(0.004)	(0.000)	

Source: Authors*** p<0.01, ** p<0.05, * p<0.1

4.2. Results of the basic model

We note that in all columns of Table 6 column 6, the lagged dependent variable contains positive coefficients that are significant at the 1% level. This result shows the state-dependent nature of the security and protection indicator, and therefore the need to consider a dynamic specification when examining the relationship between productive capacity and security and protection.Similarly, productive capacity has a positive and significant effect at the 1% threshold. This shows that a 10% increase in the productive capacity of sub-Saharan African countries would increase their security and protection by 27.3%.The democracy variable is not significant, but remains positive. This result is identical to the one found in the basic model 1. However, the autocratic regime variable is not significant, but is negative in contrast to the sign found in Model 1. Although not significant, these

results tend to support the hypothesis that autocratic or semi-democratic regimes seem to be more conflict-prone than democratic regimes (Fearon and Laitin, 2003; Hegre, 2001).The ethnic fragmentation variable is significant and negative at the 1% level. This shows that the degree of ethnic fragmentation in sub-Saharan African countries negatively influences the security and protection of people and property in these areas. This result corroborates the work of Alesina and al (1999) who suggest that ethnically divided societies are more prone to polarisation and social conflict.The variable trade openness has a significant and positive impact on security and protection at the 1% threshold. This shows that trade openness contributes to the strengthening of security and protection.Unemployment has a significant and negative effect on security and protection at the 10% threshold. This shows that an increase in the level of unemployment by 10% deteriorates security and protection by -0.086% of sub-Saharan African countries. This result is in line with the literature proposed by Hugon (2006) which shows that conflicts are favoured by economic underdevelopment, youth unemployment, poverty and the impossibility for states to ensure regalian security functions.

Table 3: Effects of productive capacity on security and protection baseline outcomes

	Dependent variable: Security and protection					
	GMM-System					
	(1)	(2)	(3)	(4)	(5)	(6)
(sec_pro) $_{t-1}$	0.840***	0.811***	0.845***	0.815***	0.803***	0.804***
	(0.037)	(0.044)	(0.035)	(0.040)	(0.030)	(0.029)
CPI	**0.243*** **	**0.251*** **	**0.254*** **	**0.183** **	**0.178** **	**0.273*** **
	(0.064)	(0.084)	(0.086)	(0.093)	(0.077)	(0.083)
democ		0.133	0.051	0.019	0.069	0.007
		(0.103)	(0.115)	(0.175)	(0.131)	(0.145)
autoc			-0.069	-0.153	-0.057	-0.027
			(0.185)	(0.233)	(0.110)	(0.133)
Frag				-3.309**	-3.065***	-2.482***
				(1.682)	(0.831)	(0.959)
OUV					0.031***	0.039***
					(0.009)	(0.012)
Chom						-0.086*
						(0.045)
Constant	4.145**	5.055**	3.194	7.040***	5.155***	3.123**
	(2.026)	(2.475)	(2.796)	(2.520)	(1.169)	(1.560)
Observations	506	451	451	451	417	417

Country	46	43	43	43	41	41
Instruments	15	22	28	31	25	22
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.522	0.473	0.456	0.490	0.621	0.586
Hansen	0.405	0.617	0.828	0.184	0.944	0.959

Source: Authors Standard errors are robust to heteroscedasticity *** p<0.01, ** p<0.05,*p<0.1

4.2.1.1. Robustness check

To test the robustness of our main results, in this subsection we conduct sensitivity analyses along several dimensions. First, we disaggregate the index of productive capacity to analyse the effect of each of its components on security and protection. Second, we change the estimation technique to check the robustness of our basic results.

4.2.1.2. Results of disaggregated effects of productive capacities on security and protection

This section analyses the individual effects of each sub-indicator of the overall Productive Capacity Index on security and protection in order to draw relevant conclusions for economic and security policies. The results of this analysis are presented in models 1 to 8 of Table 2:Human capital production capacity has a positive and significant effect at the 1% threshold, which shows that human capital has a significant impact on the security and protection of people and goods. Indeed, when human capital increases by 10%, it improves security and protection by 20.5%.On the other hand, the production capacity of natural resources in these countries has a significant and negative effect on security and protection at the 10% threshold. This shows that the abundant presence of natural resources in these areas is a source of insecurity. Indeed, when natural resources increase by 10%, security deteriorates by -0.057%. This result is similar to those of Lei and Michaels (2014); Berman and al (2017) who find that there is a positive relationship between oil wealth and war risk, which would confirm the causality between resources and conflict.Furthermore, the production capacity of the private sector has a significant and positive effect on security and protection at the 10% threshold. It can be concluded that the development of the private sector contributes significantly to the improvement of security and protection of people and goods. Indeed, this result shows that the creation of private security companies in Sub-Saharan African countries could have a negative impact on insurgencies, wars and civil conflicts as shown by the work of Akcinaroglu and al (2013) and Petersohn (2014).The transport sector has a significant and positive effect on security and protection at the 10% threshold. This shows that a 10% increase in production capacity in the transport sector improves security and protection of goods and people by 0.195%.At the institutional level, there is a significant and positive effect at the 5% threshold. This shows that the productive capacity in terms of institutional quality in these countries contributes to the preservation of security and protection. Therefore, politically stable institutions improve security.However, it is clear that productive capacity in terms of energy and structural change have no effect on security and protection in sub-Saharan African countries. His results are contrary to those found in the literature. This shows that the energy and structural change sectors in these countries lag far behind.

Table 4: Disaggregated effects of productive capacity on security and protection

	Variable dépendante: Sécurité et protection							
	GMM-Système							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(sec_pro) $_{t-1}$	0.782***	0.769***	0.777***	0.788***	0.809***	0.782***	0.812***	0.820***
	(0.032)	(0.043)	(0.054)	(0.042)	(0.055)	(0.059)	(0.040)	(0.044)
Democ	0.026	0.193	0.197	0.065	0.007	0.088	0.052	0.072
	(0.115)	(0.140)	(0.134)	(0.152)	(0.178)	(0.187)	(0.142)	(0.099)
Autoc	-0.105	-0.070	-0.018	-0.260	-0.010	-0.093	-0.163	-0.188

	(0.136)	(0.116)	(0.117)	(0.262)	(0.200)	(0.204)	(0.191)	(0.184)
Frag	-3.581***	-5.615***	-4.950***	-4.002**	-0.292	-6.676**	-3.070*	-1.983
	(1.301)	(1.272)	(1.434)	(1.770)	(2.073)	(2.802)	(1.708)	(2.458)
OUV	0.042***	0.041***	0.040***	0.025*	0.036**	0.038**	0.031**	0.027
	(0.014)	(0.011)	(0.012)	(0.013)	(0.017)	(0.015)	(0.015)	(0.016)
Chom	-0.087**	-0.029	-0.027	-0.018	-0.081	-0.000	-0.033	-0.004
	(0.042)	(0.030)	(0.035)	(0.055)	(0.060)	(0.052)	(0.055)	(0.058)
HUMCAP	**0.205*** **							
	(0.059)							
NATURAL		**-0.057***						
		(0.032)						
PRIV			**0.063***					
			(0.036)					
TRANS				**0.195***				
				(0.113)				
INST					**0.106** **			
					(0.044)			
ENERG						**0.005**		
						(0.051)		
SCI							**0.075**	
							(0.106)	
TIC								**0.203***
								(0.122)
Constant	3.376	14.015***	5.618**	9.022***	5.036	10.368***	8.350***	7.854***
	(2.230)	(3.874)	(2.317)	(2.881)	(3.080)	(3.943)	(2.991)	(2.638)
Observations	379	379	379	417	417	379	417	417
Country	41	41	41	41	41	41	41	41
Instruments	22	22	22	29	36	29	22	36
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.482	0.572	0.573	0.674	0.608	0.569	0.628	0.624
Hansen	0.707	0.719	0.649	0.543	0.391	0.372	0.660	0.341

Source: Authors. Standard errors are robust to heteroscedasticity *** p<0.01, ** p<0.05, *p<0.1

Finally, it can be seen that the level of ICT production has a significant and positive impact at the 10% threshold on the level of security and protection. This shows that a 10% increase in the level of technology improves security and protection by 20.3%. These results are in full agreement with those of Dafoe and Lyall (2015) and Shapiro and al (2015) who showed that the wider use of ICT reduces insurgent violence and therefore improves security and protection.

4.3. Robustness of basic results by changing the estimation method

To ensure the robustness of our results, we change the estimation technique and rewrite model 1 above, eliminating the lagged endogenous variable. The model 2 to be estimated takes the form of equation:

$$\sec_pro_{it} = \beta_0 + \beta_1 \Pr od\ Cap_{it} + \beta_2 Demo_{it} + \beta_3 Auto_{it} + \beta_4 Frag + \beta_5 Ouv + \beta_6 C\hom + \varepsilon_{it}$$

We then adopt an instrumental variable approach (IV) to further address the endogeneity issue. We use the double ordinary least squares (IV-2SLS) estimation technique. It is accepted in the literature that a good instrument should satisfy three conditions according to Lewbel (2012): (i) it should satisfy the orthogonality conditions (ii) it should have significant correlations with regressors; and (iii) it should be properly excluded from the model, so that their effect on the dependent variable is only indirect. However, finding appropriate instruments that simultaneously satisfy these three conditions is often problematic and constitutes the main obstacle to the use of IV-2SLS techniques in many applied research projects.In the context of our analysis, such a problem of instruments on productive capacity has not yet been addressed to our knowledge, given that this new composite indicator has not yet been the subject of much work. Therefore, we apply the method proposed by Lewbel (2012). This method is used to identify structural parameters in regression models with endogenous or poorly measured regressors in the absence of traditional identification information, such as external instruments or repeated measurements. This approach can be applied when no external instruments are available or, alternatively, used to complement external instruments to improve the efficiency of the IV estimator (Baum and al, 2012). In this context, the approach is analogous to the dynamic panel data estimators of Arellano and Bond (1991), as these estimators usually use the appropriate lagged values of the endogenous regressors to identify the model.

To this end, the results in Table 3 columns 6 show that the variables that were significant in Model 1 still retain their significance when we change the estimation technique. In line with the basic results, the robustness analysis shows that productive capacities contribute to the improvement of security and protection. It can be observed that the political variables (democracy and autocracy) retain their signs and are insignificant. Similarly, the other variables in the model remain significant in accordance with the basic model.

Table 5: Robustness analysis of the results of the basic model

	Variable dependent: Safety and protection					
	IV-2SLS					
	(1)	(2)	(3)	(4)	(5)	(6)
PCI	**1.6017*** **	**1.3886*** **	**1.5008*** **	**1.0770*** **	**0.7870*** **	**0.9862*** **
	(0.1261)	(0.1795)	(0.1946)	(0.1807)	(0.1847)	(0.1863)
Democ		0.2199	-0.3494	0.0256	0.1771	0.0954
		(0.2101)	(0.3525)	(0.3473)	(0.3500)	(0.3568)
Autoc			-0.9511**	-0.7592**	-0.3210	-0.2325
			(0.3784)	(0.3781)	(0.3448)	(0.3459)
Frag				-19.6807***	-21.1036***	-20.2943***
				(2.0008)	(2.4153)	(2.3724)

OUV					0.1025***	0.1180***
					(0.0212)	(0.0235)
Chom						-0.2110**
						(0.0841)
Constant	22.0496***	26.2525***	27.8732***	37.0079***	35.2699***	31.3251***
	(3.1694)	(3.9425)	(3.9396)	(3.6049)	(3.5825)	(3.7618)
Observations	414	369	369	366	340	340
R-squared	0.2674	0.2345	0.2439	0.3643	0.4141	0.4222
F	160.6	54.97	38.81	67.53	51.52	50.42
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
Hansen	0.617	0.870	0.818	0.473	0.307	0.327

Source: Authors Standard errors are robust to heteroscedasticity *** p<0,01, ** p<0,05,*p<0,1

Conclusion

This essay analyses the effect of productive capacity on social inclusion through security and protection in Sub-Saharan African countries. The empirical investigations carried out have allowed us, using panel data estimated by the method of generalized moments in system (GMM-System), to establish several results. First, it appears that in sub-Saharan African countries security and protection is explained by productive capacity. Second, it appears that the decomposition analysis of the effects of the eight sub-components of productive capacity on security and protection shows that they act in different ways. It can be seen that productive capacity in human capital, transport, institutions, ICT, the private sector improves security and protection. Thirdly, it can be seen that in contrast to its security and protection enhancing sectors, the natural resource productive capacity is the insecurity enhancing sector. As the literature shows, the abundant presence of natural resources in sub-Saharan African countries does not promote security. Finally, our analysis shows that structural change and energy have no effect.From this analysis, two main recommendations are formulated: (*i)* it is important for Sub-Saharan African countries to increase their productive capacity in general which will improve the level of social inclusion. (*ii*) productive capacity in human capital, transport, institutions, ICT, and private sector needs special attention from governments, as these play a crucial role in the inclusion process.

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