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MILITARY EXPENDITURES, CONFLICTS, POLITICAL INSTABILITY, AND ECONOMIC RESILIENCE IN DEVELOPING COUNTRIES

Thèse Nouveau Régime
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À la mémoire des victimes des conflits armés et de toutes les formes de violence.

Clermont-Ferrand, 2026

Au Mali, confronté à l'une des crises les plus profondes de son histoire.

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Résumé

Cette recherche doctorale examine comment différentes dimensions de la fragilité — telles que les conflits, l'instabilité politique et la vulnérabilité économique — affectent la performance macroéconomique. En combinant des méthodes économétriques avancées avec une analyse orientée vers les politiques publiques, ce travail contribue à une meilleure compréhension de la manière dont la fragilité freine le développement.

Le chapitre 1 analyse la relation entre les dépenses militaires et l'intensité des conflits armés en Afrique subsaharienne. Étant donné l'effet dissuasif de ces dépenses, notre hypothèse de base est qu'une augmentation marginale des dépenses militaires devrait réduire l'intensité des conflits armés. Nous utilisons un modèle probit dynamique, et les résultats montrent que les dépenses militaires réduisent effectivement l'intensité des conflits. Elles diminuent significativement les conflits de faible intensité, davantage que ceux de forte intensité. De plus, l'efficacité des dépenses militaires dépend de leur niveau et de la qualité des institutions. Enfin, l'analyse des canaux de transmission indique que les dépenses militaires influencent l'intensité des conflits principalement par le biais des capacités militaires.

Le chapitre 2 évalue l'impact de l'instabilité politique, en particulier des coups d'État, sur la performance macroéconomique. À partir d'une base de données couvrant 192 pays sur la période 1970–2023 et en utilisant la méthode de l'équilibrage par entropie (entropy balancing), nous montrons que les coups d'État réduisent la croissance du PIB d'environ 2,3 points de pourcentage, avec un effet persistant dans le temps. Les résultats suggèrent également que les coups d'État réussis ont des effets économiques plus marqués que les coups manqués, et que ces effets sont plus importants dans les pays à faible revenu, notamment en Afrique subsaharienne. Les coups d'État affectent la consommation privée et l'investissement, mais il existe peu de preuves d'un impact sur les indicateurs monétaires. Enfin, les sanctions économiques imposées après un coup d'État apparaissent comme une raison importante de la baisse de la croissance.

Le chapitre 3 examine comment les pays africains se redressent économiquement après un conflit interne, en s'attachant aux problèmes d'endogénéité liés à la causalité inverse. En utilisant la méthode de l'équilibrage par entropie, nous

trouvons des preuves d'un effet de rattrapage économique durant la période post-conflit. L'analyse des canaux de transmission révèle que l'augmentation de l'investissement, de la consommation et du commerce constitue les principaux moteurs de la reprise économique post-conflit. L'impact cumulé sur la croissance est estimé à 2 points de pourcentage la première année, n'augmentant que légèrement pour atteindre 2,5 points de pourcentage la cinquième année. Cette faible hausse de 0,5 point sur cinq ans indique que la croissance post-conflit demeure volatile et peu durable, reflétant les effets persistants du conflit.

Mots-clés Fragilité · Conflit armé · Coup d'État · Résilience · Dépenses publiques · Pays en développement · Économétrie appliquée

Codes JEL: H56, D74, P48, I30,O10, O470,E37

Abstract

This doctoral research examines how different dimensions of fragility—such as conflicts, political instability, and economic vulnerability—affect macroeconomic performance. By combining advanced econometric methods with policy-oriented analysis, my work contributes to a deeper understanding of how fragility undermines development.

Chapter 1 examines the relationship between military expenditure and the intensity of the armed conflict in sub-Saharan Africa. Given the deterrent effect of such expenditures, our basic assumption is that increasing military spending at the margin should reduce the intensity of armed conflict. We use a dynamic probit model, and the results show that military spending reduces the intensity of conflict. It significantly reduces low-intensity conflicts more than high-intensity conflicts. Additionally, the effectiveness of military spending depends on its level and the quality of institutions. Finally, the analysis of transmission channels shows that military spending affects conflict intensity mainly through the channel of military capabilities.

Chapter 2 evaluates how political instability, specifically coups d'état, affects macroeconomic performance. Using a dataset of 192 countries from 1970 to 2023 and an entropy balancing model, we find that coups d'état reduce GDP growth by around 2.3 percentage points in the same year, with a persistent impact over time. There is also tentative evidence to suggest that successful coups have larger economic impacts than unsuccessful coups, and that the effects are larger for low-income countries, including those in sub-Saharan Africa. Coups are found to affect private consumption and investment, but there is little evidence of an impact on monetary or fiscal indicators. Finally, economic sanctions imposed after coups are found to be an important reason for lower growth.

Chapter 3 examines how African countries recover economically after internal conflicts, focusing on endogeneity issues related to reverse causality. We use the entropy balancing method and find evidence of an economic catch-up effect in the post-conflict period. The analysis of transmission

channels reveals that increased investment, consumption, and trade are the primary drivers of post-conflict economic recovery. The cumulative impact of growth is estimated at 2 percentage points in the first year, increasing only slightly to 2.5 percentage points by the fifth year. This modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict.

Keywords: Fragility · Armed Conflict · Coup d'état · Resilience · Public spending · Developing countries · Applied econometrics

JEL Codes: H56, D74, P48, I30,O10, O470,E37

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Chapter 0

General Introduction

0.1 Background

Fragility[1] and development remain significant challenges for all countries. However, these issues are particularly worrying for developing countries, which are mainly affected by various forms of fragility (conflicts, economic vulnerability, climate change, and political instability). Fragility has persisted, becoming increasingly alarming and hindering socio-economic development prospects. It exacerbates precarious living conditions and incurs humanitarian, social, economic, and environmental costs.

The factors contributing to state fragility are complex and interconnected, involving political, economic, social, and institutional aspects (OECD, 2025). Politically, weak governance, a lack of legitimacy, corruption, and the absence of inclusive institutions weaken state authority and diminish social cohesion (Acemoglu and Robinson, 2019). Economically, low income levels, high inequality, dependence on natural resources, and limited economic diversification make states more vulnerable to shocks and hinder their resilience (World Bank, 2024). Socially, divisions based on ethnicity and religion, demographic pressures, and insufficient human capital development increase tensions and restrict collective action (UNDP, 2021; Montalvo and Reynal-Querol, 2005). From an institutional standpoint, the state's limited capacity to provide essential public goods—such as security, justice, and infrastructure—further intensifies fragility (Smith, 1995b; Turner, 2020). These factors are mutually reinforcing, creating a vicious cycle in which fragility undermines development and weak institutions perpetuate instability. More than a quarter of the countries are classified as fragile

[1]The World Bank and IMF define fragile situations as weak institutional capacity in low-income countries and/or conflict situations.
The OECD defines fragility as the combination of exposure to risk (economic, environmental, political, security, societal) and insufficient coping capacity of the state to manage, absorb, or mitigate those risks.

states by the World Bank, the IMF, or the OECD, many of which are developing nations. These states accounted for 16% of the world's population in 2022, but this share is expected to reach about a quarter by 2050 due to their rapid population growth (World Bank, 2024). This evolution underscores that conflict and fragility are far from marginal or geographically isolated phenomena: a substantial and increasing proportion of the global population is directly or indirectly exposed to the disruptions generated by armed violence. This demographic reality further reinforces the relevance of the present dissertation. The large and growing proportion of the world's population living in conflict-affected or fragile environments underscores the extensive economic consequences of armed violence.

Insecurity directly or indirectly impacts the implementation of development projects and programs initiated by public authorities and their partners. It also reduces the attractiveness of these countries, notably through a decline in foreign direct investment (Busse and Hefeker, 2007). Insecurity hampers the free movement of goods and people, slowing economic activity. Overall, a conflict situation affects all macroeconomic aggregates, with the impact being most visible on GDP (Murdoch and Sandler, 2002).

In recent decades, developing countries have been characterized by increasing insecurity and threats from rebel, terrorist, and jihadist groups. This research focuses mainly on the economic effects of conflict. Armed conflicts[2] negatively affect economic activity across different sectors (Collier, 2004; Blattman and Miguel, 2010). They act through channels such as uncertainty, reduced country attractiveness, lower private and foreign investment, inflation, weaker resource mobilization, and the crowding-out effect of public spending. Overall, conflicts undermine macroeconomic stability and long-term economic growth.

During periods of conflict, governments tend to increase military spending (Gupta et al., 2004). This increase can alter the composition of public expenditure through the crowding-out effect, affecting other public investment spending. The interest in analyzing military expenditures is as follows: since these expenditures can crowd out public investment spending (health, education, infrastructure), the inefficiency of military spending in reducing conflicts could be a double burden for a state (Ferraz, 2022; Ferdi, 2021). Not only do they place additional strain on public finances,

[2]According to the UCDP/PRIO Armed Conflict Dataset, an armed conflict is defined as "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in a calendar year."

but they also result in lower funding for other public expenditures that could help mitigate conflict risks and, ultimately, the intensity of armed conflicts.

In addition to conflict, one frequently cited barrier to growth is institutional instability, and many researchers have argued that establishing such stability is a necessary condition for achieving sustainable growth (Boly and Sawadogo, 2024; Alesina and Perotti, 1996). Institutional instability can take many forms, but irregular and unconstitutional changes in government – coups d'état – are one manifestation. It is therefore crucial to understand to what extent coups affect economic outcomes, including GDP growth, and how they do so. The increasing prevalence of coups in recent years, particularly in sub-Saharan Africa, has led to increased interest in this area of research (Boly and Sawadogo, 2024; Cebotari et al., 2024; Arezki and Fetzer, 2019). Coups are generally found to hurt the economy through several channels, but the estimated effects are far from uniform. In particular, the impact is found to depend on both the nature of the coup and the characteristics of the country in question (Masaki, 2016; Arezki and Fetzer, 2019; Balima, 2020b,a; Bjørnskov, 2022; Boly and Sawadogo, 2024; Cebotari et al., 2024).

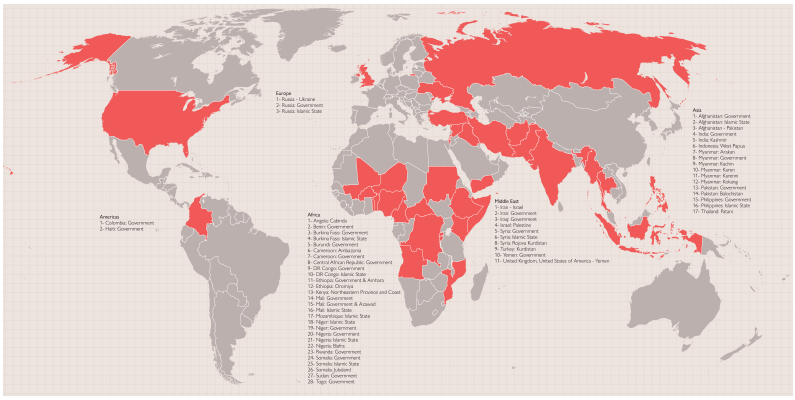
Armed conflicts or institutional instability negatively impact macroeconomic performance. However, what happens when armed conflict comes to an end? According to the literature review (Collier and Hoeffler, 2004; Del Castillo, 2001; Schumpeter, 1942; Collier et al., 2008; Hill and Menon, 2014), in such contexts, three patterns are theoretically possible:(i) The catch-up effect: In this scenario, post-conflict countries gradually return to their pre-conflict growth levels. The adverse effects of the conflict often become more apparent over time. (ii) The overshoot effect: This concept relates to Schumpeter's theory of creative destruction. During conflicts, human and physical capital are often destroyed. Reconstruction can utilize improved human and capital resources compared to before the conflict. (iii) The permanent conflict effect: This scenario is marked by a significant risk of renewed conflict following the initial conflict. The extensive destruction of productive resources can lead to a conflict trap where operational factors fail to generate growth.

This thesis improves our understanding of the complex relationships between conflict, institutional instability, resilience, and economic performance in developing countries. By employing rigorous econometric methods and utilizing high-quality data, it aims to provide new empirical evidence on the impact of armed conflicts and coups d'état on economic activity, as well as on how economies recover after experiencing instability. In addition to its analytical contributions, this research offers valuable

policy insights to help governments and international partners develop strategies that strengthen resilience, promote peace, and encourage sustainable and inclusive development in fragile contexts.

0.2 Motivation and Stylized Facts

Figure 1: Active State-Based Conflicts in 2024

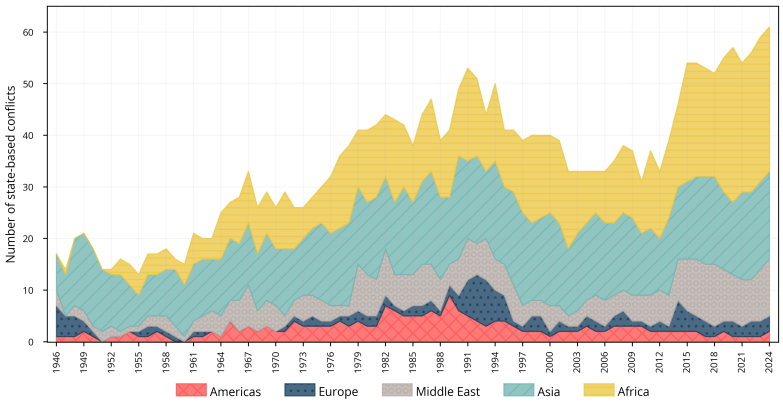


Source: Uppsala Conflict Data Program is the world's main provider of data on organized violence and the oldest ongoing data collection project for civil war, with a history of almost 40 years State-based conflict is "A contested incompatibility that concerns government or territory, where the use of armed force between two parties—of which at least one is the government of a state—results in at least 25 battle-related deaths in a calendar year".

Figure 1 displays the global distribution of active state-based conflicts in 2024, revealing a marked concentration of organized violence in Sub-Saharan Africa, the Middle East, and parts of Asia. Several countries—such as the Democratic Republic of Congo, Sudan, Myanmar, Ukraine, and Israel-Palestine—continue to experience high-intensity episodes involving state forces. At the same time, regions in Latin America and North Africa are affected by lower-intensity but recurrent confrontations. Importantly, these conflict dynamics are not confined to any specific income group: both low-income and middle-income countries appear prominently, highlighting that exposure to organized violence remains a global and persistent phenomenon.

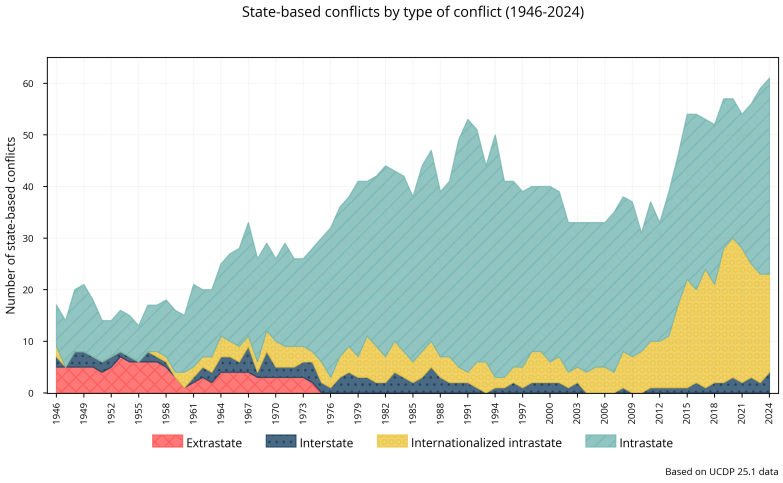
This geographical pattern directly anchors the motivation of the present dissertation. Many of the countries shown on the map display deep institutional fragilities, limited state capacity, and structural economic vulnerabilities—factors that can magnify the macroeconomic repercussions of conflict. Active violence disrupts production, constrains mobility, reduces investment, and damages critical infrastructures, while also weakening fiscal capacity and undermining policy effectiveness. The coexistence of conflict with these underlying vulnerabilities is central to understanding why the economic consequences of violence vary across contexts.

Figure 2: State-Based Conflicts by region (1949-2024)



Source: Uppsala Conflict Data Program. State-based conflict is defined as "A contested incompatibility that concerns government or territory, where the use of armed force between two parties—of which at least one is the government of a state—results in at least 25 battle-related deaths in a calendar year".

Figure 3: State-Based Conflicts by types (1949-2024)



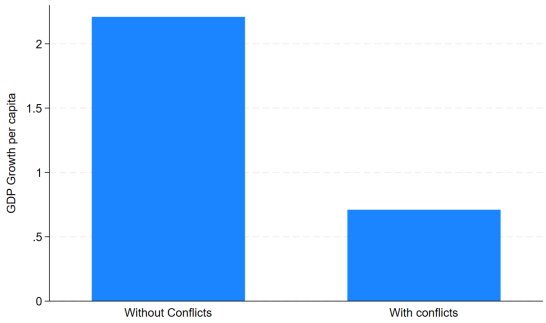
Source: Uppsala Conflict Data Program

In recent decades, armed conflicts have increased worldwide. Figure 2 illustrates the evolution of state-based[3] conflicts across various world regions from 1946 to 2024. , based on data from the Uppsala Conflict Data Program. The data show significant disparities between regions and fluctuations over time. Conflicts surged sharply in

[3]According to the Uppsala Conflict Data Program (UCDP), a state-based conflict is: "A contested incompatibility that concerns government or territory, where the use of armed force between two parties—of which at least one is the government of a state—results in at least 25 battle-related deaths in a calendar year".

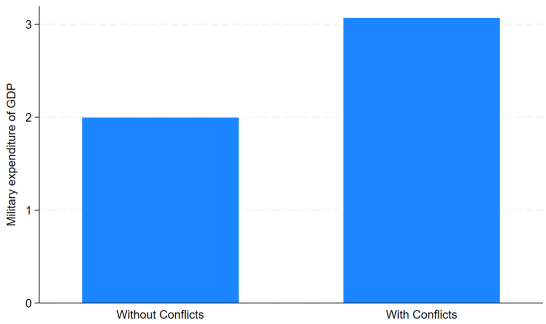
the 1960s, peaked in the early 1990s, and rose again after 2010. Africa and Asia have been the regions most affected by conflict, particularly in the post–Cold War era. At the same time, the Middle East continues to exhibit persistently high levels of conflict intensity. In contrast, Europe and the Americas have seen relatively few state-based conflicts since the 1990s. Overall, the figure underscores the geographic concentration of violent conflicts and their persistence in developing regions, despite a global decline in such conflicts elsewhere. Figure 3 documents the long-term evolution of state-based conflicts from 1949 to 2024 and highlights a profound transformation in the global conflict landscape. The figure distinguishes four types of organized violence: (i) interstate conflicts, involving the armed forces of two or more states; (ii) intrastate conflicts, opposing government forces to domestic rebel groups;(iii) internationalized intrastate conflicts, a subtype of civil wars in which external states directly intervene on one or both sides; (iv) extrastrate conflicts, involving state forces fighting armed groups outside their own territory (a historically rare category). The data reveal that, whereas interstate conflicts dominated in the early post–Second World War period, they have become increasingly uncommon since the 1990s. In contrast, intrastate conflicts, especially those internationalized, have expanded significantly. Since the early 2000s, internationalized civil wars—where foreign powers play an active military role in otherwise domestic armed confrontations—have become the most prevalent form of organized violence. This transformation reflects deeper structural dynamics, including the proliferation of non-state armed groups, the regionalization of insecurity, and the internationalization of domestic political crises. This evolution is highly relevant to the present dissertation. The contemporary dominance of intrastate and internationalized conflicts, concentrated mainly in developing countries, means that violence increasingly unfolds in contexts characterized by weak institutions, fiscal fragility, and limited economic resilience. Such conflict types are typically longer, more destructive, and more disruptive to economic activity than traditional interstate wars. They can affect production, trade, mobility, investment, and human capital formation in persistent and spatially heterogeneous ways (Novta and Pugacheva, 2021; Blattman and Miguel, 2010). By clarifying both the nature and trajectory of modern conflicts, Figure 3 demonstrates why understanding the economic effects of organized violence—particularly civil wars with foreign involvement—is essential. This motivates the central objective of this thesis: to identify and quantify how contemporary conflict dynamics shape economic activity in developing countries, in a context where violence is increasingly internal, protracted, and internationalized.

Figure 4: GDP per capita With and Without Conflicts (1989-2023)



Source: World Development Indicators. Author's calculations.

Figure 5: Military expenditure/ GDP With and Without Conflicts (1989-2023)

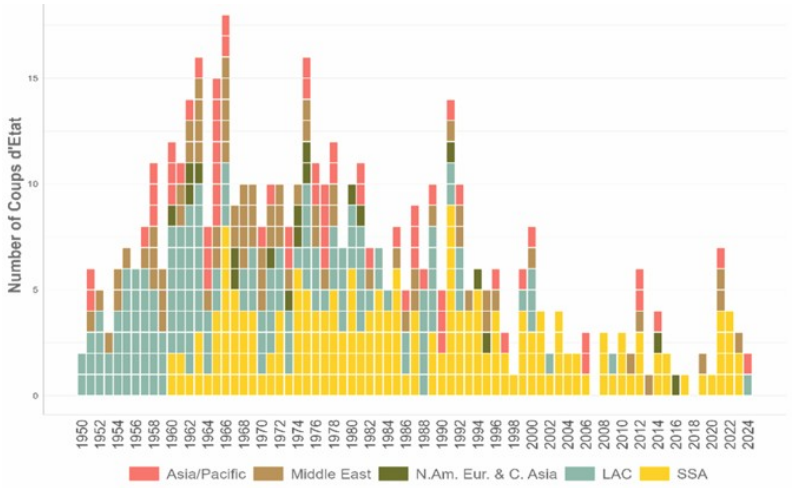


Source: World Development Indicators. Author's calculations.

Conflicts are closely associated with weak economic performance. Figure 4 shows a substantial difference in GDP per capita between countries experiencing conflict and those without. A clear correlation emerges: conflict-affected countries consistently exhibit lower income levels compared to non-conflict countries. This suggests that conflicts are associated with lower economic performance because violence disrupts productive activities, reduces investment, and destabilizes trade and governance structures (Novta and Pugacheva, 2021; Blattman and Miguel, 2010). Weak economic fundamentals—such as poverty traps, limited state capacity, inequality, Weak economic performance, and political instability—are themselves associated with a higher likelihood of conflict onset (Fearon and Laitin, 2003; Couttenier and Soubeyran, 2015). The persistent conflicts and fragile economic structures mutually reinforce each other, ultimately undermining long-term growth and development prospects (OECD, 2025; World Bank, 2024). Hence, there is a need to study the effects of armed conflicts on economic activity. This research question is in the field of development economics and, to a large extent, aligns with the 16th Sustainable

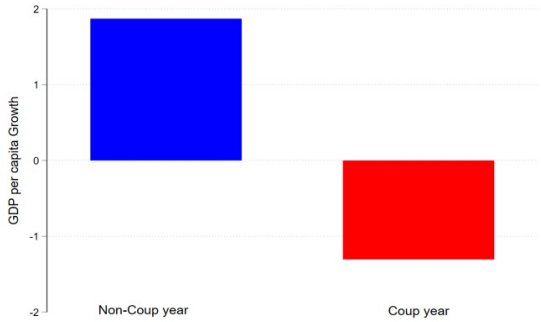
Development Goal of the United Nations 2030 Agenda. It is motivated not only by the desire to understand the mechanisms of conflict but also by the need to formulate economic policy implications that can foster more resilient economic activity in situations of instability, thereby promoting sustainable and stable socio-economic development. Figure 5 highlights that military expenditure as a share of GDP is considerably higher in countries affected by conflicts. This reveals a clear correlation between conflict exposure and defense burdens. During periods of conflict, governments tend to prioritize military and defense spending to maintain territorial control and political stability (Phillips, 2015; Gupta et al., 2004). Higher military expenditure can also change the composition of public spending or crowd out other public spending, such as infrastructure, health, and education, thereby undermining long-term development prospects. The higher military burden in conflict countries may therefore contribute to their slower economic recovery. Given the significant financial and economic impacts of military spending, increasing defense expenditure could yield better security outcomes if it effectively strengthens state capacity and deterrence. However, heightened military spending may also be associated with the continuation or escalation of conflict, particularly if it promotes militarization, deepens political instability, or diverts resources away from essential public services. Therefore, evaluating the circumstances in which military expenditure helps reduce conflict is a crucial empirical question.

Figure 6: Military Coup d'Etat by region (1950-2024)



Source: Powell and Thyne dataset identifies coups as "overt attempts by the military or other elites within the state apparatus to unseat the sitting head of state using unconstitutional means".

Figure 7: GDP per capita With and Without Coup d'Etat (1950-2024)



Source: World Development Indicators. GDP per capita averages for country-year observations with coups versus without coups. Author's calculations.

Coups d'État and armed conflicts represent two distinct but interconnected manifestations of political instability. Powell and Thyne dataset defines coups as *"overt attempts by the military or other elites within the state apparatus to unseat the sitting head of state using unconstitutional means"*. According to the Uppsala Conflict Data Program, armed conflict is defined as *"A contested incompatibility that concerns government or territory, where the use of armed force between two parties—of which at least one is the government of a state—results in at least 25 battle-related deaths in a calendar year"*. The relationship between coups and conflicts is far from independent. Empirical studies show that coups can increase the risk of civil conflict by fragmenting state institutions, weakening elite cohesion, and generating uncertainty over political rules (Bove and Nisticò, 2014; Collier, 2004). Conversely, the presence of armed conflict significantly heightens the probability of coups by undermining state capacity, weakening the military hierarchy, and exposing leadership vulnerabilities (Cebotari et al., 2024; Lehoucq, 2021). Their occurrence (both coups and conflict) can reflect structural chronic fragility. Figure 6 shows the increase in the number of coups in recent years in developing countries. Over the past decade, 17 of the 27 coups worldwide have occurred in sub-Saharan African countries. In total, 324 coup observations in our full database from 1950-2024. That includes 179 successful coups and 166 unsuccessful coups. This has led to a surge in interest and more empirical works (Cebotari et al., 2024; Boly and Sawadogo, 2024; Bjørnskov, 2022; Balima, 2020a; Arezki and Fetzer, 2019). Similar to armed conflict, coups d'état are also associated with negative economic performance. Figure 7 shows the difference in GDP per capita growth between coup and non-coup years. During coup years, GDP per capita growth is associated with negative growth (–1.2 percentage points).

This suggests that coups may have a substantial adverse association with economic activity, highlighting the importance of assessing their impact on macroeconomic outcomes. Coups can increase economic uncertainty, disrupt policy continuity, and reduce investor confidence. They may also trigger economic sanctions or limit access to international financial and trade networks, further constraining growth. Additionally, the country's reduced attractiveness to foreign direct investment during periods of political instability can exacerbate the adverse economic effects of coups.

Promoting economic resilience during or after periods of political instability, such as armed conflicts and coups d'État, is a critical concern for both policymakers and researchers (Del Castillo, 2001). Economic resilience is defined as *"the ability of an economy to absorb, adapt, and recover from shocks while maintaining or restoring growth trajectories"* (Hallegatte, 2014). Understanding and fostering resilience is fundamental in post-conflict contexts, where countries face significant reconstruction costs, severe disruptions to productive capacities, and the dual challenge of restoring social cohesion while achieving sustainable peace. In this setting, resilience extends beyond recovering GDP growth. It also involves rebuilding institutions, rehabilitating critical infrastructure, and reconstituting social and human capital, all of which are essential for laying the groundwork for long-term development (Cerra and Saxena, 2008). Furthermore, post-conflict economic resilience requires adaptive governance, efficient management of external aid, and the capacity to mitigate further risks, such as renewed political instability or external shocks (Elbadawi et al., 2007). Therefore, assessing the determinants of resilience in post-conflict economies is vital for designing policies that support sustainable recovery and reduce the risk of relapse into instability.

0.3 Literature Review

The literature has progressively recognized that conflict is a complex phenomenon with heterogeneous manifestations. Understanding the causes and consequences of conflict has generated a vast, multidisciplinary literature spanning development economics, political economy, macroeconomics, the social sciences, and peace studies. The literature on the drivers of conflict can be structured into two main models. On the one hand, the grievance model, developed in the works of Collier and Hoeffler (2002a); Collier (2004); Olsson (2007); McGuirk and Nunn (2020); Blattman and Miguel (2010); Jacquemot (2009), emphasizes religious and ethnic polarization and inequalities, as well as weak economic performance, as the primary determinants of

conflict. On the other hand, the greed model posits that conflicts mainly arise from risks related to natural resources, weak institutions Couttenier and Soubeyran (2015); Berman et al. (2017); Lujala et al. (2005); Fearon and Laitin (2003); De Soysa (2002). The exploitation and global prices of minerals affect conflicts through channels such as rebel financing, corruption, and vulnerability to exogenous shocks (climate, commodities...). Early contributions primarily focused on aggregate macroeconomic losses from conflicts, emphasizing their destructive effects on capital, human lives, and public finances (Blomberg et al., 2004; Blattman and Miguel, 2010). This tradition broadly established that conflicts undermine economic activity through channels such as capital destruction, population displacement, and disruptions to trade and investment. Subsequent research refined these insights by highlighting that conflicts generate persistent negative effects on long-run growth, institutional development, and fiscal sustainability (Novta and Pugacheva, 2021; Cerra and Saxena, 2008). Parallel research has emphasized the micro-level consequences of conflict. These studies show that conflict affects local economic activity through disruptions to markets, mobility restrictions, infrastructure destruction, labor reallocation, and changes in household economic strategies (Justino, 2009; van Weezel, 2018). This literature highlights strong nonlinearities: the same level of conflict intensity may yield different economic impacts depending on local institutional quality, social cohesion, or the degree of state presence. Another strand of research investigates fiscal responses to conflict, particularly military spending and the composition of public expenditure. Military expenditures increase with external and internal threats (Phillips, 2015; Gupta et al., 2004). According to the neoclassical demand function for the military expenditure, security is a public good, and the State, in its regulatory function, spends more in a situation of insecurity to maximize the collective good under the constraint of financing resources (Smith, 1995b, 1989; Brueckner, 2003). Military spending is considered a regional public bad when it does not reduce the risk of rebellion (Collier and Hoeffler, 2002b). Deterrence results from the costs and benefits associated with this spending Batiffol (1982). Military spending is also described as a compensatory public good when it achieves the objective of security stability (Smith, 1995b). However, the military spending is also conditional on the quality of institutions. Agostino et al. (2016) shows that such spending is highly subject to corruption practices. Military spending has increased significantly in Sub-Saharan Africa since the 2000s (Figure 1.1,b). The sub-Saharan region is also characterized by the persistent intensity of armed conflicts (Figure 1.1,a). This thesis analyses the relationship between military expenditure and the intensity of the armed conflict. Despite abundant literature, very little work has examined

the effectiveness of military spending and the intensity of conflicts in sub-Saharan African countries. These countries are consistently characterized by ongoing conflict concurrent with efforts to address conflict. The existing literature mainly uses a static model that does not account for the effect of conflict persistence, which is particularly significant for countries already in armed conflict. In sub-Saharan Africa, access to security (a public good) is problematic today due to armed conflicts. To satisfy this need, the State relies mainly on public expenditure, particularly military expenditure (Collier and Hoeffler, 2002b; Gupta et al., 2004; Batiffol, 1982).

Coups d'État are a significant indicator of political instability. A considerable amount of literature has explored their underlying causes, identifying several common factors. These factors include poor economic performance, ongoing armed conflicts, weak or poorly consolidated political institutions, autocratic or exclusionary regime structures, high levels of inequality and social fragmentation, foreign influence or external interference, and regional contagion effects—where instability in neighboring countries increases the risk of a coup (Cebotari et al., 2024; Chin et al., 2021; Powell and Thyne, 2011; Lehoucq, 2021; Jackman, 1978). Regarding the economic consequences of coups, the dominant finding in the literature is that coups d'État generally have negative, statistically significant effects on economic performance. Empirical studies show that coups tend to reduce GDP growth, disrupt investment, weaken fiscal capacity, and undermine long-term development prospects (Boly and Sawadogo, 2024; Balima, 2020b; Blum and Gründler, 2020; **?**; Alesina and Perotti, 1996). Since the end of the Cold War, donor communities have reduced their aid amounts in response to coups d'État Masaki (2016), which diminishes countries' financial capacity. In a coup d'État situation, the sovereign debt rating is downgraded, and the probability of sovereign default increases (Balima, 2020a). Blum and Gründler (2020); Fosu (2002) have found that coups can reduce GDP growth. Coups d'État also lead to a significant increase in military spending and to a crowding-out effect on other public expenditures Bove and Nisticò (2014). Coups lead to the depreciation of the nominal effective exchange rate in the country of the coup and an adverse externality effect on neighbouring countries (Balima, 2020b). However, these effects are partly offset by financial reserves and the flexibility of the exchange rate regime. Balima (2020a) find that coups are a relevant determinant of the monetary crisis. The exchange rate regime and the loss of confidence in the local currency could explain this result. As for the relationship between coups and international trade, Wu and Ye (2020) find that preferential trade agreements reduce the risk of coups. This result is explained by the long-term commitment

of the signatory countries and provides less incentive for leaders to carry out a coup d'État. The coups created economic uncertainty and made the country less attractive, which is not conducive to the business climate (Asiedu, 2006). Over the past decade, there have been different types of coups (Lehoucq, 2021; Powell and Thyne, 2011). The coups are classified as successful, unsuccessful, or military-political. The different types of coups depend on the country's socio-economic and political context and are often combined. The most commonly used cases in the literature are successful or attempted coups. The magnitude of the economic impact of coups depends on their type. According to Fosu (2002), unsuccessful coups have a more significant negative impact on economic growth than successful coups. Despite substantial progress, several important gaps remain in the literature on the economic consequences of coups d'État. First, existing studies consistently underline the endogeneity problem inherent in analysing the impact of coups: while coups can adversely affect economic outcomes, fragile economic conditions can themselves increase the likelihood of a coup, making causal inference challenging (Cebotari et al., 2024). Second, the literature provides limited evidence on how coups affect the different components of GDP and key macroeconomic sectors. Research to date has reached little consensus on the key transmission channels through which coups d'État affect the economy. Third, most studies focus primarily on successful versus unsuccessful coups, overlooking a broader typology of political takeovers, such as transitions from democratic to military coup or from autocratic to military coup, or constitutional coups, which may generate heterogeneous economic effects. Finally, existing empirical work is often limited to specific regions or cross-country settings with little systematic comparison. There is therefore a need for global analyses, supplemented by regional heterogeneity assessments, to understand better how the economic consequences of coups vary across political, institutional, and structural contexts.

While a substantial literature has documented the economic effects of armed conflict and coups d'État, research on post-conflict economic resilience and recovery remains comparatively mixed. Existing studies provide mitigated evidence. Collier and Hoeffler (2004) analyze the effects of aid and economic policies on post-conflict growth. This study builds on a related paper by (Collier and Dollar, 2002), which examines the effectiveness of aid on growth through the poverty-reduction channel. They include the post-conflict period in the latter to consider the effects of aid and economic policies on post-conflict growth. Collier and Hoeffler (2004) define the post-conflict period based on a decade without conflict (from 1 to 10 years after

the end of the conflict or the beginning of peace). The results show that official development assistance is particularly effective in restoring economic activity in the particular post-conflict context. However, this effectiveness is more significant when it is followed by social and economic policies and by good-quality institutions during the first three years after the conflict. Hence, there are diminishing returns to official aid over time. Collier and Hoeffler (2004)'s analysis is limited by the small number of samples of post-conflict countries from 1970-93. These limitations may bias the statistical analysis, which is highly subject to sample size. According to Del Castillo (2001), the post-conflict period requires synergy between the country's reconstruction and development. The authors find that international organizations have a significant role in the country's transition to sustainable stability and a return to regular economic activity. Hill and Menon (2014) show empirical evidence of Cambodia's economic recovery from the genocide in 1998. The results show that trade openness and the investment channel mainly explain this recovery. Beyond these channels, post-conflict capital accumulation is also an essential factor. Hill and Menon (2014) concludes that even in the post-conflict period, the conflict has a persistent negative effect on human capital accumulation. This ultimately impacts long-term growth. Beyond economic recovery, post-conflict countries face the challenge of reducing conflict risk. The approach used by Collier et al. (2008) depends on the risk of return to conflict. The results show a complementary relationship between economic variables and the risk of conflict in the post-conflict period, promoting sustainable stability. Post-conflict countries are fragile, with an average risk of return to conflict of 46%. Although substantial research has been conducted, important gaps remain in understanding post-conflict economic resilience. Existing studies provide mitigating evidence on the ability of economies to recover, with substantial heterogeneity in the speed, magnitude, and durability of recovery across countries and conflict episodes. The literature also lacks consensus on the key channels underlying resilience. Moreover, most analyses focus on short-term or average effects, leaving the dynamic trajectory of post-conflict recovery and the cumulative impact of conflict cessation on growth largely unexplored. Comparative studies across regions or structural contexts are rare, limiting understanding of cross-country heterogeneity and the conditions under which recovery is most likely to occur. These gaps underscore the need for systematic empirical research that identifies the channels, magnitudes, and time dynamics of post-conflict recovery, providing critical guidance for policies aimed at fostering sustainable economic resilience and preventing a relapse into conflict.

0.4 Contributions

This empirical thesis contributes to the literature through three main chapters. Chapter 1 is about the effectiveness of military spending in reducing the intensity of armed conflict in Sub-Saharan Africa. The primary economic issue with military spending is that it reduces the funds available for other public expenses. In a conflict situation, the government must balance military and investment spending. This balance can change the composition of public expenditure, affecting the country's economy. Since 2000, Military spending has increased significantly in Sub-Saharan Africa. This study analyses the relationship between military expenditure and the intensity of the armed conflict. Given the deterrent effect of such expenditures, our basic assumption is that increasing military spending should reduce the intensity of armed conflict. Chapter 1 contributes to the literature by examining the persistence of armed conflict intensity using Heckman (1981)'s dynamic probit model. This model allows for evaluating the heterogeneity across countries regarding initial differences in armed conflict intensity. The main findings suggest that military spending reduces the intensity of conflict by 0.012 percentage points. It significantly reduces low-intensity conflicts more than high-intensity conflicts, with 25-999 and more than 1000 deaths, respectively. The effectiveness of military spending depends on the level of spending and the quality of institutions. The results of the transmission channels analysis indicate that military spending acts through the military capability channel to reduce the intensity of armed conflict in Sub-Saharan Africa. Military spending is also found to reduce the risk of conflict in non-conflict countries.

Chapter 2 examines how political instability affects macroeconomic performance. One of the most frequent barriers to macroeconomic stability is political instability. It can take different forms, but irregular and unconstitutional changes in government, such as coups d'État, are among the most disruptive. With the rising number of coups in recent years, it becomes crucial to understand both their impact on economic outcomes and the channels through which these effects operate. Using a dataset of 192 countries from 1970 to 2023, we observe that GDP growth generally declines in the year before a coup. This observation aligns with the existing literature (Cebotari et al., 2024; Lehoucq, 2021), which suggests that weak economic conditions often contribute to the occurrence of coups. Additionally, a coup can also affect GDP growth. This situation raises a question of endogeneity due to the potential reverse causality between coups and GDP growth. To address endogeneity, we use the entropy-balancing method. In terms of contributions, the Chapter 2's findings show that coups d'État reduce GDP growth by about 2.3 percentage points in

the year of the coup. The effect is also persistent. Over the five years following a coup, cumulative GDP growth is on average 4.7 percentage points lower than in non-coup cases. Successful coups d'État are found to have a larger negative impact on GDP growth than unsuccessful coups, although the difference is not statistically significant. When a coup occurs in a previously democratic country, GDP growth declines slightly more than in countries previously governed by non-democratic regimes. The negative effects of coups d'état are strongest in low-income countries and Sub-Saharan Africa. These countries often face weaker institutions and limited capacity to absorb shocks, particularly in fragile and conflict-affected settings. Beyond aggregate GDP growth, coups have a disproportionate effect on private consumption, gross fixed capital formation, net trade, tax revenues, and are also associated with higher inflation. Finally, the analysis of transmission channels highlights the role of economic sanctions and heightened uncertainty. Both channels are found to be key drivers of the lower growth observed after coups.

Chapter 3 evaluates the growth resilience of African countries following internal armed conflicts. Armed conflicts negatively affect economic activity across different sectors. They act through channels such as uncertainty, reduced country attractiveness, lower private and foreign investment, inflation, and weaker resource mobilization. Overall, conflicts undermine macroeconomic stability and economic growth. However, what happens when armed conflict comes to an end? This Chapter 3 examines economic resilience by investigating the macroeconomic aggregates that drive growth after armed conflicts. One challenge of this study is the complexity of the post-conflict period. On one hand, this period can create favorable conditions for economic recovery, as stability often encourages investment, reconstruction, and institutional strengthening. On the other hand, economic growth can also foster sustained stability in post-conflict settings, as a stronger economy may reduce the likelihood of renewed conflict. This complexity also raises a question of endogeneity due to the potential reverse causality between post-conflict and GDP growth. To address endogeneity, we use the entropy-balancing method. Using a panel data set from 1989 to 2023, we find evidence of a catch-up effect in post-conflict economies. The cumulative impact of growth is estimated at 2 percentage points in the first year, increasing only slightly to 2.5 percentage points by the fifth year. This modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict. Analysis of the transmission channels reveals that investment, consumption, and trade are the primary drivers of recovery during the post-conflict period. These findings remain

robust across alternative specifications, including those that account for conflict intensity, duration, and countries' income groups.

Chapter 1

Effectiveness of Military Spending in Reducing the Intensity of Armed Conflict in Sub-Saharan Africa

This chapter[1] is published in *Oxford Economic Papers*.

Abstract

This study empirically examines the effectiveness of military spending in reducing the intensity of armed conflict in sub-Saharan Africa. We use a dynamic probit model, and the results show that military spending reduces the intensity of conflict. It significantly reduces low-intensity conflicts more than high-intensity conflicts. Additionally, the effectiveness of military spending depends on its level and the quality of institutions. Finally, the analysis of transmission channels shows that military spending affects conflict intensity mainly through the channel of military capabilities. We conducted several tests and robustness checks to ensure the validity of our results.

Keywords: • Effectiveness • military spending • armed conflict

JEL Classification: H56, I30

[1]I am pleased to report that the initial versions of this work were presented at the Workshop on Crisis and Resilience in Developing Countries: A Multidimensional Perspective held at St. Joseph's University in Beirut (2024), as well as at the African Development Bank Group seminar (2025).

1.1 Introduction

In recent decades, the African continent has been characterized by growing insecurity and threats from rebel, terrorist, and jihadist groups. This situation of fragility is much more pronounced in sub-Saharan African countries, which are affected by numerous attacks and threats from armed groups. Insecurity is one of the obstacles to all prospects for socioeconomic development World Bank (2017); Khan et al. (2023). It hinders the smooth movement of goods and people, leading to a slowdown in economic activity. A conflict situation generally affects all macroeconomic aggregates, which is most visible in GDP (Murdoch and Sandler (2002); Bilgel and Karahasan (2019); De Groot et al. (2022). Insecurity reduces the attractiveness of the countries, mainly through the reduction in foreign direct investment, which accounted for an average of 12% of the countries'GDP. The main economic problem with military spending is that it crowds out other public spending. The interest in analysing the effectiveness of military spending is that, to the extent that military spending crowds out public investment spending Ferdi (2021); Ferraz (2022)), the ineffectiveness of military spending in reducing conflict could be a double whammy for a state. Not only does it place an additional burden on the public finances of African countries, which are already highly dependent on external funding, but it also results in low levels of funding for other public expenditures that could reduce the risk of conflict, thereby reducing the intensity of the armed conflict.

Military spending has increased significantly in Sub-Saharan Africa since the 2000s (Figure 1.1,b). The sub-Saharan region is also characterized by the persistent intensity of armed conflicts (Figure 1.1,a). This study analyses the relationship between military expenditure and the intensity of the armed conflict. Our research question is : Is military spending effectively reducing the intensity of armed conflict in Sub-Saharan Africa? In other words, does military spending deliver the region's public good (security)? To answer the research question, we make the following basic assumption : an increase in military spending at the margin should reduce the intensity of armed conflict, given the deterrent effect of such spending. Our assumption is based on the military expenditure demand function theory developed by Smith (1995a, 1989); Brueckner (2003). Security is a public good, and the State's regulatory function is to spend in an insecure situation to maximize the collective good within a constraint of financial resources. In sub-Saharan Africa, security access is currently problematic because of armed conflicts. To satisfy this security need, the State relies mainly on public spending, particularly military spending. By estimating Heckman (1981)'s dynamic probit model, the results show that military

spending reduces the intensity of conflict. It significantly reduces low-intensity conflicts more than high-intensity conflicts. Additionally, the effectiveness of military spending depends on its level and the quality of institutions. Finally, the analysis of transmission channels shows that military spending affects conflict intensity mainly through the channel of military capabilities.

The rest of the study is structured as follows. In Section 2, we review the relevant literature. Section 3 discusses a simple theoretical framework. The stylized facts are presented in Section 4. The data are presented in Section 5. Section 6 discusses descriptive statistics. Section 7 explores the empirical analysis, presents the main results, presents the channel analysis, and presents the heterogeneity analysis. The robustness check of the results is discussed in Section 8. The study ends with a conclusion.

1.2 Literature Review

The literature on military spending is more developed in the countries of the North than in those of the South. This is justified by historical events such as the world wars. However, in African countries, particularly in sub-Saharan Africa, the economic literature has shown little interest in the effectiveness of military spending despite an increase in such spending in recent decades. According to Esteban et al. (2012); Buhaug and Gleditsch (2008); Blattman and Miguel (2010), contemporary armed conflicts are much more common in low-income countries. However, these internal conflicts are much more intense in the sub-Saharan region. The economic literature on conflict is structured in two main models. The first one is the grievance model developed by Collier and Hoeffler (2002a); Collier (2004); Olsson (2007); McGuirk and Nunn (2020); Blattman and Miguel (2010); Jacquemot (2009), emphasizes the quality of institutions, the low level of GDP per capita, religious and ethnic polarization, and inequalities as the main determinants of conflict. The second model is the greed model; conflicts result from the risk of insecurity linked to natural resources (Couttenier and Soubeyran, 2015; Fearon and Laitin, 2003; Berman et al., 2017). The exploitation and increase in world mineral prices impact the probability of conflict mainly through the channel of rebel financing, corruption, and vulnerability to exogenous shocks. Kollias and Tzeremes (2022) construct the Global Militarization Index (GMI) to capture the economic effect of military spending. They find no statistically significant relationship between a country's militarization levels, GDP growth rate, and gross capital formation. Regarding the redistribution, Ghosh (2022)

finds that military spending reduces income inequality. Arezki and Brueckner (2021) find that in countries with high military spending, natural resource rents do not affect the incidence of civil conflict, unlike countries with low military spending. This result refers to the effectiveness of military spending in reducing the incidence of conflict in countries with high mining activity. The analysis is based on the theory that military spending is financed by natural resources, which in turn serve to strengthen the state's ability to fight rebels in countries with low institutional quality. To take account of the endogeneity of military spending, the authors use average military spending as a percentage of total government spending per country. Phillips (2015); Gupta et al. (2004) find that military expenditures increase with external and internal threats. On the one hand, they are qualified as a regional public bad when those of neighbouring countries strongly influence them and do not deter the risk of rebellion. On the other hand, they are described as a compensatory public good when they achieve the objective of security stability. Collier and Hoeffler (2002b) analyse the effectiveness of military expenditures with an econometric model of conflict risk in the world from 1960-1990. The authors use the expenditure burden (ratio of military expenditure to GDP) to measure countries' military expenditure. As for conflicts, they measure them by a binary variable 1 (if there is a conflict in a country i over the study period t) and 0 (otherwise). Collier and Hoeffler (2002b) conclude that the effectiveness of military spending is a function of time. They are effective in periods of conflict, as opposed to the initial period. One of the main limitations of this study is that it does not consider the risks of armed conflict associated with political instability. Due to post-election crises, political instability is a significant determinant of conflict in Sub-Saharan African countries. The post-election crisis is a variation of political violence; it intervenes following the proclamation of the results following the protests of the different political parties. Through the channel of deterrence, Batiffol (1982) analyses the effectiveness of military spending at the microeconomic level through a probabilistic model of the deterrence equilibrium. He shows that the level of military expenditure conditions the effectiveness of deterrence. Deterrence is also a result of the costs and benefits associated with this spending. Khalid et al. (2020) show using a gravity model, the effectiveness of military spending in reducing armed conflict depends on the level of spending and the geographic location of the country on a panel of 188 developing countries over the period 1995 to 2015. In contrast,Batiffol (1982) finds that moderate military spending on a country's security situation is more effective than a high level. Khalid et al. (2020) also show that African and Middle Eastern countries' military burden (ratio of military expenditure to GDP) tends to be much

higher than for Southeast Asian countries. Accounting for heterogeneity in the level of military spending is addressed in the sensitivity analysis of the results. However, the effectiveness of military spending may also be conditional on the quality of institutions. Agostino et al. (2016) shows that such spending is highly subject to corrupt practices. With a low quality of public administration, averaging two on a scale of four, the effectiveness of military spending in SSA countries could be negatively impacted by poor institutional quality. In a related article, Collier and Hoeffler (2002a) examines the effectiveness of military spending according to how it is financed. They show that in low-income countries, aid-funded military spending has no direct effect on conflict risk in the short run. In the long run, conflict risk is reduced by almost 30%. The works on the effectiveness of military spending on the risk of conflict and the effect of military spending on GDP has been widely discussed in the literature.

Despite the abundant literature, very little work has focused on the link between military spending and the intensity of conflicts in sub-Saharan African countries. These countries are consistently characterized by ongoing conflict concurrent with efforts to address conflict. The existing literature mainly uses the static model that does not consider the effect of conflict persistence, which is quite significant for countries already in a situation of armed conflict. This study makes several significant analytical and methodological contributions to the existing literature. To our knowledge, we are the first to address the question of the effectiveness of military spending in reducing the intensity of armed conflict in Sub-Saharan Africa from 2000 to 2020. The study contributes to the literature by accounting for the persistence of armed conflict intensity through a dynamic probit model. This model allows for considering the heterogeneity across countries regarding initial differences in armed conflict intensity. To estimate the dynamic model, the study contributes to the literature using Heckman (1981)'s two-step dynamic probit method. In particular, this method corrects for the potential Nickell (1981) bias, one of the dynamic models' main limitations. The study also contributes to the literature by empirically highlighting the channels (military capability) through which military spending affects the effectiveness of armed conflict.

1.3 A Simple Theoretical Framework

We use the neoclassical defense model based on the economics of military expenditure policy. In the neoclassical model, social welfare is a function of civilian output and

an unobserved variable (security). Security depends on military spending. In this study, we consider a simplified version of the model. The state's role is to maximize social welfare by balancing military spending and its opportunity cost. Hence, the problem of the crowding-out effect of military spending. We use the demand function for the military expenditure of Smith (1995b, 1989); Brueckner (2003). Security is a public good, and the state, in its regulatory function, spends more in a situation of insecurity to maximize the collective good under the constraint of financing resources. The budgetary constraint on a country's military expenditure considers internal and external threats. Military spending can be determined by a country's socioeconomic, political, and strategic position. In various countries in sub-Saharan Africa, access to government services is problematic today because of armed conflicts. In order to satisfy this need, the State relies mainly on public expenditure, particularly military expenditure. To answer the research question, we make the following basic assumption : an increase in military spending at the margin should reduce the intensity of armed conflict, given the deterrent effect of such spending. However, the effectiveness of military spending could be conditioned by structural factors and the quality of institutions. There could be threshold effects or heterogeneity according to the composition of this spending. There could also be a risk of insurgency or putsch due to the level of military spending.

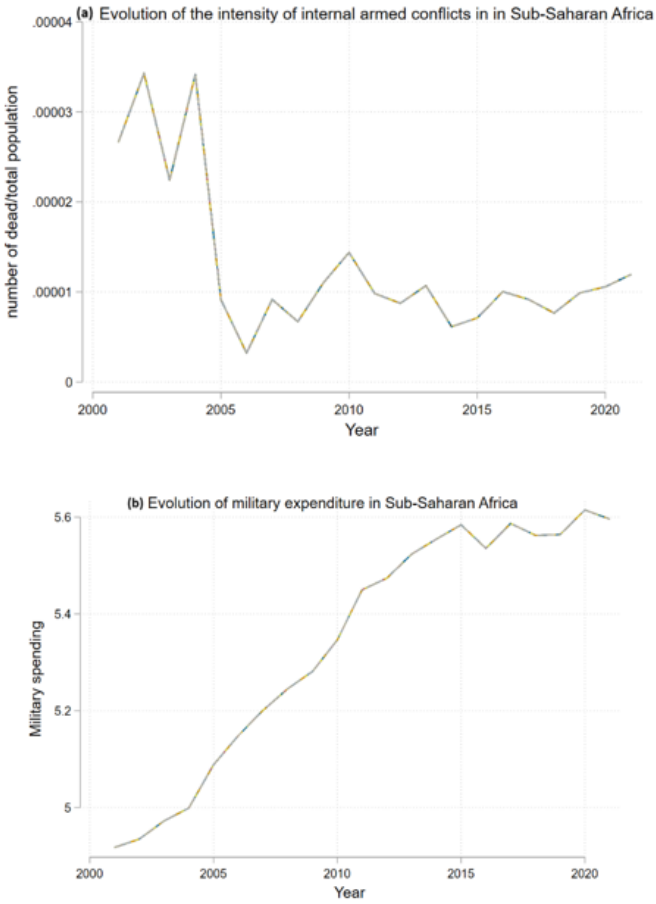
1.4 Stylized facts

In this section, we present stylized facts characterizing the relationship between military expenditure and the intensity of armed conflict over 2000-2020 in Sub-Saharan Africa.

Figure 1.1 (a) shows that between 2000 and 2006, there was a significant decrease in the average intensity of armed conflict. However, from 2007 onwards, there has been a resurgence, and this effect was more pronounced in 2010. Since the 2010s, the intensity of armed conflicts in the region has persisted.

Figure 1.1 (b) presents the average evolution of military spending over the study period (constant USD 2019). This figure shows a remarkable increase in military spending in the various Sub-Saharan African countries. On average, this expenditure represents 2.7% of GDP. However, military spending as a percentage of GDP also declined over the study period. This suggests that the wealth of these countries has increased over the period. This striking fact shows that despite an increase in military spending, it remains low in ratio to GDP.

Figure 1.1: Graph of the intensity of armed conflicts (a); Graph of military expenditure (b)



Source: Author's calculations, UCDP/PRIO data, SIPRI. Conflict intensity is measured by the ratio of deaths from intense conflict to the total population. Military expenditures are measured in constant 2019 US-$ dollars.

From Figure 1.1 (a) et (b), we observe a negative correlation between military expenditure and the intensity of the armed conflict. Over the study period, increased military spending coincides with reducing the intensity of armed conflict in the Sub-Saharan countries. The stylized facts highlight the link between the intensity of armed conflict and military spending in the countries selected in the sample. We find that graphs (a) and (b), over the period 2000-2004, are characterized by increased military spending and high intensity of the armed conflict. Since 2005, there has been a sharp increase in military spending and a decrease in the intensity of armed conflicts in the region. In order to verify the negative link between military expenditure and the intensity of armed conflicts, we proceed with empirical analysis.

1.5 Data

In this section, we explain the choice of the sample, the different data sources, and the variables used in the study.

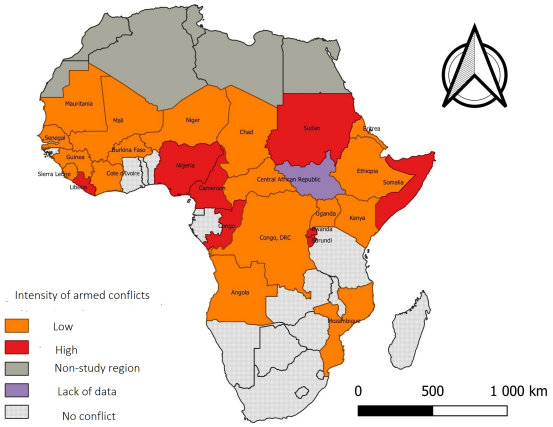


Figure 1.2: Map of armed conflict intensity in sub-Saharan Africa (2000-2020)
Source: Author's calculations, UCDP/PRIO data.

Of the 48 countries in Sub-Saharan Africa, the selected sample consists of 25 countries characterized by intense armed conflict over the study period 2000-2020 (Figure 2). We removed South Sudan from the sample due to data limitations. The remaining 22 countries did not experience intense armed conflict over the study period. To test the robustness of the results, we use all countries (with conflict and without conflict).

The choice of sample is based on the fact that these countries are prone to armed conflict and increased military spending in recent decades (Stylized Facts). One of the justifications for this sample is the persistence of armed conflicts in the different countries. The study period is chosen according to the availability of data and the history of armed conflicts. According to the stylized facts, from the 2000s to the present, Sub-Saharan African countries have been facing increased insecurity and military spending. We use panel data to analyse the effectiveness of military spending in reducing the intensity of the armed conflict. We recognize that armed conflict occurs in a specific region or area within a country during a given period. However, the countries sampled are also characterized by centralized management and a low level of fiscal decentralization. Military expenditures are planned and voted on at the macro level during a fiscal year, so we use the panel dimension (countries, years). Taking into account regional conflict data by country over the study period does not capture the effectiveness of military spending.

The dependent variable of the study is the intensity of the armed conflict. It comes from the UCDP/PRIO database (version 21.1). Armed conflict is defined as a "contested incompatibility involving a government and/or territory using armed force between two groups, at least one of which represents the government armed forces of a country, resulting in at least 25 deaths in a calendar year". In the UCDP/PRIO database, the intensity of armed conflict is coded as 1 (low-intensity armed conflict : between 25 and 999 deaths) and 2 (high-intensity armed conflict : at least 1,000 deaths). In order to facilitate the empirical analysis, to have a disaggregated panel, and to analyse the effectiveness of military expenditure according to the level of conflict intensity, we coded the dependent variable as follows : the intensity of armed conflicts is coded 1 (if there were intense conflicts in the country over a period t, without distinguishing between high and low intensity) and 0 (otherwise). To take into account the effectiveness of the military on low and high-intensity conflicts, we used the following coding : low-intensity conflicts are coded 1 (if there was a low-intensity conflict in a country i over a period t) and 0 (otherwise). High-intensity conflicts are coded as 1 (if there was a high-intensity conflict in the country i over a period t) and 0 (otherwise). According to Ray and Esteban (2017); Freytag et al. (2010), this coding allows considering the heterogeneity dimensions by the conflict intensity level. It also facilitates empirical analysis and interpretation of results.

The variable of interest in the study is the ratio of military expenditure to GDP. Because military expenditure data collected at the country level is problematic due to its reliability and availability, we use data from the Stockholm International Peace Research Institute (SIPRI). SIPRI has a more focused definition of military spending, considering all current and capital military expenditures. To our knowledge, it is the most comprehensive database on military expenditure in the world, covering the time dimension of the study. The advantage of using the ratio of military expenditure to GDP is that it captures the level of military expenditure by country wealth (Collier and Hoeffler, 2002b).

Given the multiplicity of variables causing armed conflict, the choice of control variables was made based on the existing literature on the determinants of armed conflict (Collier and Hoeffler, 2002b; Jacquemot, 2009; Desli and Gkoulgkoutsika, 2020; Berman et al., 2017). We use the following controls in the baseline model : per capita GDP growth, government quality, political stability, labor force to total population ratio, poverty incidence, climate shocks, and population density. The variable GDP/capita growth is measured at the annual level. It represents the growth of the country's wealth per capita. The quality of the government variable is

an index between 2 (low) and 4 (high). The political stability variable is between 2 and 8; the higher the index, the more stable the region. The WDI database provides the calculation of climate shocks. The calculation is based on the floods, drought, and temperature rise shocks. The population density is the ratio of the total population to the total area of the different countries over the study period. To measure monetary poverty, we took the national poverty incidence at a threshold of $1.90 per person per day. It ranges from 0% to 100%. In the rest of the study, in the sensitivity analysis section, we add additional controls to check the robustness of the model. The list of all the variables' sources is detailed in the appendix(Table A10).

1.6 Descriptive statistics

The statistics for the different variables are presented in Table 1.1. This table gives us an overview of the variables used in the study.

Table 1.1: Descriptive statistics

Variables	Obs	Nbs	Mean	Std. Dev.	Min	Max
Intensity armed conflicts	525	195	.371	.484	0	1
Low-intensity armed conflicts	525	150	.286	.452	0	1
High-intensity armed conflicts	525	45	.086	.28	0	1
Dead numbers	195		597.662	817.071	25	4780
Military expenditure/GDP	525		2.622	4.062	.22	32.656
GDP growth per capita	525		1.694	4.852	-36.557	28.676
Quality public administrations	525		2.807	.471	2	4
Political stability	525		5.512	1.676	2	8
Activpop/totalpop	525		.375	.073	.179	.51
Climate shocks	525		2.094	2.261	.001	7.525
Population density	525		70.498	94.899	2.552	491.732
Poverty Index	525		49.722	20.135	6	94.3

Source : Calcul de l'auteur.

The descriptive statistics table's first result is that the coding of the dependent variable was correctly carried out. The sum of low and high-intensity conflicts equals the total of intense conflicts. During the studied period, 195 intense armed conflicts occurred in 25 countries, i.e., 40% of the sample. The finding is that there are more low-intensity conflicts than high-intensity conflicts, 150 and 45, respectively. This corroborates the graphical analysis in the stylized facts (Figure 1 (a)). Armed conflicts in Sub-Saharan Africa are frequent, with an average intensity rating of 37 out of 100. This frequency is more pronounced in low-intensity conflicts 29% than in high-intensity conflicts 9%. Between 2000 and 2020, intense armed conflicts in the region resulted in a total of 597 deaths on average.

The variable of interest, the ratio of military expenditure to GDP (military burden), averages 2.7% over 2000-2020 in the 25 countries selected in the sample. We note heterogeneity across countries in terms of the military burden. There is a large dispersion around the mean, with a high standard deviation. An analysis of heterogeneity according to the level of the military burden ratio will be discussed in the robustness check section. With the climate of insecurity, we note that, on average, GDP/capita growth is 1.7% over the period. This growth rate varies considerably from country to country. This low GDP/capita growth is consistent with the low ratio of the working population to the total population, i.e., 37%, and a high incidence of poverty, on average 49%. However, the low labor force to total population ratio may also reflect the informal nature of the economy in Sub-Saharan Africa. The population density remains very low compared to the world average (70 inhabitants/km^2). The large size of the region could explain this. With a weak presence of the state over the extent of the territories, the quality of public administration has remained low in the region; this is one of the causes of armed conflicts Jacquemot (2009). Agostino et al. (2016) highlight that military spending is subject to corruption in developing countries because of the low quality of institutions. Beyond the quality of institutions, armed conflict is driven by post-election crises. The region has low political stability, averaging 5 on a scale of 8. The region is vulnerable to the consequences of climate change, recording an average of 2 climate shocks on a scale of 7. These shocks are of the following types : drought, flooding, and extreme temperature variation.

Table A1 (see appendix) shows the correlation between the different variables. The results of this table converge with those of the graphical analysis. A negative correlation exists between the intensity of armed conflict and the ratio of military expenditure to GDP. Thus, an increase in the military burden coincides with a

decrease in the intensity of armed conflict over the study period in the countries in the sample, with a significance level of 10%. This correlation of about 8% is relatively weak but not negligible. The negative correlation between military spending and conflict is also verified by Phillips (2015); Gupta et al. (2004). We find a negative correlation between the intensity of armed conflict and GDP per capita growth, government quality, and the labor force ratio to the total population. Armed conflict intensity positively correlates with climatic shocks and population density. According to Granger's law, not every correlation leads to causality. Hence, there is a need to empirically test the causal effect of military expenditure on the intensity of the armed conflict.

1.7 Empirical analysis

To measure the effectiveness of military spending in reducing the intensity of armed conflict, we use the following basic specification, represented by equation (1.1).

$$inten\_confl_{it} = \beta 1 milex\_gdp_{it} + \sum_{1}^{N} \beta_{hit} X_{hit} + \epsilon_{it} \tag{1.1}$$

The dependent variable $inten\_confl_{it}$ is a binary variable coded 1 (if there were intense armed conflicts in a country i over a period t, without distinction of high or low intensity) and 0 (otherwise). The variable of interest $milex\_gdp_{it}$ is the ratio of military expenditure to GDP. X_{hit} represents the vector of control variables. β represents the different associated coefficients of the observable explanatory variables. $epsilon_{it}$ represents the error term. Given the qualitative nature of the dependent variable, the preferred estimation method for estimating equation (1.1) is the probit model. Compared to the linear probability method and the logit model, the probit model is the most effective and efficient in estimating the qualitative model. It is conditional on the respect of the assumptions on the morality of the residuals.

The main threat to identification could be the endogeneity problem due to the potential simultaneity bias between the dependent variable and the variable of interest. Military expenditure may affect the intensity of armed conflict; the reverse may also be true: in a situation characterized by high instability, the state may

put more effort into military expenditure. In this case, the level of conflict would also explain the level of military expenditure. The article by Feridun and Shahbaz (2010); Collier and Hoeffler (2002b) raises the same endogeneity problem. To correct the endogeneity problem, we use the instrumental variable method. The instrument used is the lag of the ratio of military spending to GDP. The choice of the instrument is justified concerning the rank and homogeneity criteria. This instrument has been validated by Asongu and Amankwah-Amoah (2018); Collier and Hoeffler (2002a,b); Asongu et al. (2020). Using the instrument helps avoid a bias of double causality between military spending and the intensity of armed conflicts.

Since the 2000s, Sub-Saharan African countries have been subject to intense armed conflict. To account for the persistence of conflict over time, we lag the dependent variable ($inten\_confl_{it}$) among the explanatory variables in the baseline model. We assume that intense armed conflicts depend on their past.

$$inten\_confl_{it} = \gamma inten\_confl_{it-1} + \beta 1 milex\_gdp_{it} + \sum_{1}^{N} \beta_{hit} X_{hit} + \epsilon_{it} \quad (1.2)$$

γ is the real parameter. It allows us to consider heterogeneity in terms of the initial condition of the intensity of armed conflict across countries. Considering the persistence of the intensity of armed conflicts allows us to move from a static model to a dynamic one. To estimate the dynamic model, the simple probit estimation method has limitations, given the correlation between the lag of the dependent variable and the fixed effects in the error term (Nickell, 1981). To consider this bias in the estimation method, the econometric literature extensively references the significant works of Heckman (1981); Wooldridge (2005). We prefer the estimation method of Heckman (1981). This method suggests an approximation to the reduced form of the marginal probability. It is less subject to Nickell (1981) bias, requires fewer data, and is more accurate than Wooldridge (2005). The Heckman (1981) method is a system of equations consisting of a selection equation and an outcome equation. The selection equation consists of the control variables, including the lag of the variable of interest. The outcome equation consists of the variable of interest and the normalized residual of the selection equation to account for the Nickell

(1981) bias. Heterogeneity in the intensity of armed conflict between countries could threaten identification. However, using dynamics in the model allows this heterogeneity to be considered.

Unlike the linear model, the coefficients after the Probit model estimates are not directly interpretable. They can be interpreted in terms of marginal effects. The parameters' sign and significance indicate the explanatory variables' impact on the probability of observing the dependent achievement. The relevance of the identification strategy is verified in the sensitivity analysis.

1.7.1 Main results

Table 1.2: Main results

	(1)	(2)	(3)	(4)
		Dynamic Probit		
	Static Probit	Pooled	Wooldridge	Heckman
Variable: Intensity armed conflicts				
L.intensity armed conflicts		1.860***	1.700***	1.909***
		(0.151)	(0.179)	(0.151)
l.intensity armed conflicts			0.218	
			(0.222)	
Military expenditure/GDP$_{t-1}$	-0.116***	-0.073**	-0.078**	-0.012***
	(0.026)	(0.029)	(0.035)	(0.003)
GDP growth per capita	-0.021	-0.022	-0.029*	-0.016
	(0.013)	(0.015)	(0.016)	(0.014)
Quality public institutions	-0.360**	-0.186	-0.153	-0.185
	(0.155)	(0.178)	(0.222)	(0.180)
Poverty index	0.453***	0.262***	0.278***	0.165**
	(0.067)	(0.080)	(0.102)	(0.065)
Political stability	0.043	0.055	0.042	0.099**
	(0.043)	(0.051)	(0.056)	(0.045)
Activepop/ totalpop	-3.065***	-2.009*	-2.496	-2.803**
	(1.023)	(1.200)	(1.597)	(1.089)
Climate shocks	0.178***	0.130***	0.152***	0.093***
	(0.031)	(0.037)	(0.050)	(0.031)
Population density	0.003***	0.002*	0.002	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Average x			X	
Constant	-3.359***	-3.048***	-3.123**	-2.162**
	(0.825)	(0.969)	(1.220)	(0.877)
Observations	525	500	500	500

Data from UCDP/PRIO, SIPRI, WDI. Column 1 is estimated using the static probit method. Columns 2 to 4 are estimated using the dynamic probit method. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 1.2 presents the study's main results through static and dynamic panel estimation. We find that the direction of causality of the coefficient of the variable of interest (military spending/GDP) is negative and significant in the different columns of Table 1.2. The negative sign confirms the presumption of negative causality of military spending on the intensity of armed conflict discussed in the correlation analysis (Appendix Table A1). This result shows that military spending effectively reduces the intensity of armed conflict over the study period. The primary hypothesis put forward at the beginning of the study is confirmed : an increase in military spending at the margin effectively reduces the intensity of the armed conflict. The results of the different specifications (static and dynamic) converge in the same direction.

Column 1 of Table 1.2 shows the results of the static model equation (1.1). An average increase in military spending/GDP of 1% decreases the probability of armed conflict intensity by 0.11 percentage points. This column also serves as a robustness check for the effect of military spending in a dynamic model. Given the persistence of armed conflict intensity in the region, we analyse the effectiveness of military spending in a dynamic model. The specification of equation (1.2) allows us to estimate the dynamic model. Given the Nickell (1981) bias discussed in the identification strategy, we use different methods to ensure the quality of the estimation of equation (1.2). Columns 2 to 4 show the results of the dynamic model. We can see that the intensity of an armed conflict depends on its past. Military spending also remains effective in the dynamic model with a smaller magnitude than in the static model.

Column 2 of Table 1.2 is estimated by the pooled dynamic probit model. On average, an increase in the military burden decreases the probability of conflict intensity by 0.073 percentage points at the 5% threshold. The average marginal effect of armed conflict intensity in period t 1 increases the probability of conflict intensity in period t by 1.8 percentage points.

In column 3, we use the estimation method of Wooldridge (2005). This method uses a Mundlak (1978)'s solution, adding the mean of the explanatory variables to the controls to the model. In addition to the lag of the dependent variable, this method also considers the initial condition in the model's dependent variable among the explanatory variables. An average increase in the military spending/GDP of 1% decreases the probability of conflict intensity by 0.078 percentage points. The intensity of armed conflicts depends on their past, i.e., an average marginal effect of

intense conflicts in period t1 increases the probability of conflict intensity in period t by 1.7 percentage points.

Unlike columns 2 and 3, column 4 presents the results of the Heckman (1981) estimation method. On average, a 1% increase in military spending/GDP ratio decreases the probability of armed conflict intensity by 0.012 percentage points at the 1% threshold. As discussed in the econometric literature, the Heckman (1981) estimation method is more effective in correcting the Nickell (1981) bias in a dynamic discrete model. The magnitude of the coefficient on the variable of interest is smaller than those in the other columns 2 and 3. Similarly, the lag of the dependent variable has a more significant coefficient than columns 2 and 3. We prefer the Heckman (1981) dynamic probit in the rest of the study.

Compared to the results of the dynamic probit model, we can deduce that the effectiveness of military spending is overestimated in the static model because of the failure to consider the initial difference in the intensity of armed conflict between countries. In the static model, on average, an increase in the ratio of military expenditure to GDP of 1% decreases the probability of armed conflict intensity by 0.11 percentage points. As for the dynamic model considering the persistence of armed conflicts, on average, a 1% increase in the military expenditure/GDP ratio decreases the probability of the intensity of armed conflicts by 0.012 percentage points.

The results in table 1.2 corroborate the economic literature on the determinants of conflict in low-income countries (Buhaug and Gleditsch, 2008; Esteban et al., 2012). Degraded socioeconomic status is a significant determinant of armed conflict in low-income countries. This analysis shows that GDP/capita growth is statistically insignificant in determining conflict intensity. Sub-Saharan African countries, already affected by multiple socioeconomic crises, need help creating sufficient wealth, which could explain nominal GDP/capita growth. One of the explanations could also be the high level of the Gini index, which averages more than 47% inequality in income distribution over the study period.

The Sub-Saharan African region has the lowest quality of institutions in the world. This can affect not only its spending allocation but also its effectiveness. According to our findings, intense armed conflicts generally occur in countries where the quality of institutions remains very low. This finding is confirmed by Buhaug and Gleditsch (2008). State failure at the institutional level is one of the causes of armed conflict in developing countries. The results show that, on average, an increase in the quality

of institutions decreases the probability of the intensity of armed conflict by 0.37 percentage points, with a significance level of 5%. This result is consistent with the prevailing reality in the region. Political stability has a positive and significant impact on the intensity of armed conflict, i.e., 0.099 percentage points. This result could be explained by the resurgence of rebel groups against democratically elected regimes in sub-Saharan Africa.

Beyond the poor quality of institutions, climate shocks have been widely discussed in the literature as a cause of armed conflict through the shock income loss channel McGuirk and Nunn (2020). The region, being prey to the consequences of climate change, is the victim of shocks, such as floods, drought, and rising temperatures. In the sub-Saharan context, the climate factor is not negligible in the probability of incidence of armed conflicts. On average, an increase in climate shocks increases the probability of the intensity of armed conflict by 0.18 percentage points at the 5% threshold. Like climate shocks, poverty also increases the probability of armed conflict intensity by 0.18 percentage points on average. Similarly, an increase in the labor force could reduce the intensity of armed conflict at the 1% threshold.

In addition to socio-economic and climatic factors, demographic and geographic factors are captured by population density. Population density increases the probability of armed conflict intensity by 0.21 percentage points at the 1% threshold. An increase in population in different regions of a country could lead to social fractionalization. According to Fearon and Laitin (2003); Collier and Hoeffler (2002a); Berman et al. (2017) ethnic and religious groups are partly at the origin of armed conflicts. However, to a lesser extent, the perfect illustration of this result is the case of Nigeria, which is characterized by a high population density and a high intensity of armed conflict over the study period.

1.7.2 Channels

The analysis of transmission channels allows us to know through which means military spending reduces the intensity of armed conflict in Sub-Saharan African countries. The literature points to the military capability channel as the primary channel through which such spending reduces the intensity of the armed conflict. High military capacity deters armed groups from reducing the intensity of the conflict. We measure military capacity by the ratio of the total number of armed forces to the total population.

In order to test this channel empirically, we will first implement a Pearson cor-

relation analysis (Appendix Table A2). The Pearson correlation shows us that military capability is strongly and positively correlated with military spending, i.e., a correlation of 97%. Similarly, military capability is negatively correlated with intense armed conflict. To confirm the causal effect of the channel, we conduct uni-variate regressions (Appendix Table A3). Column 1 of Table A3 shows that military spending effectively reduces the intensity of the armed conflict. However, by regressing military expenditure on military capacity, column 2 shows that military expenditure leads to increased military capacity. All else being equal, a 1% increase in the ratio of military expenditure to GDP leads to an increase in military capability of about 0.3%. In column 3, we find that military capability decreases the intensity of armed conflict, on average, by 23 percentage points at the 1% threshold. Military capability is a deterrent to reducing the intensity of the armed conflict. Through this result, we can conclude that military spending acts through the military capability channel to reduce the intensity of armed conflict in Sub-Saharan Africa.

1.7.3 Heterogeneity Analysis

The heterogeneity analysis is based primarily on the ratio of military expenditure to GDP, the quality of institutions, the geography of countries, and the intensity of armed conflict. The underlying assumption is that the effectiveness of military spending in reducing armed conflict could be conditioned on the different dimensions of heterogeneity.

To facilitate the analysis, we first classify countries into two categories (low and high) according to the level of the ratio of military expenditure to GDP and the quality of institutions. This classification is made based on descriptive statistics. Second, to account for heterogeneity in terms of geography, we base our classification on the geographic location of countries. Since Sahelian countries are much more characterized by intense conflict, we analyse the effectiveness of military spending on countries in the Sahelian belt. We also consider all countries (with and without conflict). Third, we analyse the effectiveness of spending in reducing the level (low, high) of the intensity of the armed conflict.

The heterogeneity analysis shows that the effectiveness of military spending depends on its ratio to GDP (Appendix Table A6, columns 1 and 2). The higher the military expenditure ratio, the more effective it is in reducing the intensity of armed conflict, and the lower it is, the less effective it is. This result corroborates with the work of Khalid et al. (2020).

The quality of institutions also conditions the effectiveness of military spending. For Agostino et al. (2016), military spending is subject to corruption practices. It is less effective in the face of low-quality institutions. The results in (Appendix Table A6, columns 3 and 4) show some homogeneity across SSA countries regarding institutional quality. Despite increased spending, its effectiveness depends on the institutional framework.

Taking into account the sample of Sahelian countries (Appendix Table A8), we find that military spending is effective; on average, an increase in the ratio of military spending to GDP decreases the probability of intense conflict by 0.007 percentage points in Sahelian countries. We conducted robustness tests on all countries (Appendix Table **??**). Military spending reduces the intensity of conflict in conflict-affected countries and the risk of conflict in non-conflict countries. The results show that the sample size does not affect the results.

Table A7 in Appendix presents the effectiveness of military spending in reducing low- and high-intensity armed conflict. We find that the direction of causality of the different variables remains unchanged. On average, a one percent increase in the ratio of military spending to GDP decreases the probability of low- and high-intensity armed conflict by 0.01 and 0.007 percentage points, respectively. This result shows that military spending is more effective in reducing the intensity of low-intensity conflicts than high-intensity conflicts.

Aggregate military spending does not target a specific level of armed conflict intensity. They are allocated to meet the need for security in general. An essential dimension of heterogeneity to analyse would be the composition of military spending. However, data on the composition of such expenditures remain difficult to access because of the sensitivity of the military domain.

1.8 Robustness Check

In this section, we will test the robustness of the main results in order to verify their validity in different circumstances.

1.8.1 Adding Additional Control Variables

Given the multiplicity of conflict determinants in Sub-Saharan African countries, this subsection adds additional controls to the basic model. We add variables such as the Gini index, ethnic tensions, religious tensions, and political regimes. The

literature review justifies the choices of these control variables.

The Gini index is derived from the World Inequality Database (WID) and measures income inequality. The Gini Index indicates the situation in which the distribution of household income deviates from the uniform distribution. The Gini coefficient ranges from 0 (for a situation of no inequality) to 100 (for a perfectly unequal society). This index measures the impact of income inequality on the intensity of the armed conflict. The data on religious and ethnic tensions are taken from the International Country Risk Guide (ICRG). It assesses the degree of religious and ethnic tensions within a country. The scores range from 0 to 6. High tensions characterize countries with low scores, and low tensions over the period characterize high-score countries. The Polity IV database provides data on the political regime variable. They are calculated from the combination of the autocracy score and the democracy score over the period. With a scale between +10 (highly democratic) and -10 (highly autocratic), this variable captures the impact of the political regime on the intensity of the armed conflict.

The model remains robust to the addition of additional controls. The variable of interest remains negative and significant in the individual columns of A4 in Appendix. Adding the additional control variables does not impact the results.

In this study, income inequality determines armed conflict in Sub-Saharan Africa. On average, a 1% increase in the Gini index increases the probability of armed conflict intensity by 5.7 percentage points, with significance at the 1% threshold. Sub-Saharan Africa is a region of multiple ethnic and religious diversities. These diversities can be sources of conflict, as previously discussed in the literature Montalvo and Reynal-Querol (2005); Collier and Hoeffler (2002b); Fearon and Laitin (2003). Unlike this study, we consider religious and ethnic tensions in determining the intensity of the armed conflict. On average, an increase in religious and ethnic tension increases the intensity of armed conflict by 0.12 and 0.11 percentage points, respectively.

1.8.2 Alternative Measure of the Intensity of Armed Conflict

In this subsection of the robustness analysis, we use an alternative measure of the intensity of the armed conflict. The alternative measure is the number of deaths following intense armed conflict. This measure has also been used by Ray and Esteban (2017); Freytag et al. (2010).

To account for heterogeneity across countries regarding conflict deaths, we use the

ratio of deaths to intense armed conflicts to the total population as the dependent variable. This proxy allows us to move from a discrete to a continuous model to estimate the two equations (Appendix Table A5).

The ratio of the number of deaths/total population is the dependent variable to estimate equation (2). The GMM conditions are closely followed because there is a slight difference between the time dimension T =21 and the individual dimension N =25. We prefer the bias corrected the least squares (LSDVC) estimation method, suitable for a small gap between N and T Bruno (2005). We have the same finding as in the dynamic discrete model; results are converged with columns 2 to 4 of Table 2. After administering the Hausman test, we focused on the random effect model to estimate the static model equation (1). The results are consistent with those in column 1 of Table 1.2.

The robustness check shows a rather remarkable empirical contribution. Using the binary dependent variable coded 1 (if intense conflicts in a country i over a period t) and 0 (otherwise) converges with the quantitative variable, the ratio of deaths in intense armed conflicts to the total population. This convergence is verified in both the static and dynamic models. The robustness analysis also allows us to guard against possible measurement errors. We note that military spending is still effective in reducing the intensity of the armed conflict.

1.9 Conclusion

This study analyses the effectiveness of military spending in reducing the intensity of armed conflict in sub-Saharan Africa. The results show that military spending effectively reduces the intensity of the armed conflict. The effectiveness of military spending is valid in both a static and dynamic model. Indeed, we have moved from a simple probit base model to a dynamic model, given the persistence of armed conflict intensity in the region. Controls and sensitivity tests show that this result is robust under different alternative specifications. The robustness analysis shows that the ratio of deaths to the total population is a relevant proxy for measuring the intensity of the armed conflict. The intensity of conflicts depends on their past; the climate of insecurity is favorable to the intensification of conflicts. We also find that military spending is more effective in the static than the dynamic model. This could be explained by the failure to account for the initial difference in the level of conflict intensity between countries in the static model. Military spending affects conflict primarily through the channel of military capability, which serves as

a deterrent to reduce conflict intensity. Through the heterogeneity analysis, we find that the effectiveness of military spending depends strongly on the ratio of military spending to GDP and the quality of institutions. Military spending is more effective in reducing low-intensity conflicts than high-intensity conflicts.

The study contributes to the literature on the effectiveness of military spending in reducing the intensity of armed conflict in sub-Saharan Africa. This study recommends a good balance between military and investment spending to ensure the continuity of development projects. This makes it possible to fight against the key determinants of conflicts, such as poverty and unemployment in sub-Saharan Africa. Beyond military spending, improved socioeconomic conditions, strong resilience to the consequences of climate change, and a stable political and institutional framework could reduce armed conflict activities.

The internal validity of the study is verified through the analysis of heterogeneity. The question we ask is about the external validity of the study. Replication of the study in another region characterized by conflict could confirm or deny the external validity.

A Appendix

A.1 Channels

Table A1: Correlations between variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Intensity armed conflicts	1.000						
(2) Military expenditure/GDP	-0.079*	1.000					
(3) GDPgrowth per capita	-0.013	-0.069	1.000				
(4) Quality public institutions	-0.082*	-0.032	0.170*	1.000			
(5) Activepop/totalpop	-0.132*	0.269*	0.004	0.305*	1.000		
(6) Climate shocks	0.092*	0.454*	0.029	0.105*	0.118*	1.000	
(7) Population density	0.164*	-0.109*	0.056	0.299*	0.312*	-0.143*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Table A2: Pearson correlation

Variables	(1)	(2)	(3)
(1) Intensity armed conflicts	1.000		
(2) Military expenditure/GDP	-0.079*	1.000	
(3) Military capacity	-0.108*	0.967*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Table A3: Transmission channel

	(1)	(2)	(3)
VARIABLES	Inten_confl	Military capacity	Inten_confl
Military expenditure/GDP	-0.0686***	0.00272***	
	(0.016)	(0.000)	
Military capacity			-23.98***
			(6.208)
Observations	525	525	525

A.2 Robusness check

Table A4: Additional controls

	(1)	(2)	(3)	(4)
	Heckman	Heckman	Heckman	Heckman
L. Intensity armed conflicts	1.850***	1.853***	1.868***	1.881***
	(0.152)	(0.152)	(0.152)	(0.151)
Military expenditure/GDP	-0.011***	-0.011***	-0.008**	-0.008***
	(0.003)	(0.003)	(0.003)	(0.003)
GDP growth per capita	-0.019	-0.018	-0.020	-0.018
	(0.015)	(0.015)	(0.015)	(0.015)
Quality public institutions	-0.118	-0.138	-0.223	-0.247
	(0.196)	(0.184)	(0.185)	(0.185)
Poverty Index	0.112*	0.107	0.223***	0.206***
	(0.067)	(0.066)	(0.068)	(0.065)
Political stability	0.102**	0.099**	0.050	0.052
	(0.047)	(0.045)	(0.048)	(0.048)
Active pop./Total pop.	-2.308**	-2.365**	-4.023***	-3.394***
	(1.121)	(1.129)	(1.197)	(1.137)
Climate shocks	0.105***	0.105***	0.130***	0.122***
	(0.031)	(0.031)	(0.034)	(0.033)
Population density	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Political system	-0.001			
	(0.003)			
Gini index		3.945**		
		(1.577)		
Religious tensions			0.141***	
			(0.052)	
Ethnic tensions				0.154***
				(0.059)
Constant	-4.514***	-4.348***	-2.465***	-2.397***
	(1.334)	(1.261)	(0.910)	(0.896)
Observations	500	500	500	500

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Alternative Measure of the Intensity of Armed Conflict

	(1)	(2)
	Static model	Dynamic model
	Random effects	LSDVCV
Variable	Deaths/pop	Deaths/pop
L.Deaths/pop		0.305***
		(0.007)
Military expenditure/GDP	-2.47e-06**	-2.30e-06**
	(0.000)	(0.000)
GDPgrowth per capita	-1.81e-06***	-1.82e-06***
	(0.000)	(0.000)
Quality public institutions	4.64e-06	1.29e-05***
	(0.000)	(0.000)
Poverty Index	7.82e-06***	1.84e-05***
	(0.000)	(0.000)
Political stability	-5.04e-06***	-1.87e-07
	(0.000)	(0.000)
Budget Management Index	-8.98e-06*	-9.96e-06*
	(0.000)	(0.000)
Activepop/totalpop	-0.000110**	-0.000151
	(0.000)	(0.000)
Population density	6.24e-10	-2.55e-07***
	(0.000)	(0.000)
Observations	500	500

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

A.3 Heterogeneity

Table A6: Heterogeneity Analysis

	(1)	(2)	(3)	(4)
	Heckman	Heckman	Heckman	Heckman
Variable : intensity armed conflicts	Low milex	High milex	Low institu	High institu
L.intensity armed conflicts	1.852***	1.940***	1.619***	1.952***
	(0.191)	(0.260)	(0.236)	(0.207)
Military expenditure/GDP	-0.070	-0.007*	-0.008**	-0.009*
	(0.051)	(0.004)	(0.003)	(0.005)
GDPgrowth per capita	-0.022	-0.014	-0.036**	-0.018
	(0.019)	(0.024)	(0.018)	(0.021)
Quality public institutions	-0.202	-0.185	0.553	-0.022
	(0.220)	(0.470)	(0.596)	(0.463)
Poverty Index	0.184**	0.297**	0.197**	0.164
	(0.088)	(0.127)	(0.081)	(0.111)
Political stability	0.071	0.111	-0.027	0.178***
	(0.055)	(0.095)	(0.073)	(0.063)
Activepop/totalpop	-2.187*	-4.863**	-7.338***	1.135
	(1.325)	(1.931)	(1.808)	(1.908)
Climate shocks	0.127***	0.033	0.086	0.053
	(0.039)	(0.060)	(0.056)	(0.043)
Population density	0.002**	0.002	0.001	0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Constant	-2.417**	-2.741	-1.693	-4.585**
	(1.033)	(2.355)	(1.582)	(1.792)
Observations	332	168	219	281

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A7: Heterogeneity (level of intensity of armed conflicts)

	(1)	(3)
	Heckman	
VARIABLES	Low intensity	High intensity
L.intensity armed conflicts	1.469***	1.646***
	(0.143)	(0.280)
Military expenditure/GDP	-0.010***	-0.007***
	(0.003)	(0.002)
GDP growth per capita	-0.004	-0.055*
	(0.014)	(0.029)
Quality public institutions	-0.082	0.246
	(0.166)	(0.276)
Poverty index	0.115*	0.472***
	(0.060)	(0.122)
Political stability	0.083*	-0.147*
	(0.044)	(0.076)
Activepop/ totalpop	-0.024	-11.167***
	(1.019)	(1.662)
Climate shocks	0.058**	0.096*
	(0.029)	(0.056)
Population density	0.001	0.005***
	(0.001)	(0.001)
Constant	-2.706***	-3.374**
	(0.843)	(1.649)
Observations	500	500

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A8: Heterogeneity (Sahel countries)

	(1)	(2)
	Sahel countries	
	Static Probit	Dynamic Probit
Variable: Intensity armed conflicts		
L.Intensity armed conflicts		1.856***
		(0.217)
Military expenditure/GDP	-0.156***	-0.007*
	(0.035)	(0.004)
GDPgrowth per capita	-0.012	-0.003
	(0.023)	(0.029)
Quality public institution	-1.371***	-0.832***
	(0.264)	(0.314)
Poverty Index	0.485***	0.008
	(0.128)	(0.116)
Political stability	0.215***	0.162**
	(0.076)	(0.081)
Activepop/totalpop	0.964	-0.277
	(1.562)	(1.440)
Climate shocks	0.124**	0.032
	(0.048)	(0.047)
Population density	-0.004	0.002
	(0.003)	(0.004)
Constant	-2.449*	0.387
	(1.451)	(1.499)
Observations	240	240

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A9: Determinants of conflict risk and intensity

	(1)	**(2)**
	Countries without conflicts	Countries in conflict
VARIABLES	Risk of conflict	Intensity of armed conflicts
L.Risk of conflict	0.848***	
	(0.018)	
L.Intensity of armed conflicts		1.909***
		(0.151)
Military expenditure/GDP	-0.072***	-0.012***
	(0.023)	(0.003)
Constant	1.202***	-2.162**
	(0.297)	(0.877)
Observations	963	500

Table A10: Variables, definitions and sources

Variable	Explanation	Source
Intensity of internal armed conflicts	Contested incompatibility concerning government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in a calendar year.	UCDP/PRIO
Low-intensity armed conflicts	Between 25 and 999 battle-related deaths in a given year.	UCDP/PRIO
High-intensity armed conflicts	At least 1,000 battle-related deaths in a given year.	UCDP/PRIO
Military expenditure/GDP	Military expenditure includes all current and capital military expenditure as a ratio of GDP, including peacekeeping forces; defense ministries and other government agencies engaged in defense projects.	SIPRI
GDP growth per capita	GDP per capita is gross domestic product divided by midyear population (constant 2015 US$).	WDI
Quality public administrations	Captures perceptions of the quality of public services, the quality of the civil service and its independence from political pressures.	WDI
Poverty index	Poverty headcount ratio at $1.90 a day (2011 PPP), % of population.	WDI
Political stability	Perceptions of the likelihood of political instability.	WDI
Climate shocks	Includes floods, droughts, and temperature rise shocks.	WDI
Population density	Midyear population divided by land area in km^2.	WDI
Natural resources/GDP	Sum of oil, natural gas, coal, mineral, and forest rents as % of GDP.	WDI
Political system	Political regime variable combining autocracy and democracy scores.	Polity IV
Gini index	Measures inequality in income or consumption distribution (0 = equality, 100 = inequality).	WID
Religious tensions	Degree to which one religion dominates governance/society, seeks to impose religious law, or suppresses religious freedom.	ICRG
Ethnic tensions	Assessment of tensions due to racial, nationality, or language divisions. Lower ratings = higher tensions.	ICRG

Chapter 2

Political Fragility: The Economic Impact of Coups d'État

This chapter[1] was co-written with Luc Tucker[2]. It is an *IMF Working Paper*.

Abstract

This study uses an entropy balancing model to show that coups d'état can reduce GDP growth by around 2.3 percentage points in the same year, with a persistent impact over time. There is also tentative evidence to suggest that successful coups have larger economic impacts than unsuccessful coups, and that the effects are larger for low-income countries, including those in sub-Saharan Africa. Coups are found to affect private consumption and investment, but there is little evidence of an impact on monetary or fiscal indicators. Finally, economic sanctions imposed after coups are found to be an important reason for lower growth.

Keywords: • Fragility • Drivers of fragility • Coup d'État

JEL Classification: D74, P48,O10, O43.

[1]This paper was presented to the International Monetary Fund at a seminar organized by the African Department.

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2.1 Introduction

Finding the formula for growth in low-income countries (LICs) has been a longstanding goal in development economics. Questions about how LICs should pursue greater prosperity dominate many academic and policy-making debates. One frequently cited barrier to growth is political instability, and many researchers have argued that establishing such stability is a necessary condition for achieving sustainable growth (Boly and Sawadogo, 2024; Alesina et al., 1996). Political instability can take many forms, but irregular and unconstitutional changes in government—coups d'état—are one manifestation. It is therefore crucial to understand to what extent coups affect economic outcomes including GDP growth, and how they do so.

The increasing prevalence of coups in recent years, particularly in sub-Saharan Africa, has led to increased interest in this area of research, as well as a wealth of new observations and case studies for empirical work. Coups are generally found to have a negative impact on the economy via a number of channels, but the estimated effects are far from uniform. In particular, the impact is found to depend both on the nature of the coup as well as the characteristics of the country in question.

This study makes a number of new contributions to this area of literature, by deepening the understanding of how coups affect GDP growth. While some previous research has found that coups can have an important impact on growth in the short term, other studies find smaller effects. There is also less understanding of the longer-term impacts. In this analysis, coups are found to be associated with lower GDP growth by around 2.3 percentage points in the same year. The effect is also found to be persistent so that cumulative GDP growth over the subsequent five years is found to be 5.6 percentage points lower. While previous studies typically group all coup d'état observations together in one large dataset, this research also uses detailed coup and country characteristics to carry out more detailed heterogeneity analysis. There is tentative evidence to suggest that successful coups are found to have a larger negative impact on GDP growth than unsuccessful coups, for example, and the impact also appears to be larger for low-income countries than more developed ones. Finally, this study also considers the channels by which coups d'état affect GDP growth. Splitting GDP into its expenditure components shows that lower private consumption and total investment growth are the principal contributors to the lower overall growth. Further analysis also shows that GDP growth is particularly affected when coups are accompanied by sanctions.

This paper is structured as follows: Section 2 summarizes the main findings from

the existing literature. Section 3 presents the data sources used and highlights some notable facts regarding coups d'état since 1970. Section 4 reports the main results regarding different types of coups and the size of the impact on GDP in all cases, as well as how these coups can affect GDP. Section 5 provides policy recommendations and Section 6 sets out the main conclusions.

2.2 Literature Review

The political instability—specifically coups d'état—is one of the most frequent barriers to macroeconomic stability in recent years. On the first hand, the literature on coups is mainly based on the determinants of coups Cebotari et al. (2024); Chin et al. (2021); Lehoucq (2021); Powell and Thyne (2011); Collier and Hoeffler (2002a); Jackman (1978). On the other hand, the literature about the impact of coup and their political implication finds that coups d'état have a negative impact on the economy, although there is a large range of estimated impacts. Some studies have found that coups can reduce growth by as much as 2-3 percentage points Blum and Gründler (2020), whereas others find that the impact is less than 0.5 percentage points Fosu (2002). Existing literature typically finds that coups d'état have a negative impact on the economy, although there is a large range of estimated impacts. Some studies have found that coups can reduce growth by as much as 2-3 percentage points Blum and Gründler (2020), whereas others find that the impact is less than 0.5 percentage points Fosu (2002). Existing research explored a number of potential economic impacts of coups d'état, beyond the effect on GDP growth. Some of the most important findings to date highlight how coups can lead to:

- Reduced aid. Countries that experience coups are generally dependent on foreign aid, so any reduction in support reduces the country's financial capacity and puts pressure on the public finances Masaki (2016).
- Sovereign debt rating downgrades. Ratings agencies are found to lower their assessment of countries' debt sustainability following a coup d'etat Balima (2020a). The authors also find that the probability of default increases by 1.5 percentage points.
- Increased military spending. The need to increase security and defense spending creates a risk of crowding out other public expenditures Bove and Nisticò (2014), which could include social spending to support the most vulnerable members of society, or growth-enhancing public investment.

- Depreciation of the nominal effective exchange rate, partly offset by financial reserves and the flexibility of the exchange rate regime Balima (2020b).
- Lower foreign direct investment. From 1950 to 2019, Bjørnskov (2022) finds that coups resulting in a transition to an autocratic government are crucial factors contributing to economic crises.

Past analysis employs a range of different estimation techniques to identify the impact of coups on GDP growth. Jones and Olken (2009) assumes that once a coup takes place, its probability of success is exogenous with regard to economic growth. There are also numerous examples where researchers have used a form of instrumental variables to address the identification challenges. For example, Blum and Gründler (2020) use the spatial variation in the frequency of coups in neighboring countries as an instrument. Over recent years, many studies have relied on matching methods similar to those proposed by Hainmueller (2012), including entropy balancing techniques. The entropy balancing method is the principal approach used in this analysis.

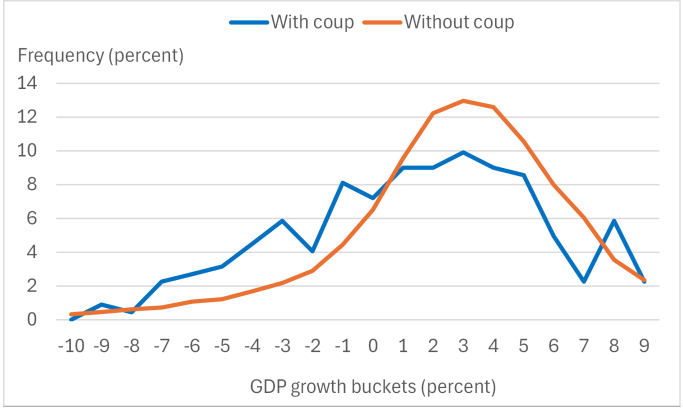
2.3 Data Summary and Initial Observations

The main data source for our empirical analysis is the coups database compiled by Powell and Thyne. Those data are combined with economic statistics drawn from the IMF's World Economic Outlook (WEO) database, as well as some other country characteristics according to the World Bank World Development Indicators database. The dataset covers 192 countries over the period 1970 to 2023, although observations are missing in some cases, for example where reliable GDP statistics are not available. In total, there are 308 coup observations over this period, 148 of which were successful. Given that in some cases there were multiple coups in a single country within a given year, we have 252 country-year pairings where at least one coup took place and 130 country-year pairings where at least one successful coup took place.

Simple comparisons using the combined dataset show that GDP growth tends to be lower in coup years than in other years. In years where a coup occurs, GDP growth is negative in 32 percent of cases. In years without a coup, by comparison, GDP falls in only 16 percent of cases (Figure 2.1). Comparing average GDP growth rates in the years before and after a coup d'état show little evidence of a persistent trend (Figure 2.2). While average GDP growth falls to 1.1 percent in the year of the

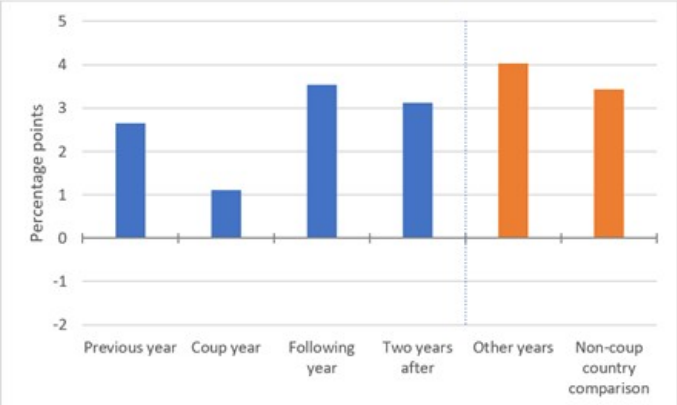
coup, there is no evidence of persistently lower GDP growth, nor is there evidence of a rebound in average growth rates in the following years. GDP growth is instead similar to the average growth rates for other countries in the sample where no coup occurred.

Figure 2.1: The distribution of GDP growth observations in years with and without coups



Note: The vertical axis shows the percentage of observations where GDP growth falls within the stated range. The horizontal axis labels show the lower end of the range, e.g. 0 corresponds to cases where annual GDP growth is between 0 and 1 percent.

Figure 2.2: Average growth in GDP for years before and after a coup d'état



Note: 'Other years' shows the average growth rate in the countries that experienced a coup across the years not affected by the coup. Specifically this is the average growth rate across those countries excluding years which were either the year before a coup or no more than two years after a coup. The 'non-coup country comparison' shows the average growth rate in countries that did not experience a coup between 1970 and 2023.

2.4 Empirical Approach and Main Results

2.4.1 Ordinary Least Squares Analysis

Let $i = 1, \ldots I$ represent the set of countries in the dataset and let $t = 1, \ldots T$ represent the time period for which annual data are available. In each country-year observation, either a coup attempt occurs ($Coup_{it} = 1$) or not ($Coup_{it} = 0$), so you have:

$$\text{Coup}_{it} = \begin{cases} 1 & \text{if there is an attempt to seize power from the existing government} \\ 0 & \text{if there is no attempt} \end{cases}$$

The dependent variable is defined as:

$$Y_{it} = \frac{GDP_{it} - GDP_{i,t-1}}{GDP_{i,t-1}} \times 100$$

Now, the basic model can be written as:

$$Y_{it} = \alpha_0 + \alpha_1 \, \text{Coup}_{it} + \alpha_2 \, Y_{i,t-1} + \sum_{n=1}^{N} \beta_n X_{nit} + u_i + u_t + \varepsilon_{it} \tag{2.1}$$

Where $X_1, \ldots, X_N$ is a set of N additional control variables. Those control variables include both one-off factors that could affect a country's GDP growth in a given year and more structural characteristics of an economy that can influence GDP growth over a longer period:

- The level of economic uncertainty in a country as measured by the 'World Uncertainty Index'(Bloom, Furceri and others, 2025). The original data are available quarterly for 143 countries and provide an estimate of economic uncertainty based on the frequency of the word 'uncertainty' (or its variants) in Economist Intelligence Unit country reports.
- Natural or technological disasters that could reduce GDP growth. The data are taken from the EM-DAT Emergency Events Database. The database records the number of people affected by both technological disasters, for example industrial accidents, and natural disasters, such as floods or earthquakes. The number of people affected by both types of disaster are reported in millions.

- The share of natural resource rents in the country's GDP. Resource rents are defined as the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. This variable aims to control for cases where resource-rich countries see large changes in GDP as a result of factors unrelated to the occurrence of coups. Estimates are available up to 2021 and are held constant thereafter.
- Life expectancy at birth, which is one indicator of a country's long-term structural development. Data are again available from the World Bank World Development Indicators database.
- Merchandise trade as a share of GDP, as measured by the total of merchandise exports plus merchandise imports. Total trade is a measure of a country's openness. The data are again taken from the World Bank World Development Indicators database.
- Population growth, based on UN population estimates, which is another possible indicator of economic development, with some of the least-developed countries exhibiting the highest population growth. Controlling for population growth ensures that the analysis is not affected by cases where countries experience large changes in GDP growth purely as a result of sharp changes in population sizes.
- The number of coups that occurred in the country over the previous decade. It could be argued that countries that have experienced more frequent coups in the past might have certain other characteristics that lead to a higher likelihood of further coups and also affect GDP growth. This analysis therefore controls for the frequency of past coups as a way of capturing this type of fragility.

The model controls for lagged GDP growth and also includes country and year fixed effects. The table presenting the results starts with the simplest specification and then shows how the results evolve after adding additional control variables incrementally. In the most basic model without any control variables, GDP growth is found to be 2 percentage points lower on average in the years where a coup d'état takes place (Table 2.1, column 1). The result is statistically significant at the 1 percent level. Adding control variables incrementally is found to have little effect on the estimated coefficient, and the result remains highly significant. The coefficient estimates associated with each of these control variables are generally found to be intuitive. Higher economic uncertainty is found to be associated with lower GDP

growth, and the result is highly significant. Higher life expectancy and more trade openness are associated with higher GDP growth, although these results are not consistently found to be statistically significant. Population growth and GDP growth are positively related, as would be expected given that an increasing population size will mechanically increase total output even in the absence of productivity growth. Regressing GDP growth on coup occurrences while controlling for population growth in this way ensures that the impact of the coups on GDP growth must reflect changes in GDP per capita growth. This can be further verified using separate regressions with GDP per capita growth as the dependent variable. The results of such alternative specifications were found to be very similar to these main findings. In the specification which includes all control variables, as well as country and year fixed effects, GDP growth is found to be 2.3 percentage points lower on average in coup years (Table 2.1 column 6).

Table 2.1: Ordinary least squares estimates suggest that if a country experiences a coups d'etat, annual GDP growth is between 2.0 and 2.3 percentage points

	1	2	3	4	5	6
Any coup dummy	-2.031***	-1.821***	-1.915***	-2.181***	-2.196***	-2.338***
	(0.390)	(0.319)	(0.364)	(0.430)	(0.432)	(0.430)
Lagged GDP growth		0.295***	0.273***	0.234***	0.188***	0.186***
		(0.037)	(0.051)	(0.056)	(0.057)	(0.059)
Economic uncertainty			-2.064***	-2.168***	-2.054***	-1.373**
			(0.476)	(0.521)	(0.592)	(0.583)
Natural disaster			0.056	0.201	-0.223	-0.097
			(0.161)	(0.172)	(0.165)	(0.150)
Technological disaster			-0.842	-0.695	-0.962	-0.926
			(0.971)	(1.014)	(1.153)	(0.960)
Natural res. rents (%)				-0.002	0.039	0.014
				(0.019)	(0.030)	(0.030)
Life expectancy (years)				0.012	0.010	0.106***
				(0.012)	(0.025)	(0.040)
Merchandise trade (%)				0.009***	0.017**	0.012
				(0.002)	(0.009)	(0.008)
Total pop. growth				0.509**	0.700***	0.703**
				(0.198)	(0.271)	(0.280)
Coups prev. decade (lagged)				0.041	0.064	0.068
				(0.086)	(0.100)	(0.074)
Constant	3.638***	2.646***	3.129***	0.986	1.253	-0.534
	(0.102)	(0.153)	(0.260)	(0.960)	(1.946)	(2.165)
Country fixed effects	No	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	No	Yes
Observations	13,748	13,49	7,52	6,45	6,45	6,45
Number of countries	141	141	141	141	141	141

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

2.4.2 Entropy Balancing

The entropy balancing approach is used in this analysis because of the possibility of endogeneity. For example, it is possible that the ordinary least squares results presented in the previous section could be affected by reverse causality, whereby a worsening economic situation can lead to a coup d'etat. Measurement error could also be problematic for many of the variables included in this study, including in the definition of a coup d'état, where different data sources provide different criteria for classifying coups.

The aim of the entropy balancing method is to create an artificial control group which matches the treatment group as closely as possible according to the different moments (mean, variance, etc) of a set of observable characteristics (see Hainmueller (2012), for full details). In this case, the treated group comprises those observations where a coup d'état occurred, while the control group is made up of those where no coup d'état took place.

To ensure that the slow-moving, structural characteristics of the countries included in the treatment and control groups are comparable, the control group is reweighted so that the average characteristics of the reweighted sample match those of the treatment group. The analysis focuses on the first moment alone in this case. The set of observable characteristics are the share of natural resource rents in the country, life expectancy at birth, merchandise trade as a share of GDP, population growth and the number of coups over the previous decade. This approach aims to replicate a hypothetical scenario where coups d'etat are randomly assigned across the treatment and control groups.

Before the reweighting, country-year observations where coups occurred are found to have a higher share of natural resource rents than non-coup cases (Table 2.2). Those coup observations are also found to occur in cases with lower life expectancies, lower trade as a share of GDP, higher population growth, and in countries where coups have occurred more frequently in previous years. These differences are all found to be statistically significant, suggesting that the two groups are not comparable. After the reweighting of the non-coup observations, however, these differences largely disappear. Overall, the method is shown to be successful in assigning weights to the non-coup observations to create a control group which is very similar to the treatment group across all five of the observable characteristics considered (Table 2.3).

Table 2.2: Observable characteristics across the treatment and control groups show significant differences prior to reweighting

Variable	Coup cases	Non-coup cases	Difference	Standard error	t-statistic
Natural resource rents (%)	8.88	7.19	-1.69***	0.63	-2.68
Life expectancy	56.27	66.39	10.12***	0.63	16.00
Merchandise trade (%)	40.46	57.45	16.99***	1.65	10.31
Population growth	2.35	1.69	-0.66***	0.11	-6.18
Previous coups	1.59	0.26	-1.33***	0.13	-10.64

*** p<0.01, ** p<0.05, * p<0.1

Table 2.3: Observable characteristics across the treatment and control groups are more comparable after reweighting

	Coups cases	Non-coup cases	Difference	Standard error	*t*-statistic
Natural resource rents (%)	8.88	8.85	0.03	0.18	0.14
Life expectancy	56.27	56.39	-0.12	0.19	-0.65
Merchandise trade (%)	40.46	40.81	-0.35	0.46	-0.76
Population growth	2.35	2.34	0.01	0.03	0.32
Previous coups	1.59	1.58	0.01	0.04	0.34

*** p<0.01, ** p<0.05, * p<0.1

The second stage of the entropy balancing method involves running a simple regression on the re-weighted dataset, with GDP growth as the dependent variable, and the explanatory variable of interest (as before) as the occurrence of a coup d'etat. The results are presented for numerous specifications with additional control variables in each case, including country and year fixed effects:

$$\begin{aligned}\text{GDP\_Growth}_{it} = \alpha_0 &+ \alpha_1 \,\text{Coup\_Dummy}_{it} + \alpha_2 \,\text{GDP\_Growth}_{i,t-1} \\ &+ \alpha_3 \,\text{Uncertainty}_{it} + \alpha_4 \,\text{Nat\_Disast}_{i,t-1} + \alpha_5 \,\text{Tech\_Disast}_{it} \\ &+ \alpha_6 \,\text{Nat\_Res\_Rents\_(\%)}_{it} + \alpha_7 \,\text{Life\_Expectancy}_{it} \\ &+ \alpha_8 \,\text{Merch\_Trade\_(\%)}_{it} \quad + \alpha_9 \,\text{Previous\_Coups}_{it} \\ &+ v_i + u_t + \varepsilon_{it}\end{aligned} \tag{2.2}$$

Results show that a coup d'état reduces GDP growth by 2.3 percentage points in the same year (Table 2.4). The finding is very similar to the estimate using ordinary least squares and the effect is found to be statistically significant. This finding is

robust to the inclusion of control variables in the second stage regression, as well as country and year fixed effects. Similar to the ordinary least squares results, economic uncertainty is found to be associated with lower GDP growth, although the effect is not statistically significant in this case. While large natural disasters are not found to have a consistent relationship with GDP growth, technological disasters are linked to lower GDP growth in this case, and the result is statistically significant. Life expectancy and trade openness are again found to be linked to higher GDP growth in this case, although the results are no longer significant. By contrast, an increase in natural resource rents as a share of GDP is found to be associated with lower GDP growth on average.

Table 2.4: Entropy balancing estimates suggest that if a country experiences a coup d'etat in a given year, annual GDP growth is around 2.3 percentage points lower on average in the same year

	(1)	(2)	(3)	(4)	(5)	(6)
Any coup dummy	−2.395***	−2.188***	−2.064***	−2.107***	−1.979***	−2.286***
	(0.491)	(0.424)	(0.470)	(0.347)	(0.381)	(0.367)
Lagged GDP growth		0.281***	0.299***	0.192**	0.088	0.070
		(0.078)	(0.093)	(0.091)	(0.094)	(0.081)
Economic uncertainty			−0.574	−0.972	−1.546	−0.483
			(1.922)	(1.639)	(1.643)	(1.214)
Natural disaster			0.253	−0.176	−0.291	0.330
			(0.514)	(0.435)	(0.548)	(0.517)
Technological disaster			−5.637**	−4.449**	−3.978	−3.166
			(2.274)	(2.018)	(2.545)	(1.951)
Natural res. rents (%)				−0.097***	−0.170**	−0.110**
				(0.034)	(0.075)	(0.054)
Life expectancy (years)				0.052	0.005	0.180
				(0.035)	(0.072)	(0.125)
Merchandise trade (%)				0.021*	0.033	0.011
				(0.011)	(0.022)	(0.014)
Total pop. growth				1.591***	1.903***	1.482***
				(0.259)	(0.228)	(0.187)
Coups prev. decade (lagged)				−0.056	−0.100	−0.069
				(0.111)	(0.199)	(0.129)
Constant	3.598***	2.641***	2.523***	−3.509	−4.641	−8.206
	(0.219)	(0.329)	(0.460)	(2.180)	(3.881)	(5.384)
Country fixed effects	No	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	No	Yes
Observations	11,346	11,302	6,587	6,587	6,587	6,587
R-squared	0.032	0.098	0.105	0.247	0.333	0.437

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

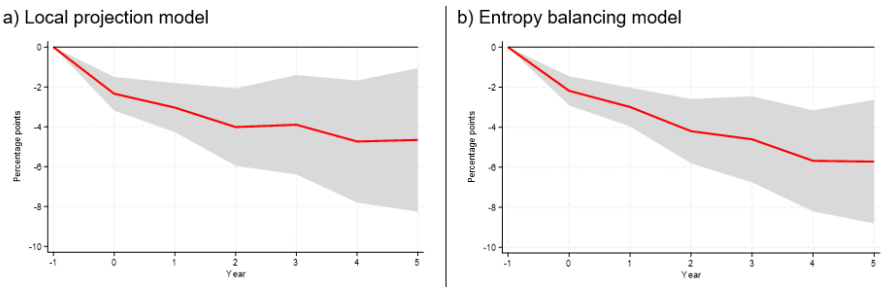
2.4.3 Estimating the Impact of a Coup d'État on GDP Growth in Subsequent Years

Following the method proposed by Jordà (2005a), the local projections approach can be used to estimate the impact of coups d'état over time. This method uses repeated ordinary least squares regressions at different horizons to estimate the effect of a coup d'état, both in the year in which it takes place, and the following five years. Similar to the original specification (1), the local projections model can be written as:

$$Y_{i,t+h} = \alpha_0^h + \alpha_1^h \, \text{Coup}_{it} + \alpha_2^h \, Y_{i,t-1} + \sum_{n=1}^{N} \beta_n^h X_{nit}^h + u_i^h + u_t^h + \varepsilon_{it}^h \qquad (2.3)$$

Where h represents the time horizon, ranging from 0 to 5. For example, where h=5 the regression estimates the impact of a coup in year t on GDP growth in year t+5. Results based on the local projection specification suggest that during the five years after a coup d'etat takes place, cumulative GDP growth is 4.7 percentage points lower on average than for non-coup cases, controlling for other country-year characteristics (Figure 2.3a). That result is corroborated by the entropy balancing approach, which finds that cumulative GDP growth over the same five-year period is 5.6 percentage points lower on average than for non-coup cases (Figure 2.3b). These results demonstrate that while annual GDP growth rates recover somewhat in the years following a coup, there is a persistent effect on the level of GDP. The results are again found to be robust to the inclusion of a range of control variables and are statistically significant.

Figure 2.3: Estimates of the impact of coups d'etat on cumulative GDP in the subsequent five years show a persistent impact on GDP over the subsequent five years



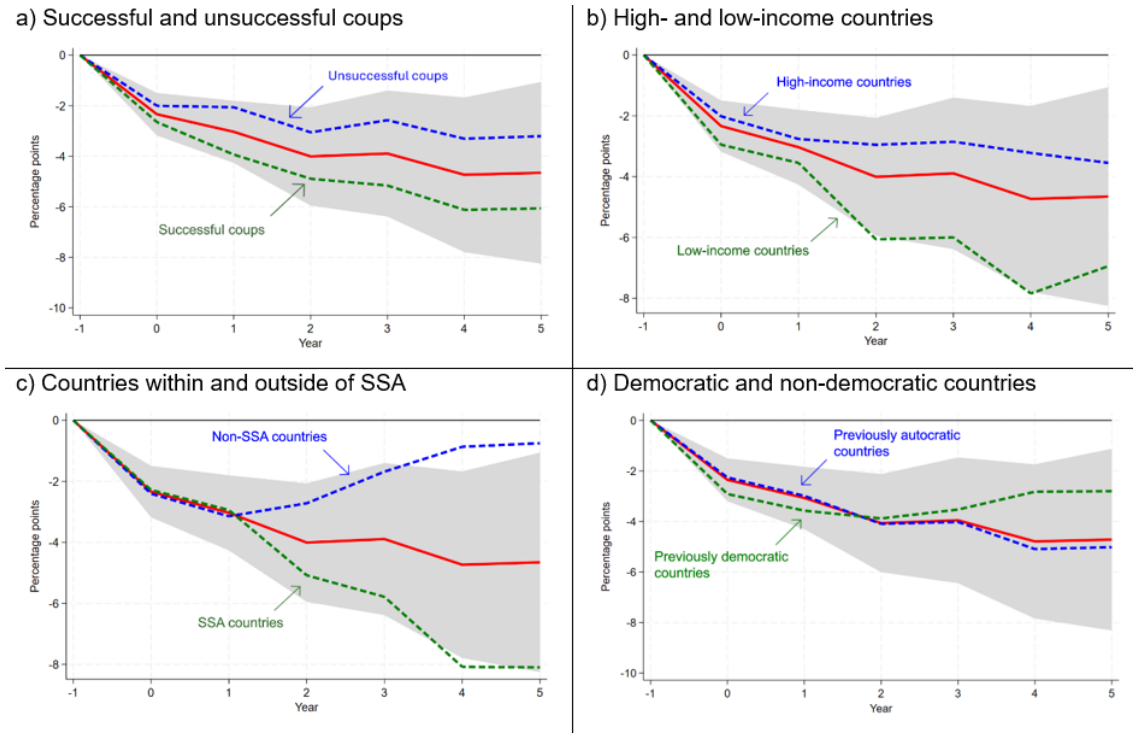
Note: The grey area shows the 95 percent confidence interval around the central estimates. Year 0 represents the year in which the coup d'etat took place and the estimate for year where t-1 is set to zero by construction. See appendix for tables showing detailed results.

2.4.4 The Impacts of Different Types of Coup on GDP Growth

While previous research has generally found that coups d'etat have a negative impact on economic outcomes overall, there is generally little evidence as to whether different types of coup, or different characteristics in the countries where they take place, lead to different outcomes. This study therefore explores these questions in more detail.

The analysis presented below is based on different variations of the local projections model, which follow the same specification as before, but with the addition of further interaction terms. The findings above suggest that local projections results are consistent with those found using the entropy balancing method, which supports the use of local projections specifications for these purposes. The main results are summarized below, with full results and details regarding the different model specifications are reported in the appendix.

Figure 2.4: Local projections estimates of the impact of coups d'etat on annual GDP growth in subsequent years



Note: The grey area shows the 95 percent confidence interval around the central estimates. Year 0 represents the year in which the coup d'etat took place and the estimate for year where t-1 is set to zero by construction. See appendix for tables showing detailed results.

Successful coups d'etat are found to have a larger negative impact on GDP growth than unsuccessful coups, although the difference is not statistically significant

The most common heterogeneity analysis conducted in empirical research to date is to check whether there is a difference between successful and unsuccessful coups. We conduct similar checks using the categorization into successful and unsuccessful coups provided by Powell and Thyne (2011). Both successful and unsuccessful coups are found to have a negative impact on GDP growth in the year that the coup takes place, as well as a persistent effect over time (Figure 2.4a). While successful coups are found to have a larger impact on GDP growth on average, the difference between the economic impacts of these two classes of coup is not large enough to be statistically significant.

Coups that occur in low-income countries are found to have a larger negative impact on GDP growth than those that occur in other countries, although again the difference is not statistically significant.

The latest income classifications from 2024 can be used to test whether coups which take place in low-income countries have different effects on GDP growth from other countries. The World Bank classifies member countries into categories from low to high income World Bank (2024). For this analysis, the classification is assumed to be unchanged over time, so that a country classed as low-income in 2024 is assumed to have been low-income throughout the time period under consideration.

The resulting model suggests that coups tend to have a larger impact on average when they take place in low-income countries. The model is similar to the main local projections specification, with the addition of a dummy variable indicating whether country is low-income level and an interaction term given by the product of the coup dummy variable and the low-income dummy variable. While coups are found to have a larger impact on average when they take place in low-income countries, the difference is not found to be statistically significant, with negative effects on GDP growth seen in both low-income cases and other cases (Figure 2.4b). Low-income countries often suffer from weaker institutions and lack the resources to cope with negative shocks. This is particularly true for fragile and conflict-affected states (FCS).

Coups have a larger negative impact on GDP growth when they occur in SSA countries than in non-SSA countries, although the divergence typically only appears some years after the coup takes place.

Consistent with the finding that low-income countries suffer larger negative effects from coups, the effects are also found to be larger for countries in sub-Saharan Africa, although differences only appear two years after the coup. This finding is based on a similar approach where a dummy variable indicating whether the country is in SSA and an interaction term with the occurrence of a coup are added to the baseline specification. In the year of the coup and the following year, the impact on GDP growth is found to be similar across SSA and non-SSA countries (Figure 2.4c). Two years after the coup d'état, however, GDP growth begins to recover in non-SSA countries, whereas in SSA countries GDP growth continues to be below that of other countries such that cumulative GDP growth over the five years after the coup is 8 percentage points lower than in other country cases. As a result of that observed divergence, the coefficient estimate on the interaction term is statistically significant at the 5 percent level four years after the coup and at the 10 percent level five years ahead. The results are little changed when the low-income dummy variable and an interaction term between the low-income variable and the coup indicator, suggesting that the additional negative impact seen in sub-Saharan African countries is additional to the fact that many of those countries are low-income countries.

If a coup takes place in a country that was previously democratic, GDP growth is found to be a little lower on average than if the country was previously governed by non-democratic regime, although the difference is small, temporary and not statistically significant.

Using a similar method it is possible to test whether coups that occur in previously democratic countries have different impacts from those that occur in non-democratic countries. A successful coup will by definition switch a country to an autocratic regime, at least temporarily, which is likely to represent a major change for a country that was previously democratic. The model is therefore adjusted to control for the democratic status of the country in the year prior to the coup, as well as an interaction term with the coup d'etat dummy variable, to test whether coups that occurred in previously democratic countries have different impacts from those that occurred in countries with autocratic regimes. Democratic classifications are based on the V-Dem Variations of Democracy database.

Evidence shows that coups that take place in previously democratic countries have

a larger initial economic impact on average than those in previously autocratic countries. In previously autocratic countries, GDP growth is found to be 2.3 percentage points lower on average following a coup d'état. This is the case for the vast majority of coups in the dataset and therefore the results are similar to those of the baseline specification. In countries that were previously democratic, GDP growth in the year of the coup is found to be 2.9 percentage points lower on average than cases where no coup took place (Figure 2.4d). The difference between these two estimates as captured by the interaction term between the occurrence of a coup and previous democratic status is not found to be statistically significant.

While there is tentative evidence that coups d'état have a larger impact on GDP growth in the same year in countries that were previously democratic, GDP growth in those countries is found to recover somewhat over time. Cumulative GDP growth over the following five years is found to be 2.8 percentage points lower than for non-coup cases. This difference is smaller than the impact on previously autocratic countries, which experience a more persistent impact on GDP growth, and smaller than the estimation in the baseline specification. Again, given the small sample size and in particular the small number of coups that occur in previously democratic countries since 1970, the differences reported in this section are not found to be statistically significant.

2.5 Further Extensions and Robustness Checks

A number of other robustness checks are used to test the validity of the main results. These are described only briefly in this section, with detailed results available in the appendix or by contacting the authors.

2.5.1 Removing outliers

Some of the countries included in the database experienced very large changes in GDP, which may increase the possibility of measurement errors. GDP growth is particularly volatile for low-income and fragile states, where coups are more prevalent. In Rwanda in 1994, for example, GDP fell by over 50 percent. There are also cases of very high positive growth following coups. Ten years after the unsuccessful coup d'état in Thailand in 1985, for example, GDP was almost two and a half times its level at the time of the attempted coup. It could be argued that there is additional uncertainty around GDP growth estimates when growth rates are highly volatile.

To test whether extreme GDP growth observations are driving the main findings of this analysis, it is possible to repeat the entropy balancing analysis with the largest outliers either replaced or excluded altogether. In the first variant of the model, the dataset is adjusted such that GDP growth observations at the lower end of the distribution are set equal to the fifth percentile of all annual growth rates (-4.1 percent) and those at the upper end are set equal to the ninety-fifth percentile (11.1 percent). This approach ensures that all observations are retained, but the largest positive and negative GDP growth rates are replaced with less extreme observations. The second variant of the model simply removes any observations with GDP growth rates outside the fifth and ninety-fifth percentiles, which reduces the dataset size somewhat. The specification remains otherwise unchanged in both cases.

Results show that while the initial impact a coup d'état is smaller after replacing or excluding outliers, the result remains statistically significant and the cumulative impact over five years is very similar in magnitude to the baseline specification. After replacing outliers with less extreme growth rates, GDP growth is found to be 1.7 percentage points lower on average in years where a coup takes place (Figure 2.5a). Over the following five years, cumulative GDP growth is on average 4.4 percentage points lower. If the outliers are removed altogether, GDP growth is found to be 1 percentage point lower in the year of the coup and 4.1 percentage points lower in the following five years. Again these results are statistically significant, despite being somewhat smaller in magnitude and being based on a smaller sample size given that some observations have been removed.

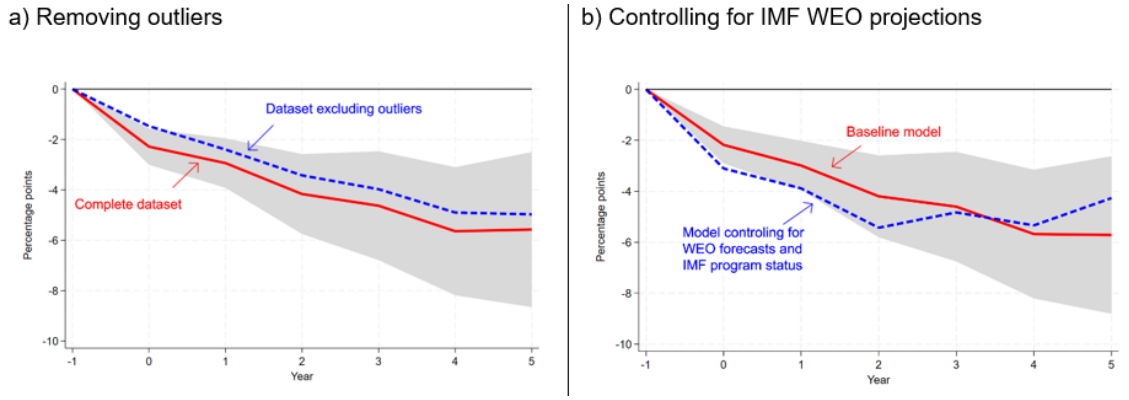
2.5.2 Controlling for IMF WEO forecasts

It is also possible to add additional regressors capturing GDP growth forecasts and IMF program status. Previous research estimating the macroeconomic impact of conflict followed a similar approach Novta and Pugacheva (2021). The objective is to capture changes in growth that were not predicted and can therefore be attributed to the effect of the coup. Given that IMF growth forecasts have previously been found to be optimistic under IMF programs Kim et al. (2021) these model specifications also include an additional dummy variable indicating program status to control for any resulting bias in growth projections.

Under this model, GDP growth is again found to be lower in cases where a country experiences a coup d'état, although there is some recovery in GDP growth over the following five years. The entropy balancing model which follows that standard

approach except for the addition of these two control variables indicates that GDP growth is 3.1 percentage points lower in the same year as the coup (Figure 2.5b). Thereafter, cumulative GDP growth is again found to be significantly lower than in non-coup countries, although there is some recovery in GDP growth rates relative to non-coup cases, such that cumulative GDP growth over the following five years is found to be 4.3 percentage points below non-coup cases. The inclusion of these additional control variables reduces the sample size somewhat, with no data available for the earlier years in the full dataset. The smaller sample size means that the impact on the cumulative GDP growth rate over five years is not found to be statistically significant in this model.

Figure 2.5: Alternative estimates of the impact of coups d'état on cumulative GDP in the subsequent five years using the entropy balancing method continue to show a persistent impact on GDP over the subsequent five years



Note: The grey area shows the 95 percent confidence interval around the central estimates. Year 0 represents the year in which the coup d'etat took place and the estimate for year where t-1 is set to zero by construction. See appendix for tables showing detailed results.

2.5.3 Removing countries which did not experience any coup during the time period

It could be argued that countries where no coup took place might have very different characteristics to those that experienced coups, so even a reweighting process such as entropy balancing might not create a fully comparable control group. To test this possibility, the regression analysis is repeated after excluding all countries where no coup took place since 1970. The number of countries is reduced from 141 to 71. The control group in this case consists of the years where coups did not take place, for countries that experienced at least one coup during the time period in question.

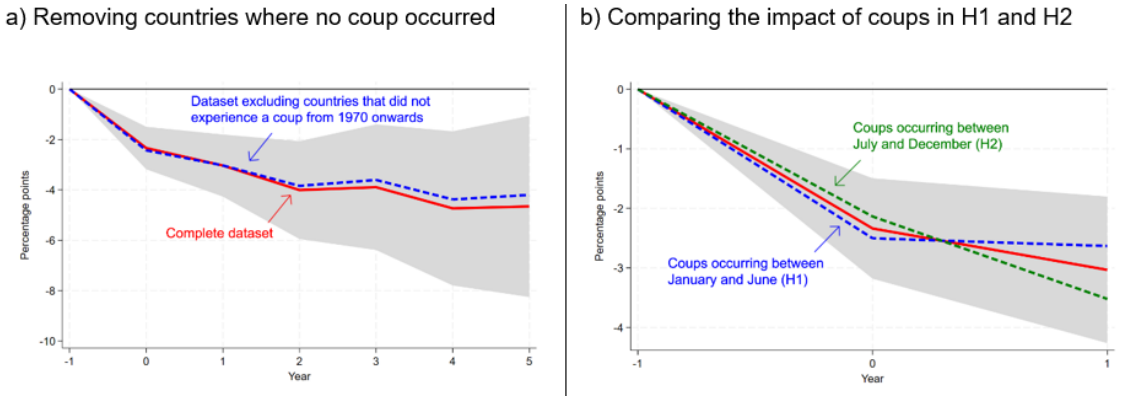
Removing countries where no coup took place from the sample has little effect on

the results. GDP growth is still found to be lower in those years a coup d'état took place and the difference is found to be statistically significant (Figure 2.6a).

2.5.4 Comparing the impact of coups which occurred in the first and second half of the year

Coups d'etat are found to negatively affect GDP growth in the same year, regardless of whether they take place in the first or second half of the year. Coups which occur during the second half of the year are found to have a greater effect on GDP growth in the following year, which is intuitive (Figure 2.6b).

Figure 2.6: Alternative estimates of the impact of coups d'état on cumulative GDP in the subsequent five years using the local projections method continue to show a persistent impact on GDP over subsequent years



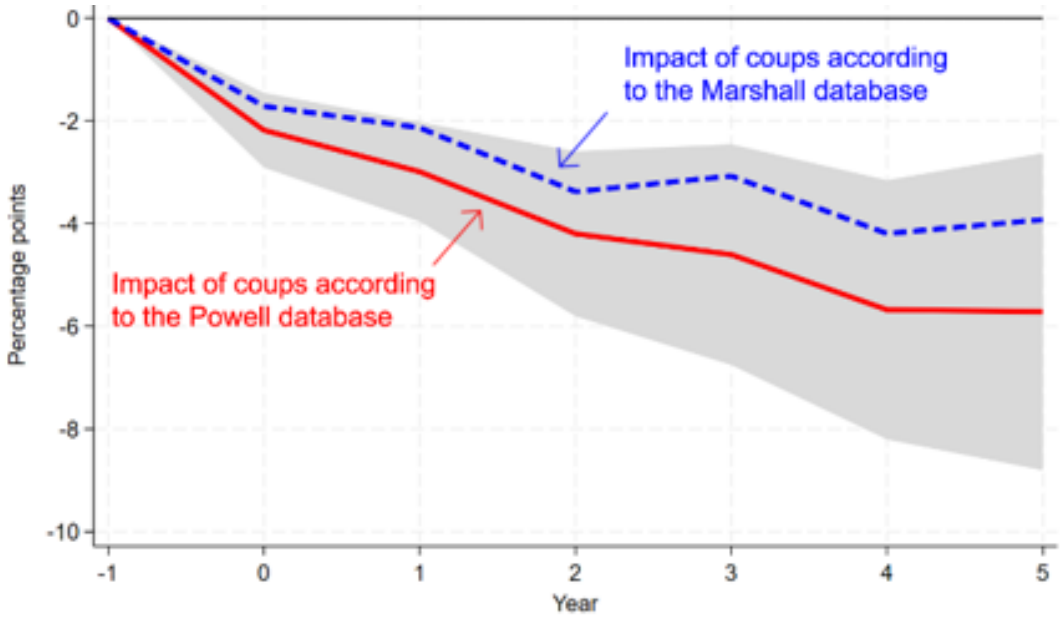
Note: The grey area shows the 95 percent confidence interval around the central estimates. Year 0 represents the year in which the coup d'etat took place and the estimate for year where t-1 is set to zero by construction. See appendix for tables showing detailed results.

2.5.5 Repeating the estimations with an alternative coups database

Results presented so far have all been based on the database of coups d'état compiled by Powell and Thyne (2011), but alternative databases are also available. Marshall and Marshall (2019) produced a comparable dataset, which can be used to carry out similar analysis. Powell and Thyne (2011) coup is defini as "overt attempts by the military or other elites within the state apparatus to unseat the sitting head of state using unconstitutional means". They distinguish a successful coup from a un successful coup by whether the perpetrators were able to seize and hold power for at least seven days. According to the Marshall and Marshall (2019) define coup "As a forceful seizure of executive authority and office by a dissident/opposition faction

within the country's ruling or political elites that results in a substantial change in the executive leadership and the policies of the prior regime". This database consider four types of coups : successful coup; attempted (failed) coup; plotted coup; and alleged coup plot. Marshall data does not take into account the number of days in power, as Powell data does. It takes into account the number of different types of coups. The definitions of coups d'état differ slightly across the two sources and as a result the Marshall database records 204 coups since 1970 that can be included in the analysis, compared to around 250 according to the Powell database. While the Marshall database records a higher total number of coup attempts, it records only 114 of those coups as having been successful. This is a smaller number than in the Powell database, which records 130 successful coups. Repeating the analysis with the occurrence of a coup d'état according to the Marshall database as the explanatory variable of interest provides a cross-check for the main findings.

Figure 2.7: Coups d'état as measured by the Marshall database are found to have a negative effect on cumulative GDP growth in the subsequent five years, similar to the Powell data



Note: The grey area shows the 95 percent confidence interval around the central estimates. Year 0 represents the year in which the coup d'etat took place and the estimate for year where t-1 is set to zero by construction. See appendix for tables showing detailed results.

Estimates of coup impacts according to the Marshall database are slightly smaller than those estimated using the Powell database, but the results are broadly consistent and remain statistically significant. In the year of the coup, GDP growth is found to be 1.5 percentage points lower in cases where a country experienced a coup according

to the Marshall database. Cumulative GDP growth in the five years following the coup is found to be 3.7 percentage points lower on average. In both cases, these estimated coefficients are somewhat smaller than those estimated using the Powell database (Figure 2.7). The model uses the same entropy balancing method as the baseline specification, including the same reweighting variables and additional controls

2.6 Assessing the Ways in which Coups d'État Affect Different Aspects of the Economy

Having estimated the effect of coups on GDP growth, a similar approach can be used to assess how coups can affect other aspects of the economy. . This analysis can also shed light on which areas of the economy are the main causes of the downward effect on overall output growth.

To identify the channels that warrant further analysis, an event study approach can be used to test which variables show the largest variations around the time of coups d'état. The event study method uses a consistent specification across a range of different dependent variables, with no additional controls, following the method of Gourinchas and Obstfeld (2012).

Event study results show that all the growth rates of all expenditure components of GDP are lower in cases where a coup d'état takes place, but there is less evidence of a statistically significant impact on monetary nor fiscal indicators (Appendix B9. While event studies suggest that governance indicators are lower for countries that experience coups, the time trends show that the decline in governance indicators starts before the coup takes place. These data are only available over a shorter time horizon and the variables are also likely to be particularly endogenous, with coups mechanically lowering some of these scores, so these impacts are not investigated further in this analysis.

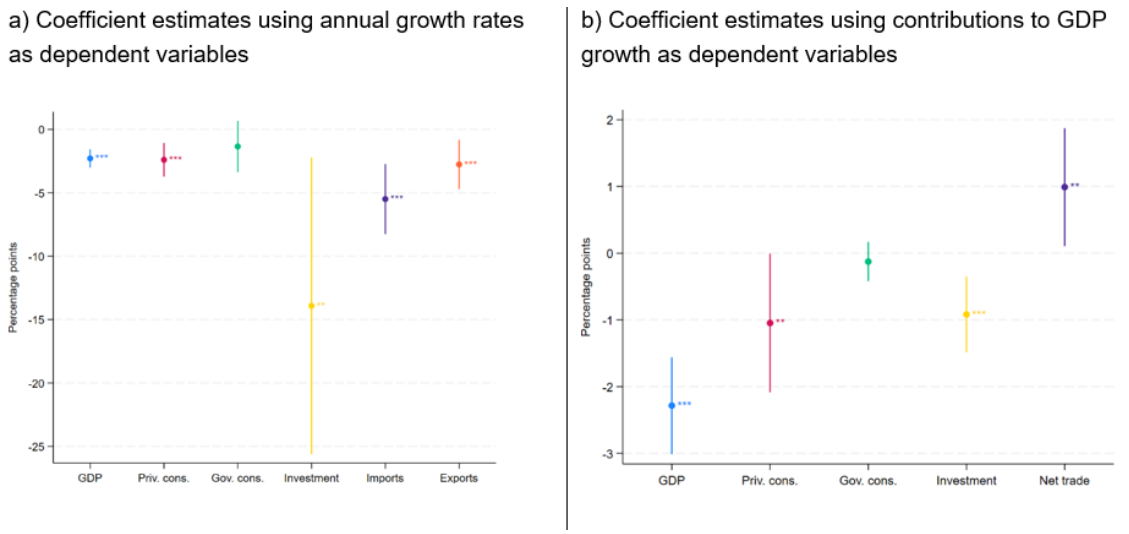
2.6.1 Entropy balancing estimations with the expenditure components of GDP as dependent variables

It is possible to conduct the same analysis as above, but with the components of GDP as separate dependent variables. This section uses the entropy balancing method, with the same set of control variables as the baseline specification.

Using the annual growth rates of GDP components as the dependent variable shows that coups d'état have a very large negative impact on investment in particular. Gross fixed capital formation growth is 13.9 percentage points lower on average than in non-coup cases (Figure 2.8a). External trade growth also shows large effects, with imports growth 5.5 percentage points lower on average and exports growth 2.8 percentage points lower.

While private consumption growth does not fall by as much as investment growth in the years where a country experiences a coup d'état, its typically large share in GDP means that it is also a major driver of lower GDP growth. Private consumption growth is 2.4 percentage points lower on average in the years where a country experiences a coup d'état (Figure 2.8b). This corresponds to a lower contribution to overall GDP growth by 1 percentage point, which is even slightly larger than the lower contribution from investment. Given that imports growth is typically reduced by more than exports growth, the contribution to GDP growth from net trade typically increases in the year of a coup d'état.

Figure 2.8: Entropy balancing models suggest that both private consumption and total investment contribute to the observed fall in GDP growth following a coup d'état, while imports fall by more than exports such that the contribution of net trade to GDP growth increases on average



Note: : * p<0.10, ** p<0.05, *** p<0.01. All results are based on entropy balancing regressions with the same set of control variables as the baseline specification.

2.6.2 Entropy balancing estimations with the monetary and fiscal indicators as dependent variables

A similar analysis using indicators of monetary and credit conditions as the dependent variables does not produce statistically significant evidence that this is an important channel. Entropy balancing regressions with broad money supply, net credit to the private sector and net foreign direct investment flows as the dependent variables, all measured as a share of GDP, do not show statistically significant changes in the years of coups d'état. Similarly, interest rate spreads and indicators of risk premia do not change significantly in the years where a coup takes place. See Table B15 for detailed results.

A further set of regressions conducts similar tests to consider whether coups d'état typically have an impact on fiscal indicators, but results are again generally not found to be statistically significant. The variables tested include the fiscal deficit, tax revenues, current government spending and government investment. As above, the fiscal variables of interest are all measured as a share of GDP. Results show little effect on most fiscal variables, although government investment is found to be lower in coup cases. See Table B16 for detailed results.

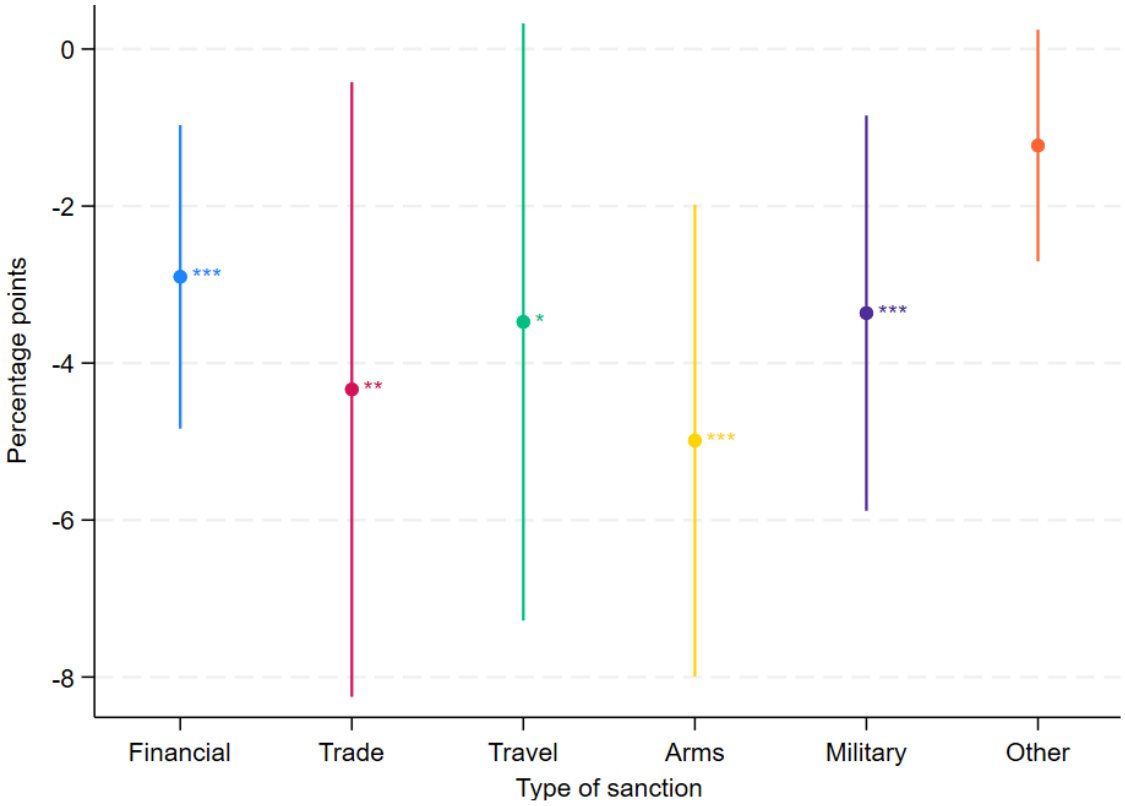
2.6.3 The Combined Impact of Coups and Economic Sanctions

It is common for sanctions to be imposed following a coup d'état. These sanctions can take different forms, including financial, trade, travel, arms, military and other restrictions. The Global Sanctions Database provides global statistics on these different forms of sanctions and shows that they are particularly common across a number of global regions, including Europe and Central Asia, the Middle East and North Africa region and sub-Saharan Africa. The database also highlights the association between sanctions and coups d'état. Following the Sierra Leone coup in 1997, for example, sanctions were imposed by the UN including arms and oil embargos. Further sanctions were also imposed at the regional level by ECOWAS, as well as bilateral sanctions by a number of countries including the UK and USA. Many of these sanctions remained in place for seven years or more. For the dataset as a whole, a country has a 45 percent chance of being under some form of sanction in the year where a coup d'état takes place, higher than in other non-coup cases where the equivalent probability is 32 percent.

The ordinary least squares specification used in this analysis can be adapted to test the combined impact of coups and sanctions on GDP growth. By including dummy variables indicating the presence of sanctions in the original ordinary least squares specification, as well as an interaction term indicating the occurrence of a coup and sanctions in the same year, it is possible to test whether economic sanctions alone have an impact on GDP growth, and whether the effect of a coup d'état on GDP growth is exacerbated in cases where sanctions occur in the same year. This process can be repeated in separate regressions for all the different forms of sanctions included in the database, with identical control variables to ensure consistency with previous results.

Sanctions are found to be an important channel by which coups d'état can affect GDP growth. When a country experiences a coup that is not accompanied by financial sanctions then GDP growth is found to be 1.4 percentage points lower in the same year. When such a coup is accompanied by financial sanctions, however, there is a further negative impact on GDP growth of 2.9 percentage points, as captured by the interaction term. The total impact of the coup on GDP growth in those cases is therefore 4.3 percentage points. Those additional impacts measured by the interaction term are found to be negative and significant for most types of sanctions. Trade sanctions are found to exacerbate the impact of a coup by 4.3 percentage points, while travel sanctions reduce GDP growth by an additional 3.5 percentage points (Figure 2.9). Arms sanctions reduce growth by a further 5 percentage points on average and military sanctions lower GDP growth by an additional 3.4 percentage points. In all of these cases the interaction terms are found to be statistically significant. For 'other' sanctions the additional impact is found to be smaller and not significantly different from zero.

Figure 2.9: Ordinary least squares regressions including interaction terms show that if a coup d'état and financial, trade, arms or military sanctions occur in the same year, then the downward effect on GDP growth is amplified



Note: * p<0.10, ** p<0.05, *** p<0.01. Each estimate shown on the chart is based on a separate ordinary least squares regression with the same set of control variables as the baseline specification as well as one additional control variable for the different type of sanction and an interaction term indicating whether a coup d'état and some form of sanctions against a country occurred in the same year. The estimates shown in the charts are the coefficients associated with the interaction term and the lines show 95 percent confidence intervals around those estimates.

2.7 Conclusion

The regression results reported in this paper show that on average, coups d'état are associated with lower GDP growth by between 1.5 and 3.1 percentage points. Within the estimated range, the central estimate according to the entropy balancing method is that a coup d'état reduces growth by 2.3 percentage points on average in the same year. The effect on GDP is persistent, such that cumulative GDP growth in the subsequent five years is reduced by 5.6 percentage points on average.

The results are consistent across a number of specifications, although further investigation also finds tentative evidence that the average effect of coups on GDP growth

is somewhat dependent on the country characteristics and economic circumstances. There is tentative evidence that successful coups have a larger effect than unsuccessful coups, while results also suggest that low-income countries and those countries in SSA may also experience a larger reduction in GDP growth. Countries that were previously democratic may also see larger effects on GDP growth, although the effect is found to be temporary and the differences are not found to be statistically significant.

It appears that coups d'état have a large effect on private consumption and investment growth, but little effect on monetary or fiscal variables. Private consumption growth is typically found to be somewhat lower in cases where a coup d'état occurs. Given that consumption typically accounts for a large share of overall GDP, this is found to be an important channel when measured as a contribution to GDP. Investment growth is found to fall even more dramatically when a coup takes place. Given that investment typically accounts for a smaller share of GDP, however, the change is similar to that of private consumption when measured as a contribution to GDP growth.

In many cases, coups d'état coincide with economic sanctions and this is indeed found to be an important transmission channel. Many different types of sanctions are found to exacerbate the impact of coups on GDP growth and the effects are found to be statistically significant.

The findings suggest that countries can benefit from creating economic, political and social environments where coups d'état are less likely to take place. Cebotari et al. (2024) show that weak institutions and governance are important drivers of coups d'état, for example, so structural improvements in both of these areas can ensure that a country does not suffer the economic loss associated with a coup. In many cases such reforms will also be consistent with reducing fragility and therefore increase GDP growth on average, beyond their impact on reducing the likelihood of coups.

Following a coup d'etat—be it successful or unsuccessful—authorities should aim to offer support to the parts of the economy that are likely to be most affected and to directly mitigate the main transmission channels. Coups are found to have a large negative impact on private consumption and investment growth, so supporting both consumer and business confidence, for example by reducing economic uncertainty as quickly as possible, could help to attenuate those channels. Clear communications and policies that ensure the functioning of key public sector institutions could be

beneficial in this regard. Resilience could be strengthened with the involvement of business partners and international financial institutions via technical assistance, aid and access to financing. Sanctions are also found to be an important transmission mechanism, so if countries are able to find diplomatic solutions by working with international partners, this could reduce the economic impact of coups.

It is hoped that this study has enhanced the understanding of the link between coups d'état and GDP growth, but the work has some important limitations and there remain numerous areas for further work. This study, like others, is limited by data availability. Coups are relatively rare events in most countries, so there are a relatively small number of coup observations, particularly for successful coups, in the time period under consideration. Those coups also happen most frequently in those countries where economic data are incomplete, so in some cases GDP data are not available at the time where coups occurred. One possible extension to this work would be to fill in some of those data gaps to create more complete datasets with a higher number of coup observations. A further possible extension of this study would be to analyze other elements of fragility that can affect the economy, such different aspects of conflict or state failure.

B Appendix

Table B1: Local projections estimates of the impact of coups d'etat on cumulative GDP growth over the subsequent five years show that cumulative GDP growth is persistently lower than non-coup cases

	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
						[t]
Any coup dummy	-2.338***	-3.033***	-4.007***	-3.892***	-4.733***	-4.655**
	(0.430)	(0.628)	(0.990)	(1.271)	(1.560)	(1.835)
Lagged GDP cumul. growth	0.186***	0.277***	0.364***	0.392***	0.427***	0.473***
	(0.059)	(0.081)	(0.096)	(0.112)	(0.116)	(0.124)
Economic uncertainty	-1.373**	-2.341**	-1.937	-1.561	-1.332	-1.749
	(0.583)	(1.022)	(1.523)	(1.926)	(2.294)	(2.856)
Natural disaster	-0.097	0.176	0.348	0.894*	1.362**	1.740**
	(0.150)	(0.256)	(0.379)	(0.478)	(0.601)	(0.724)
Technological disaster	-0.926	-1.648	-2.261	-1.213	-1.255	-2.959
	(0.960)	(1.509)	(1.740)	(1.808)	(2.280)	(2.840)
Natural res. rents (%)	0.014	0.042	0.069	0.072	0.104	0.160
	(0.030)	(0.056)	(0.073)	(0.093)	(0.122)	(0.152)
Life expectancy (years)	0.106***	0.187**	0.264**	0.363**	0.417*	0.473
	(0.040)	(0.074)	(0.121)	(0.176)	(0.234)	(0.294)
Merchandise trade (%)	0.012	0.024	0.031	0.029	0.020	0.005
	(0.008)	(0.018)	(0.027)	(0.037)	(0.045)	(0.055)
Total pop. growth	0.703**	0.960**	0.873***	0.885**	0.840*	0.685
	(0.280)	(0.384)	(0.328)	(0.402)	(0.456)	(0.466)
Coups prev. decade (lagged)	0.068	0.209	0.531*	0.859*	1.216**	1.606**
	(0.074)	(0.183)	(0.318)	(0.457)	(0.616)	(0.787)
Constant	-0.534	0.354	3.528	8.912	17.197	23.438*
	(2.165)	(3.779)	(5.944)	(8.654)	(11.406)	(14.140)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,45	6,448	6,31	6,172	6,033	5,893
Number of countries	141	141	141	141	141	141

Table B2: Entropy balancing estimates of the impact of coups d'etat on cumulative GDP growth over the subsequent five years show that cumulative GDP growth is persistently lower than non-coup cases

	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Any coup dummy	-2.180***	-2.991***	-4.198***	-4.604***	-5.679***	-5.716***
	(0.371)	(0.493)	(0.820)	(1.096)	(1.288)	(1.576)
Lagged GDP growth	0.042	0.108	0.150*	0.040	-0.018	0.043
	(0.072)	(0.077)	(0.086)	(0.099)	(0.110)	(0.123)
Economic uncertainty	-0.381	-2.313	-4.775**	-3.500	-3.008	-2.465
	(1.243)	(1.888)	(2.301)	(2.609)	(3.083)	(4.136)
Natural disaster	0.013	0.716	0.784	0.470	0.059	0.697
	(0.444)	(0.657)	(0.870)	(1.090)	(1.163)	(1.346)
Technological disaster	-3.293	-3.507	-2.310	-6.898	-7.136	-7.911
	(2.065)	(2.268)	(2.497)	(5.880)	(6.119)	(7.050)
Natural res. rents (%)	-0.090*	-0.039	-0.055	-0.064	0.034	0.080
	(0.050)	(0.070)	(0.103)	(0.124)	(0.161)	(0.194)
Life expectancy (years)	0.258**	0.293***	0.287**	0.358**	0.322	0.441
	(0.103)	(0.076)	(0.132)	(0.181)	(0.230)	(0.269)
Merchandise trade (%)	0.008	0.000	-0.016	-0.064	-0.105	-0.164*
	(0.015)	(0.026)	(0.039)	(0.059)	(0.073)	(0.091)
Total pop. growth	1.383***	1.143***	1.137**	1.357**	1.537**	1.401*
	(0.175)	(0.312)	(0.499)	(0.612)	(0.649)	(0.731)
Coups prev. decade (lagged)	-0.091	-0.055	-0.116	-0.116	0.026	0.335
	(0.123)	(0.260)	(0.383)	(0.521)	(0.630)	(0.752)
Constant	-11.191**	-5.440	1.065	10.804	25.636**	29.071**
	(4.562)	(3.297)	(6.161)	(8.904)	(11.181)	(12.687)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,45	6,448	6,31	6,172	6,033	5,893
R-squared	0.444	0.420	0.432	0.454	0.482	0.499

Table B3: Local projections estimates suggest that coups d'état which occur in previously democratic countries have a slightly larger effect on cumulative GDP growth initially compared with non-democratic countries, although the difference is not statistically significant

	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Any coup dummy	-2.262***	-2.988***	-4.097***	-4.021***	-5.096***	-5.019**
	(0.499)	(0.712)	(1.075)	(1.385)	(1.709)	(2.051)
Previous year democracy	-0.301	-0.723	-1.039	-1.134	-1.196	-1.325
	(0.290)	(0.649)	(1.085)	(1.508)	(1.906)	(2.303)
Coup * Prev. yr. democracy.	-0.655	-0.586	0.214	0.490	2.272	2.216
	(0.788)	(1.270)	(2.271)	(2.922)	(3.290)	(3.648)
Lagged GDP growth	0.186***	0.276***	0.363***	0.391***	0.426***	0.472***
	(0.059)	(0.081)	(0.096)	(0.111)	(0.115)	(0.124)
Economic uncertainty	-1.328**	-2.239**	-1.799	-1.415	-1.183	-1.578
	(0.578)	(1.019)	(1.524)	(1.927)	(2.289)	(2.836)
Natural disaster	-0.087	0.198	0.375	0.928**	1.392**	1.774**
	(0.150)	(0.254)	(0.371)	(0.465)	(0.584)	(0.703)
Technological disaster	-0.907	-1.601	-2.216	-1.191	-1.228	-2.927
	(0.962)	(1.515)	(1.744)	(1.808)	(2.273)	(2.835)
Natural res. rents (%)	0.014	0.042	0.068	0.071	0.103	0.159
	(0.030)	(0.056)	(0.073)	(0.093)	(0.122)	(0.153)
Life expectancy (years)	0.108***	0.190**	0.268**	0.368**	0.422*	0.479
	(0.041)	(0.075)	(0.122)	(0.177)	(0.234)	(0.294)
Merchandise trade (%)	0.012	0.024	0.031	0.028	0.020	0.005
	(0.008)	(0.018)	(0.028)	(0.037)	(0.046)	(0.055)
Total pop. growth	0.702**	0.958**	0.870***	0.880**	0.833*	0.678
	(0.280)	(0.384)	(0.328)	(0.402)	(0.458)	(0.468)
Coups prev. decade (lagged)	0.052	0.172	0.479	0.803*	1.158*	1.542*
	(0.074)	(0.186)	(0.326)	(0.468)	(0.632)	(0.806)
Constant	-0.706	-0.012	3.034	8.370	16.668	22.842
	(2.203)	(3.837)	(5.978)	(8.659)	(11.387)	(14.085)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,45	6,448	6,31	6,172	6,033	5,893
Number of countries	141	141	141	141	141	141

Table B4: Local projections estimates suggest that coups d'état which occur in low-income countries have a larger effect on cumulative GDP growth over the subsequent five years than coups d'état in high-income countries, although the difference is not statistically significant

	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Any coup dummy	-2.016***	-2.762***	-2.952**	-2.852*	-3.220*	-3.547
	(0.461)	(0.824)	(1.168)	(1.596)	(1.863)	(2.234)
Low-income country	1.396**	2.932***	5.324***	10.335***	15.930***	22.431***
	(0.566)	(0.829)	(0.985)	(1.258)	(1.595)	(1.956)
Coup and low-income interaction	-0.934	-0.786	-3.111	-3.146	-4.623	-3.398
	(0.941)	(1.264)	(1.955)	(2.365)	(2.985)	(3.620)
Lagged GDP growth	0.187***	0.277***	0.365***	0.393***	0.428***	0.474***
	(0.059)	(0.081)	(0.096)	(0.112)	(0.116)	(0.124)
Economic uncertainty	-1.366**	-2.336**	-1.912	-1.533	-1.289	-1.717
	(0.584)	(1.023)	(1.524)	(1.928)	(2.298)	(2.860)
Natural disaster	-0.099	0.175	0.343	0.889*	1.352**	1.732**
	(0.150)	(0.257)	(0.379)	(0.479)	(0.603)	(0.726)
Technological disaster	-0.941	-1.661	-2.312	-1.262	-1.328	-3.012
	(0.964)	(1.509)	(1.742)	(1.829)	(2.298)	(2.849)
Natural res. rents (%)	0.015	0.042	0.070	0.072	0.105	0.161
	(0.030)	(0.056)	(0.073)	(0.093)	(0.122)	(0.153)
Life expectancy (years)	0.106***	0.186**	0.263**	0.362**	0.415*	0.472
	(0.040)	(0.074)	(0.121)	(0.176)	(0.234)	(0.294)
Merchandise trade (%)	0.012	0.024	0.031	0.029	0.021	0.005
	(0.008)	(0.018)	(0.028)	(0.037)	(0.046)	(0.055)
Total pop. growth	0.699**	0.957**	0.861***	0.872**	0.820*	0.671
	(0.282)	(0.386)	(0.331)	(0.403)	(0.458)	(0.467)
Coups prev. decade (lagged)	0.063	0.204	0.513	0.840*	1.187*	1.585**
	(0.073)	(0.182)	(0.317)	(0.455)	(0.613)	(0.781)
Constant	-1.926	-2.574	-1.780	-1.377	1.338	1.058
	(2.015)	(3.576)	(5.800)	(8.414)	(11.122)	(13.801)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of countries	141	141	141	141	141	141

Table B5: Local projections estimates suggest that coups d'état which occur in SSA countries have a similar effect on cumulative GDP growth to other countries in the year of the coup and the following year, but a larger effect on GDP growth two years and more after the coup takes place

	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Any coup dummy	-2.405***	-3.146***	-2.720*	-1.683	-0.869	-0.751
	(0.619)	(1.030)	(1.528)	(2.003)	(2.320)	(2.844)
Sub-Saharan Africa	-1.385**	-2.923***	-5.268***	-10.267***	-15.820***	-22.336***
	(0.560)	(0.823)	(0.983)	(1.263)	(1.600)	(1.963)
Coup and SSA interaction	0.123	0.205	-2.359	-4.102	-7.208**	-7.347**
	(0.858)	(1.344)	(1.966)	(2.564)	(3.052)	(3.738)
Lagged GDP growth	0.186***	0.277***	0.365***	0.393***	0.428***	0.475***
	(0.059)	(0.081)	(0.096)	(0.112)	(0.116)	(0.125)
Economic uncertainty	-1.373**	-2.341**	-1.936	-1.562	-1.328	-1.760
	(0.583)	(1.022)	(1.521)	(1.923)	(2.291)	(2.857)
Natural disaster	-0.098	0.176	0.350	0.898*	1.367**	1.745**
	(0.150)	(0.256)	(0.378)	(0.477)	(0.601)	(0.724)
Technological disaster	-0.924	-1.644	-2.299	-1.278	-1.370	-3.077
	(0.958)	(1.507)	(1.748)	(1.851)	(2.335)	(2.902)
Natural res. rents (%)	0.014	0.042	0.070	0.072	0.106	0.162
	(0.030)	(0.056)	(0.073)	(0.093)	(0.122)	(0.153)
Life expectancy (years)	0.106***	0.186**	0.265**	0.365**	0.421*	0.477
	(0.041)	(0.074)	(0.121)	(0.176)	(0.234)	(0.295)
Merchandise trade (%)	0.012	0.024	0.031	0.029	0.021	0.005
	(0.008)	(0.018)	(0.027)	(0.037)	(0.046)	(0.055)
Total pop. growth	0.703**	0.960**	0.863***	0.868**	0.809*	0.653
	(0.281)	(0.385)	(0.330)	(0.403)	(0.458)	(0.469)
Coups prev. decade (lagged)	0.069	0.210	0.526*	0.851*	1.200*	1.591**
	(0.074)	(0.183)	(0.319)	(0.459)	(0.620)	(0.790)
Constant	-0.529	0.363	3.433	8.779	16.957	23.191
	(2.168)	(3.777)	(5.946)	(8.666)	(11.427)	(14.173)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,45	6,448	6,31	6,172	6,033	5,893
Number of countries	141	141	141	141	141	141

Table B6: Entropy balancing estimates controlling for WEO growth forecasts and IMF program status show that the results remain robust, with coups d'état in this case associated with lower GDP growth by 3.1 percentage points in the same year

	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Any coup dummy	-3.106***	-3.887***	-5.431***	-4.829**	-5.340**	-4.268
	(0.659)	(0.744)	(1.245)	(1.865)	(2.317)	(2.836)
Lagged GDP growth	-0.101	0.012	0.035	-0.051	-0.000	0.011
	(0.095)	(0.104)	(0.135)	(0.151)	(0.172)	(0.172)
WEO GDP gr. forecast	0.531***	0.568***	0.561***	0.403***	0.396***	0.392***
	(0.119)	(0.049)	(0.058)	(0.087)	(0.085)	(0.103)
IMF program (lagged)	0.830*	0.680	0.885	0.765	0.836	-0.224
	(0.466)	(0.585)	(1.046)	(1.853)	(2.355)	(2.351)
Economic uncertainty	-1.598	-2.476	-6.016	-3.052	-4.039	-4.435
	(1.598)	(2.863)	(3.718)	(4.426)	(5.252)	(5.858)
Natural disaster	0.305	1.208*	1.519*	1.197	0.275	0.208
	(0.629)	(0.656)	(0.913)	(1.312)	(1.302)	(1.630)
Technological disaster	-3.641	-5.518	-1.198	-3.375	-2.515	-2.586
	(3.326)	(5.977)	(4.943)	(7.006)	(8.552)	(7.641)
Natural res. rents (%)	-0.183***	-0.180***	-0.227**	-0.296*	-0.241	-0.261
	(0.052)	(0.065)	(0.106)	(0.159)	(0.187)	(0.196)
Life expectancy (years)	0.381*	0.387***	0.299*	0.496**	0.520	0.619*
	(0.211)	(0.140)	(0.160)	(0.240)	(0.315)	(0.351)
Merchandise trade (%)	0.015	-0.008	-0.019	-0.096	-0.176**	-0.225**
	(0.020)	(0.038)	(0.048)	(0.070)	(0.082)	(0.107)
Total pop. growth	1.042***	0.709*	0.809	0.858	0.847	0.991
	(0.196)	(0.359)	(0.523)	(0.607)	(0.610)	(0.675)
Coups prev. decade (lagged)	0.088	0.210	0.558	1.241**	1.456**	2.273***
	(0.190)	(0.240)	(0.415)	(0.566)	(0.614)	(0.840)
Constant	-23.048**	-21.859***	-17.127**	-13.495	-10.334	-12.222
	(10.789)	(7.072)	(8.596)	(12.998)	(16.721)	(18.934)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,476	4,472	4,337	4,2	4,061	3,921
R-squared	0.651	0.614	0.635	0.638	0.653	0.668

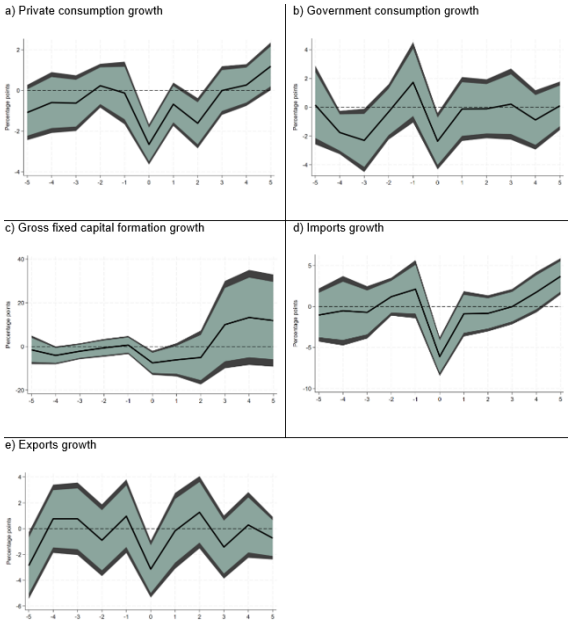
Table B7: A local projections model suggests that coups which occur later in the year have a larger effect on GDP growth in the following year, although the differences are not statistically significant

	(Year 0)	(Year 1)
Any coup dummy	-2.804***	-2.591***
	(0.596)	(0.741)
Coup * July-December dummy	0.603	-0.987
	(0.690)	(1.033)
Lagged GDP growth	0.185***	0.280***
	(0.059)	(0.081)
Economic uncertainty	-1.314**	-2.363**
	(0.561)	(1.035)
Natural disaster	-0.061	0.235
	(0.148)	(0.254)
Technological disaster	-0.992	-1.700
	(0.957)	(1.490)
Natural res. rents (%)	0.019	0.044
	(0.031)	(0.056)
Life expectancy (years)	0.091**	0.157**
	(0.044)	(0.079)
Merchandise trade (%)	0.012	0.023
	(0.008)	(0.017)
Total pop. growth	0.683**	0.968**
	(0.277)	(0.385)
Coups prev. decade (lagged)	0.064	0.199
	(0.075)	(0.184)
Constant	0.305	1.635
	(2.242)	(3.837)
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	6,587	6,448
Number of countries	141	141

Table B8: Entropy balancing using the Marshall dataset of coups d'état shows that coups are associated with lower GDP growth by 1.5 percentage points in the same year, smaller than the estimate using the whole dataset but still statistically significant

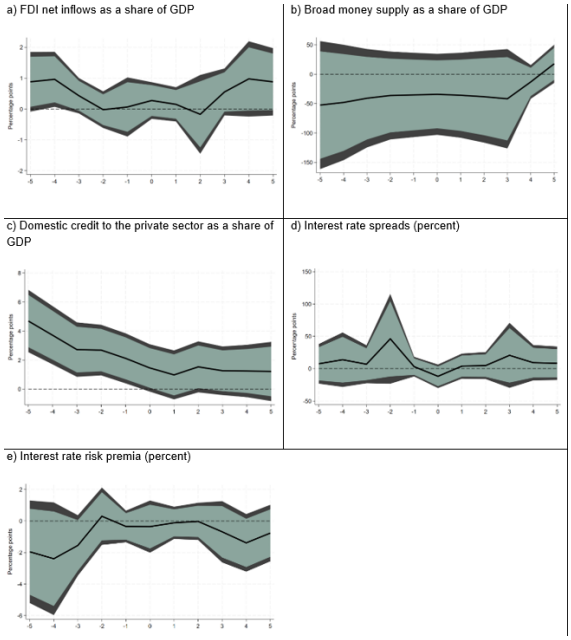
	(Year 0)	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Any coup dummy	-1.478***	-2.074***	-3.337***	-2.877**	-4.037***	-3.701*
	(0.522)	(0.613)	(0.917)	(1.279)	(1.472)	(1.876)
Lagged GDP growth	0.073	0.126	0.165*	0.053	-0.011	0.057
	(0.083)	(0.085)	(0.089)	(0.098)	(0.111)	(0.126)
Economic uncertainty	-1.023	-2.828	-5.567**	-4.428*	-4.189	-3.593
	(1.221)	(1.896)	(2.348)	(2.640)	(3.144)	(4.201)
Natural disaster	0.268	0.697	0.654	0.430	-0.013	0.613
	(0.516)	(0.651)	(0.868)	(1.101)	(1.189)	(1.366)
Technological disaster	-2.853	-2.975	-1.800	-6.120	-5.892	-6.735
	(2.028)	(2.322)	(2.546)	(6.122)	(6.248)	(7.303)
Natural res. rents (%)	-0.113**	-0.036	-0.058	-0.092	0.013	0.067
	(0.055)	(0.072)	(0.108)	(0.123)	(0.160)	(0.195)
Life expectancy (years)	0.161	0.163	0.161	0.198	0.365*	0.496**
	(0.134)	(0.112)	(0.155)	(0.186)	(0.196)	(0.248)
Merchandise trade (%)	0.015	0.003	-0.016	-0.053	-0.099	-0.158*
	(0.014)	(0.025)	(0.037)	(0.058)	(0.073)	(0.091)
Total pop. growth	1.558***	1.361***	1.388**	1.650**	1.682**	1.509*
	(0.195)	(0.338)	(0.540)	(0.655)	(0.693)	(0.777)
Coups prev. decade (lagged)	0.018	0.093	0.062	0.147	0.296	0.623
	(0.138)	(0.283)	(0.401)	(0.526)	(0.627)	(0.751)
Constant	-7.548	-0.725	5.762	16.894*	23.741**	26.489**
	(5.804)	(4.768)	(6.952)	(8.929)	(9.647)	(11.573)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,587	6,448	6,309	6,17	6,03	5,889
R-squared	0.426	0.409	0.420	0.442	0.477	0.495

Table B9: Event study analysis shows that the growth rates of all expenditure components of GDP are lower on average in the same year that a country experiences a coup d'état



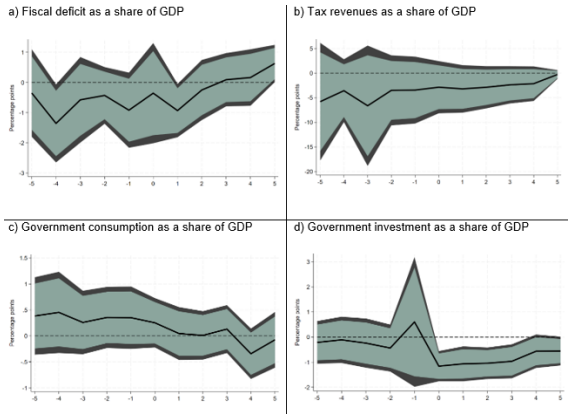
Source: Author's calculations. The lighter shaded areas indicate 90 percent confidence intervals and the darker shaded areas indicate 95 percent confidence intervals. All results are based on event study regressions with no control variables.

Table B10: Event study analysis shows that monetary and credit indicators do not generally move in a statistically significant way in the year that a country experiences a coup d'état



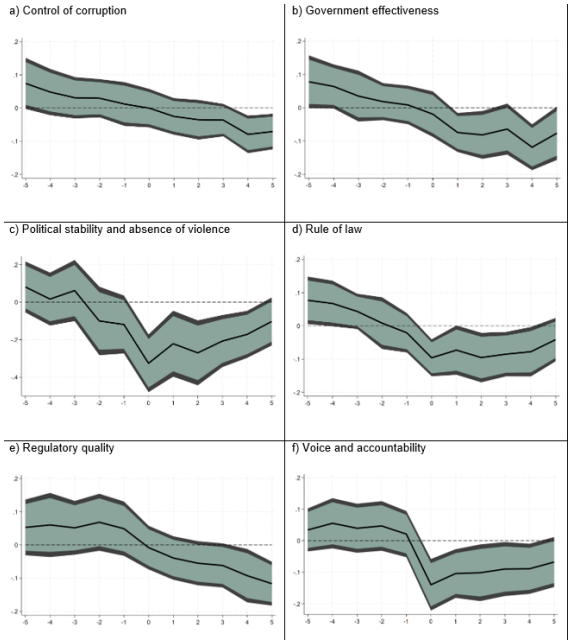
Source: Author's calculations. The lighter shaded areas indicate 90 percent confidence intervals and the darker shaded areas indicate 95 percent confidence intervals. All results are based on event study regressions with no control variables.

Table B11: Event study analysis shows that fiscal indicators do not generally move in a statistically significant way in the year that a country experiences a coup d'état



Source: Author's calculations. The lighter shaded areas indicate 90 percent confidence intervals and the darker shaded areas indicate 95 percent confidence intervals. All results are based on event study regressions with no control variables.

Table B12: Event study analysis shows that Worl Bank Governance Indicators are typically on a declining trend before the occurrence of a coup d'état



Source: Author's calculations. The lighter shaded areas indicate 90 percent confidence intervals and the darker shaded areas indicate 95 percent confidence intervals. All results are based on event study regressions with no control variables.

Table B13: Entropy balancing estimations show that the growth rates of all the components of GDP are lower in the year of coups d'état than in other cases and that the differences are statistically significant

	(GDP)	(Private consumption)	(Government consumption)	(Gross fixed capital formation)	(Imports)	(Exports)
Any coup dummy	-2.286***	-2.398***	-1.344	-13.915**	-5.494***	-2.761***
	(0.367)	(0.672)	(1.024)	(5.912)	(1.396)	(0.984)
Lagged dependent variable	0.070	0.051	-0.077*	-0.179***	-0.021	0.001
	(0.081)	(0.071)	(0.042)	(0.035)	(0.054)	(0.080)
Economic uncertainty	-0.483	1.001	-4.812	-55.174	-3.664	-1.342
	(1.214)	(2.334)	(2.960)	(51.368)	(3.775)	(4.956)
Natural disaster	0.330	-0.385	-0.325	-1.304	-0.883	0.872
	(0.517)	(0.982)	(1.224)	(6.195)	(2.075)	(1.944)
Technological disaster	-3.166	-3.046	1.600	-20.604	0.802	5.465
	(1.951)	(1.930)	(4.527)	(29.537)	(3.331)	(8.045)
Natural res. rents (%)	-0.110**	-0.065	0.227*	-0.854	0.112	0.044
	(0.054)	(0.102)	(0.134)	(0.831)	(0.155)	(0.212)
Life expectancy (years)	0.180	0.171	0.354*	-2.780	-0.106	0.363
	(0.125)	(0.110)	(0.210)	(2.858)	(0.237)	(0.277)
Merchandise trade (%)	0.011	0.050	-0.022	0.043	0.063	0.001
	(0.014)	(0.031)	(0.049)	(0.186)	(0.065)	(0.087)
Total pop. growth	1.482***	0.736**	2.675***	13.403	0.229	2.557***
	(0.187)	(0.340)	(0.235)	(10.129)	(0.616)	(0.464)
Coups prev. decade (lagged)	-0.069	-0.137	-0.249	10.121	0.360	-0.058
	(0.129)	(0.154)	(0.496)	(9.607)	(0.393)	(0.453)
Constant	-8.206	-0.993	-11.163	112.221	25.526**	-3.691
	(5.384)	(4.864)	(11.058)	(108.491)	(11.559)	(14.245)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,587	5,169	5,13	4,946	5,426	5,426
R-squared	0.437	0.308	0.328	0.211	0.235	0.269

Table B14: Entropy balancing estimations show that the contributions to GDP growth from consumption and investment are lower in the years where a country experienced a coup d'état, while the contribution from net trade is typically higher

	(GDP)	(Private consumption)	(Government consumption)	(Gross fixed capital formation)	(Net trade)
Any coup dummy	-2.286***	-1.047**	-0.126	-0.919***	0.990**
	(0.367)	(0.525)	(0.149)	(0.287)	(0.447)
Lagged dependent variable	0.070	0.101	0.012	0.051	-0.033*
	(0.081)	(0.092)	(0.037)	(0.079)	(0.019)
Economic uncertainty	-0.483	0.157	-0.762	-0.273	0.832
	(1.214)	(1.813)	(0.614)	(1.365)	(1.310)
Natural disaster	0.330	0.130	-0.060	0.224	0.728
	(0.517)	(0.742)	(0.177)	(0.315)	(0.513)
Technological disaster	-3.166	-1.240	0.618	1.765	-0.049
	(1.951)	(1.723)	(0.993)	(1.424)	(0.724)
Natural res. rents (%)	-0.110**	-0.079	0.029*	-0.018	-0.084
	(0.054)	(0.078)	(0.016)	(0.037)	(0.053)
Life expectancy (years)	0.180	0.109*	0.050**	0.032	-0.013
	(0.125)	(0.062)	(0.020)	(0.044)	(0.064)
Merchandise trade (%)	0.011	0.043**	-0.003	0.016	-0.009
	(0.014)	(0.021)	(0.005)	(0.013)	(0.024)
Total pop. growth	1.482***	0.661***	0.268***	0.303***	0.145*
	(0.187)	(0.223)	(0.034)	(0.110)	(0.081)
Coups prev. decade (lagged)	-0.069	-0.000	-0.059	0.009	-0.025
	(0.129)	(0.102)	(0.058)	(0.078)	(0.079)
Constant	-8.206	-2.857	-3.119***	-0.674	4.651*
	(5.384)	(2.668)	(1.063)	(1.939)	(2.723)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6,587	4,99	4,951	4,743	5,18
R-squared	0.437	0.313	0.334	0.363	0.195

Table B15: Entropy balancing estimations with the same set of control variables but with monetary indicators as the dependent variable do not show statistically significant results

	(FDI)	(Broad Money Supply)	(Credit to the Private Sector)	(Interest Rate Spreads)	(Risk Premium on Lending)
Any coup dummy	0.117	-0.305	-0.504	-3.531	-0.334
	(0.163)	(0.290)	(0.394)	(2.776)	(1.264)
Lagged dep. variable	0.391***	0.849***	0.922***	0.049***	0.528***
	(0.133)	(0.028)	(0.015)	(0.002)	(0.118)
Economic uncertainty	1.144	-1.389	-1.107	-12.167	0.706
	(0.761)	(1.055)	(0.713)	(9.861)	(1.941)
Natural disaster	0.137	-0.351	0.207	3.495	-0.770*
	(0.178)	(0.421)	(0.199)	(2.595)	(0.427)
Tech. disaster	0.075	2.671	-0.213	3.365	0.890
	(0.412)	(1.674)	(0.342)	(2.269)	(2.281)
Natural res. rents (%)	-0.020	-0.018	-0.040**	0.205	-0.097
	(0.022)	(0.035)	(0.016)	(0.140)	(0.069)
Life expectancy (yrs)	0.048**	0.047*	-0.092	-0.524	-0.029
	(0.019)	(0.028)	(0.083)	(0.417)	(0.126)
Merch. trade (%)	0.007	0.080***	0.035***	-0.040	-0.006
	(0.011)	(0.025)	(0.010)	(0.062)	(0.018)
Total pop. growth	-0.052	-0.305***	-0.032	0.245	1.607***
	(0.069)	(0.093)	(0.083)	(0.284)	(0.296)
Coups prev. decade (lgd)	-0.014	-0.001	0.218***	-0.931	-0.329
	(0.057)	(0.103)	(0.078)	(1.114)	(0.281)
Constant	-3.378***	0.312	2.818	47.398**	1.168
	(1.064)	(1.254)	(3.654)	(19.616)	(5.234)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6,459	5,443	4,903	2,801	1,577
R-squared	0.542	0.955	0.971	0.551	0.854

Table B16: : Entropy balancing estimations with the same set of control variables but with fiscal indicators as the dependent variable generally do not show statistically significant results, although government investment is found to fall during coup years

[t]

	(Fiscal Deficit)	(Tax Revenues)	(Government Consumption)	(Government Investment)
Any coup dummy	0.442	-0.288	-0.065	-1.100***
	(0.391)	(0.226)	(0.175)	(0.292)
Lagged dep. variable	0.563***	1.021***	0.902***	0.212***
	(0.033)	(0.006)	(0.023)	(0.047)
Economic uncertainty	-0.249	0.579	1.190*	-2.707***
	(0.960)	(0.473)	(0.700)	(0.830)
Natural disaster	0.558***	-0.143	-0.386**	0.061
	(0.213)	(0.174)	(0.166)	(0.286)
Technological disaster	-1.764*	-0.438	0.464	1.843
	(0.910)	(0.371)	(0.659)	(1.307)
Natural res. rents (%)	0.158**	-0.006	-0.009	0.036
	(0.079)	(0.026)	(0.022)	(0.031)
Life expectancy (years)	-0.072	-0.065***	-0.042	0.100**
	(0.073)	(0.019)	(0.033)	(0.040)
Merchandise trade (%)	0.018**	0.020**	0.021**	0.012
	(0.009)	(0.009)	(0.010)	(0.010)
Total pop. growth	1.000	0.061	0.021	0.010
	(0.738)	(0.074)	(0.049)	(0.056)
Coups prev. decade (lgd)	0.012	0.098	-0.018	-0.330***
	(0.089)	(0.066)	(0.049)	(0.120)
Constant	-0.680	1.258	3.255**	0.349
	(2.809)	(1.626)	(1.248)	(2.069)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	3,316	3,497	6,054	2,371
R-squared	0.705	0.993	0.925	0.734

Table B17: Ordinary least squares estimations with a sanctions dummy variable and an interaction with the coup d'état dummy variable and the same set of control variables show that coups have a larger negative impact on GDP growth when they coincide with sanctions

	(Financial sanctions)	(Trade sanctions)	(Travel sanctions)	(Arms sanctions)	(Military sanctions)	(Other sanctions)
Any coup dummy	-1.374***	-2.003***	-2.078***	-1.268***	-1.676***	-2.328***
	(0.450)	(0.434)	(0.466)	(0.363)	(0.496)	(0.499)
Sanctions dummy	-0.192	-0.821***	0.374	0.464	-0.159	0.010
	(0.267)	(0.301)	(0.338)	(0.324)	(0.299)	(0.311)
Coup * Sanctions interaction	-2.901***	-4.336**	-3.476*	-4.987***	-3.364***	-1.229
	(0.979)	(1.981)	(1.924)	(1.520)	(1.273)	(0.747)
Lagged GDP growth	0.184***	0.181***	0.185***	0.184***	0.184***	0.185***
	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)
Economic uncertainty	-1.265**	-1.288**	-1.271**	-1.272**	-1.305**	-1.288**
	(0.562)	(0.561)	(0.560)	(0.564)	(0.562)	(0.562)
Natural disaster	-0.056	-0.069	-0.057	-0.053	-0.056	-0.059
	(0.150)	(0.151)	(0.148)	(0.149)	(0.150)	(0.148)
Technological disaster	-0.911	-0.952	-0.976	-0.883	-1.023	-0.980
	(0.934)	(0.973)	(0.952)	(0.913)	(0.967)	(0.954)
Natural res. rents (%)	0.020	0.019	0.020	0.021	0.020	0.019
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Life expectancy (years)	0.089**	0.082*	0.096**	0.089**	0.089**	0.092**
	(0.044)	(0.045)	(0.044)	(0.043)	(0.044)	(0.044)
Merchandise trade (%)	0.011	0.012	0.012	0.013	0.012	0.012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Total pop. growth	0.682**	0.689**	0.687**	0.682**	0.690**	0.685**
	(0.277)	(0.270)	(0.276)	(0.281)	(0.274)	(0.276)
Coups prev. decade (lagged)	0.061	0.063	0.054	0.047	0.068	0.063
	(0.073)	(0.079)	(0.075)	(0.074)	(0.074)	(0.075)
Constant	0.503	0.527	-0.285	-0.069	0.455	0.219
	(2.305)	(2.268)	(2.273)	(2.212)	(2.189)	(2.264)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,587	6,587	6,587	6,587	6,587	6,587
R-squared	0.228	0.230	0.227	0.230	0.228	0.226

Chapter 3

Growth Resilience After Internal Armed Conflicts in African countries

This chapter[1] is under submission in *Defence and Peace Economics*.

Abstract

Armed conflicts are widely acknowledged as significant obstacles to economic stability and growth. This study analyzes how African countries recover economically after internal conflicts, focusing on endogeneity issues related to reverse causality. We use the entropy balancing method and find evidence of an economic catch-up effect in the post-conflict period. The analysis of transmission channels reveals that increased investment, consumption, and trade are the primary drivers of post-conflict economic recovery. The cumulative impact of growth is estimated at 2 percentage points in the first year, increasing only slightly to 2.5 percentage points by the fifth year. This modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict. We perform a series of robustness checks to validate our results, ensuring the consistency and reliability of our estimates across various specifications.

Keywords: • after armed conflict • economic growth • resilience
JEL Classifications: O470,E37

[1]The paper was presented at the CERDI doctoral students' seminar, and I appreciate all the members of CERDI who provided me with insightful comments and suggestions.It has been also presented at the 8th International Ph.D. Meeting in Economics, hosted by the University of Macedonia.

3.1 Introduction

Since the end of the Second World War, armed conflicts have increasingly localized in developing countries, particularly in sub-Saharan Africa (Blattman and Miguel, 2010). These conflicts are primarily internal and can have various determinants, but a common thread is the need for financing (Hugon, 2003). This necessity becomes especially clear in the post-conflict period, which entails substantial economic costs for reconstruction and achieving sustainable peace. The effects of armed conflict on economic activity are well-documented in theoretical and empirical literature. Conflicts negatively impact economic activity to varying degrees, depending on their type and intensity, and they also produce externalities that affect neighboring or partner countries (Fearon and Laitin, 2003; Blattman and Miguel, 2010; Collier, 2004; Collier and Hoeffler, 2002b; Novta and Pugacheva, 2021; Phillips, 2015; McGuirk and Nunn, 2020; Jacquemot, 2009; Fang et al., 2020). However, is the post-internal armed conflict situation favorable to growth enough to ensure recovery? Despite the extensive research on the economic effects of conflict, there is relatively little work focusing on post-internal armed conflict growth in Africa.

Collier (2004) was among the first to empirically analyze the effects of economic policies on post-conflict growth. Their results indicate that official development assistance is particularly effective in restoring economic activity in the unique context of post-conflict situations. Using a dynamic panel model estimated via the GMM method, Cevik and Rahmati (2015) find that the risk of conflict recurrence is a significant determinant of post-conflict growth. This approach considers the endogeneity bias between growth and post-conflict periods, revealing that the risk of returning conflict significantly influences post-conflict growth beyond demographic, economic, and institutional variables. Dahl and Høyland (2012) investigates how growth affects conflict risk. The findings indicate that the relationship between growth and conflict risk is mixed, as conflict studies often depend on the definitions of conflict and the databases used. Demekas et al. (2002) explore the impact of post-conflict aid on growth, capital accumulation, and welfare. They highlight that post-conflict aid's effects differ significantly from traditional development aid's. Their model is based on a Cobb-Douglas production function. On the one hand, post-conflict aid ensures the minimum continuity of activities, while on the other, it facilitates the reconstruction of the country following the conflict. In the long term, the authors find that reconstruction aid positively influences social capital and growth, whereas humanitarian aid tends to diminish human capital and growth over time.

Our main research question is: Is the post-internal armed conflict situation favorable to growth in Africa? To answer this question, we make the following basic assumption: The post-internal armed conflict period could be a period of growth par excellence with the resumption of economic activities. This study makes three main contributions to the literature review. First, we present empirical evidence from the post-conflict economic recovery in Africa. We contribute to the study of Collier (2004); Suhrke et al. (2005); Cevik and Rahmati (2015) using the Entropy Balancing method to address endogeneity concerns between post-conflict and growth. Second, we analyze the channels through which post-conflict growth is channeled. Which macroeconomic aggregate drives growth in post-conflict situations? The analysis of channels allows us to make more specific economic policy implications. Hill and Menon (2014) analyzes Cambodia's economic recovery from genocide, attributing it mainly to trade openness and investment channels. We find that channels such as consumption, foreign direct investment (FDI), exports, and imports play a crucial role in the reconstruction phase after a conflict period in Africa. Third, we also estimated the impact of post-conflict over time. The study of Collier (2004) estimates the effect on the first year after the conflicts. Using the local projection method, we estimate the cumulative effect of the post-conflict on growth. This cumulative effect helps us understand the growth trajectory during the post-conflict period and enables us to make more tailored economic policy recommendations. Overall, the study also contributes to the literature on the effects of the post-conflict period on economic activity and the determinants that promote growth in the post-conflict period. This study aims to make policy implications for promoting greater resilience in post-conflict countries and fostering economic activity recovery.

Our findings suggest an economic catch-up effect in which countries experience accelerated growth following the cessation of conflict. We use the entropy-balancing method and find evidence of an economic catch-up effect in the post-conflict period. Analysis of transmission channels reveals that increased investment and trade are the primary drivers of post-conflict economic expansion, particularly in Africa. Using the local projection method, we find that the cumulative impact of this growth is estimated at 2 percentage points in the first year, increasing to 2.5 percentage points in the fifth year. This modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict.

The rest of the study is structured as follows. In Section 2, we present data summary and stylized facts. Section 3 deals with the empirical analysis and the main results.

The sensitivity analysis of the results is discussed in Section 4. Finally, Section 5 concludes the study and highlights the main policy implications.

3.2 Literature Review

Research on post-conflict economic resilience and recovery remains comparatively mixed. Collier and Hoeffler (2004) empirically analyze the effects of aid and economic policies on post-conflict growth. This study builds on a related paper by (Collier and Dollar, 2002), which examines the effectiveness of aid on growth through the poverty-reduction channel. They include the post-conflict period in the latter to consider the effects of aid and economic policies on post-conflict growth. Collier and Hoeffler (2004) define the post-conflict period based on a decade without conflict (from 1 to 10 years after the end of the conflict or the beginning of peace). The results show that official development assistance is particularly effective in restoring economic activity in the particular post-conflict context. However, this effectiveness is more significant when it is followed by social and economic policies and by good-quality institutions during the first three years after the conflict. Hence, there are diminishing returns to official aid over time. Collier and Hoeffler (2004)'s analysis is limited by the small number of samples of post-conflict countries from 1970-93. These limitations may bias the statistical analysis, which is highly subject to sample size. Suhrke et al. (2005) raise concerns about identifying the post-conflict period, challenging the methods used by Collier (2004). The definition based on a threshold of combat deaths is not always reliable, as the cessation of fighting or attacks does not necessarily signal the beginning of peace. To address this shortcoming, Suhrke et al. (2005) propose that the post-conflict period should also consider indicators such as institutional reforms to consolidate peace, peace agreements between conflicting parties, UN-supervised ceasefires, and the arrest and trial of rebel groups. According to Del Castillo (2001), the post-conflict period requires synergy between the country's reconstruction and development. The authors find that international organizations have a significant role in the country's transition to sustainable stability and a return to regular economic activity. Hill and Menon (2014) show empirical evidence of Cambodia's economic recovery from the genocide in 1998. The results show that trade openness and the investment channel mainly explain this recovery. Beyond these channels, post-conflict capital accumulation is also an essential factor. Hill and Menon (2014) concludes that even in the post-conflict period, the conflict has a persistent negative effect on human capital accumulation. This ultimately impacts long-term growth. Beyond economic

recovery, post-conflict countries face the challenge of reducing conflict risk. The approach used by Collier et al. (2008) depends on the risk of return to conflict. The results show a complementary relationship between economic variables and the risk of conflict in the post-conflict period, promoting sustainable stability. Post-conflict countries are fragile, with an average risk of return to conflict of 46%.

In the post-conflict situations, we can identify three possible scenarios. (i) The catch-up effect: In this scenario, post-conflict countries gradually return to their pre-conflict growth levels. The adverse effects of the conflict often become more apparent over time. Research by Del Castillo (2001) indicates that international organizations significantly facilitate a country's transition to sustainable stability and the resumption of regular economic activities. Additionally, Bleaney and Dimico (2011) find that, during the post-conflict period, economic recovery is strongly supported by official development assistance. Similarly, Elbadawi et al. (2007) assert that aid is crucial in promoting catch-up growth after conflict. Beyond official development assistance, implementing policy reforms and investing in peacekeeping operations—whether by the United Nations or the post-conflict country itself—are vital in these fragile circumstances. (ii) The overshoot effect: This concept relates to Schumpeter's theory of creative destruction Schumpeter (1942). During conflicts, human and physical capital are often destroyed. However, countries with an effective governing apparatus may emerge from conflict with a higher growth trajectory than before. Reconstruction can utilize improved human and capital resources compared to before the conflict. (iii) The permanent conflict effect: This scenario is marked by a significant risk of renewed conflict following the initial conflict. The extensive destruction of productive resources can lead to a conflict trap where operational factors fail to generate growth. Additionally, there is uncertainty regarding the resurgence of conflict, often exacerbated by the proliferation of weapons during conflict Pézard and Florquin (2007). Collier et al. (2008) employs a risk function concerning the likelihood of returning to conflict and finds that economic and social variables must work together to promote sustainable stability. Hill and Menon (2014) concludes that even during the post-conflict period, the effects of the conflict persistently hinder human capital accumulation, ultimately affecting long-term growth.

Although substantial research has been conducted, important gaps remain in understanding post-conflict economic resilience. Existing studies provide mitigating evidence on the ability of economies to recover, with substantial heterogeneity in the speed, magnitude, and durability of recovery across countries and conflict episodes. The literature also lacks consensus on the key channels underlying resilience. Moreover, most analyses focus on short-term or average effects, leaving the dynamic

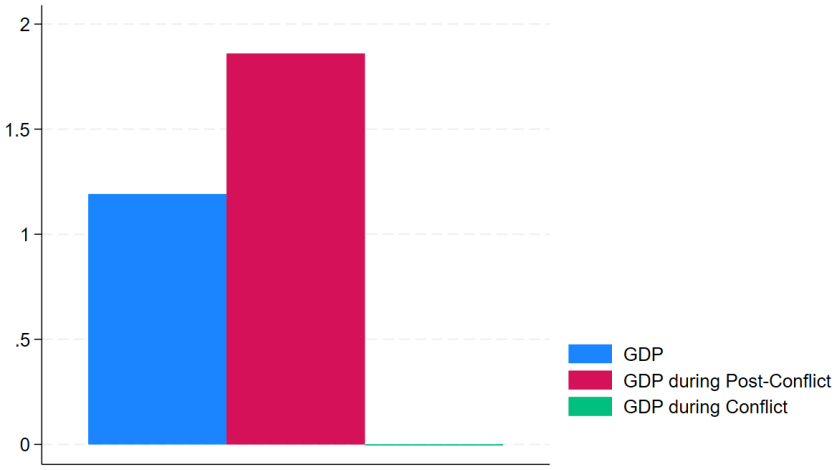
trajectory of post-conflict recovery and the cumulative impact of conflict cessation on growth largely unexplored. Comparative studies across regions or structural contexts are rare, limiting understanding of cross-country heterogeneity and the conditions under which recovery is most likely to occur. These gaps underscore the need for systematic empirical research that identifies the channels, magnitudes, and time dynamics of post-conflict recovery, providing critical guidance for policies aimed at fostering sustainable economic resilience and preventing a relapse into conflict.

3.3 Data Summary and Stylized Facts

Among the 54 African countries, 34 have experienced internal armed conflicts between 1989 and 2023. Internal armed conflict (UCDP/PRIO database) is defined as "a contested incompatibility that involves government or territory where the use of armed force between two parties, at least one of which is the government of a state, results in at least 25 combat-related deaths in a calendar year". Countries such as Ethiopia, Sudan, Angola, Uganda, and Chad have experienced the most armed conflicts, i.e., a cumulative 20 years of internal conflicts. We also note that countries such as Lesotho, Gambia, and Togo experienced one year of conflict with very low intensity. The African continent has generally experienced more low-intensity than high-intensity internal armed conflicts. Post-internal armed conflict is defined as the end of internal armed conflicts. It is a dummy variable that indicates whether the conflict is inactive the following year and whether an episode of the conflict ends. If the conflict is inactive in the following year(s), this variable is coded 1. Otherwise, it is coded 0. The dependent variable is GDP per capita growth. It measures the country's per capita wealth change in the sample between periods t and t-1. This variable comes from the World Development Indicators database. The list of all the variables'sources is detailed in the appendix (Table C2).

Figure 3.1 presents the average economic growth of the continent over the period 1989-2023. Despite macroeconomic fluctuations, African annual GDP growth follows an average trajectory of 1.2% between 1989 and 2023 (blue bar). Disturbed by the effects of internal armed conflicts, the average growth rate is almost zero during conflict periods, at 0.07% (green bar). This average is consistent with the economic literature on the adverse effects of conflict on growth Blattman and Miguel (2010); Fearon and Laitin (2003); Collier and Hoeffler (2002b). As for the post-internal armed conflict period (red bar), we find that it is favorable to the recovery of economic activity. During this period, we find that the average growth rate is 1.8%.

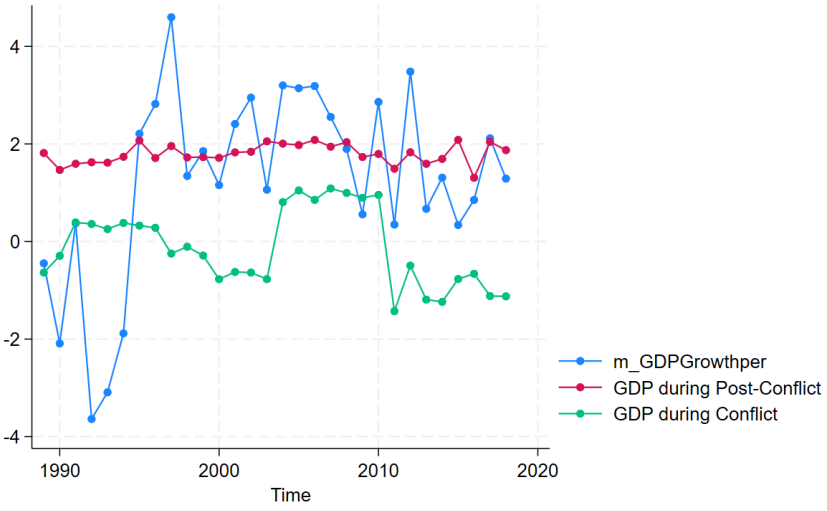
Figure 3.1: Mean Economic growth in Africa (1990-2023)



Source : Author's calculations. Data from UCDP/PRIO, WDI. The growth trend is calculated based on the average growth rate. The bleu bar graph represents general GDP. The red bar graph represents GDP during the post-conflict. The green bar graph represents GDP during the conflict.

This average exceeds the general average for the period, which is 0.6%.

Figure 3.2: Economic growth in Africa (1989-2023)

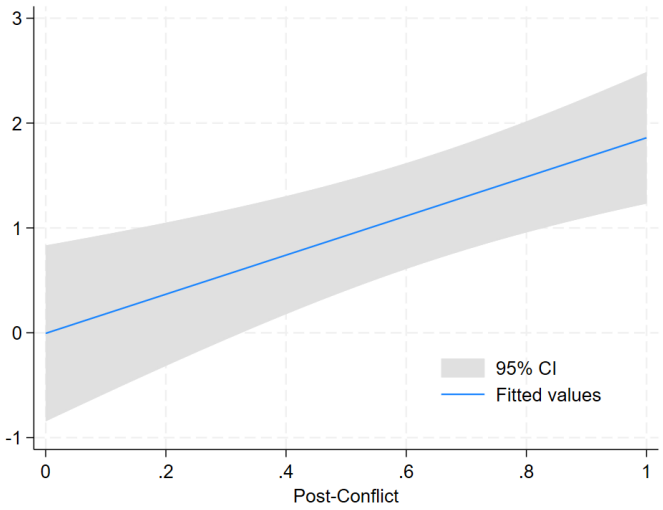


Source : Author's calculations. Data from UCDP/PRIO, WDI. The growth trend is calculated based on the average growth rate. The continuously blue curve represents general GDP. The red dashed line represents GDP during the post-conflict period. The green dotted line represents GDP during conflict period.

Figure 3.2 shows Africa's economic growth evolution from 1989-2023. The African economy, mainly extractive and agricultural due to its natural resource potential,

is following a growth trajectory that numerous crises have heavily impacted. The growth trend is calculated based on the average growth rate. We also consider this evolution during the conflict and post-conflict period. We see from the continuous bleu curve that, in general, African growth has been on an upward trend since 1995. The continent's economic performance was significantly impacted by the pandemic in 2019, registering a decline or even a slowdown in economic activity. Beyond the health crisis, economic performance is also impacted by the security and instability crisis that has plagued the continent for several decades. The green dotted line in Figure 3.2 shows us the growth during the period of armed conflict. The African economy was negatively impacted by armed conflict over the study period. This finding is consistent with the theoretical and empirical literature on the effects of conflict on economic activity Blattman and Miguel (2010); Fearon and Laitin (2003); Collier and Hoeffler (2002b). The red dashed line in Figure 3.2 represents growth in the post-conflict period. We note that during this period, there is growth. However, this level of growth is relatively stable over the period. This is significant because the results of the literature on the effects of the post-conflict period on growth are mixed Collier et al. (2008), Dahl and Høyland (2012). Through these different averages, we see that there is more growth in the post-conflict period. The resumption of economic activity could explain this after a period of decline and the assistance of international institutions to support and guarantee sustainable stability.

Figure 3.3: Correlation between growth and post-internal armed conflict



Source : Author's calculations. Data from UCDP/PRIO, WDI

Figure 3.3 shows the correlation between growth and the post-internal armed conflict period with a 95% confidence interval. We see a positive correlation between growth

and the post-conflict period. This means that the post-internal armed conflict period coincides with economic growth. This correlation is also verified in the work of Suhrke et al. (2005); Cevik and Rahmati (2015); Collier et al. (2008). Beyond these salient facts, we empirically analyze the relationship between growth and Africa's post-internal armed conflict period.

3.4 Empirical Approach and Main Results

To test post-internal armed conflict growth, we use the following equation (3.1).

$$Y_{it} = \alpha_1 Y_{i,t-1} + \alpha_2 Post\_conflict_{it} + \sum_{n=1}^{N} \alpha_n X_{nit} + \gamma_i + \alpha_t + \epsilon_{it}, \qquad (3.1)$$

where i denotes country i and t denotes year t, with t running from 1989 to 2023.

Y_{it} represents the GDP per capita growth of the country i between period t and $t-1$. Under the assumption that growth in period t depends on the country's growth in $t-1$, we add the lag of GDP per capita lag among the explanatory variables. $Post\_conflict$ represents the variable of interest in the study; it is coded 1 (post-internal armed conflict) and 0 (otherwise).To properly specify the model, X_{nit} represents the control variables: natural resources rents of GDP, political stability/absence of terrorism, government effectiveness, unemployment, country economic uncertainty index and Autocracy Democracy Index. These control variables are chosen based on the literature review. γ_i and α_t represent individual and time fixed effects, respectively. ϵ_{it} represents the error terms.

3.4.1 Ordinary Least Squares Method

Table 3.1 presents the estimation results of equation (3.1) using the Ordinary Least Squares (OLS) method. The findings indicate that post-conflict countries experience significant economic recovery, although other factors, such as political and economic uncertainty, have adverse effects. Government effectiveness and the political regime also positively influence growth. In Column 1, post-conflict growth is estimated at 1.86 percentage points on average without including control variables or fixed effects. After incorporating control variables in Column 2, this growth adjusts slightly to 1.70 percentage points. Column 3, including control variables and fixed effects for countries and years, results in an estimated 1.72 percentage points of post-conflict

Table 3.1: Ordinary Least Squares Results

Dependent variable: GDP Growth per capita	1	2	3
Post-conflict	1.865***	1.701***	1.729**
	(0.524)	(0.654)	(0.821)
Lag.GDP per capita		0.000	0.005***
		(0.000)	(0.001)
Natural Resources Rents as a % of GDP		0.042	0.032
		(0.048)	(0.075)
Political Stability and Absence of Terrorism		-0.538	-1.137*
		(0.401)	(0.652)
Government Effectiveness		1.304**	0.388
		(0.652)	(0.630)
Unemployment Rate		-0.087**	0.092
		(0.036)	(0.082)
Country Uncertainty Index		-4.420***	-4.095***
		(1.121)	(1.335)
Autocracy Democracy Index		0.138***	0.290***
		(0.047)	(0.110)
Observations	1,146	907	907
R-squared	0.011	0.179	0.235
Control Variables	No	Yes	Yes
Year Fixed Effects	No	No	Yes
Country Fixed Effects	No	No	Yes

Source : Author's calculations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

growth. The increase in R^2 from 0.011 in Column 1 to 0.235 in Column 3 suggests that adding explanatory variables and country-fixed effects improves the model's ability to explain GDP growth. Including fixed effects accounts for country-specific characteristics, strengthening the robustness of the results.

Initial conditions influence economic growth. The lagged GDP per capita (t-1) is significant at 1%. Although the effect is minor (0.005 percentage points), it is positive, indicating that higher initial GDP per capita levels are linked to more significant growth. This finding highlights the importance of initial conditions in promoting African wealth creation. Despite Africa's substantial natural resource potential, the variable representing Natural Resource Rents as a percentage of GDP is insignificant across all columns. This indicates that the share of GDP derived from natural resource rents has no noticeable effect on economic growth. Government effectiveness emerges as significant in Column 2 but loses its significance in Column 3, suggesting that its impact on growth may be sensitive to the model specifications. It is associated with a growth increase of 1.3 percentage points. Political stability and the absence of terrorism become significant at the 10% level in Column 3, showing a negative effect of -1.137 percentage points. This indicates that greater political instability is associated with lower economic growth. The unemployment rate negatively and significantly impacts growth in Column 2 (-0.087 percentage points); however, this effect becomes insignificant in Column 3. This could suggest that other uncontrolled variables may influence the relationship between unemployment and GDP growth. In post-conflict periods, economic uncertainty remains a critical risk factor. The Country Uncertainty Index exhibits a negative and significant effect at the 1% level in both Columns 2 and 3, indicating that increased uncertainty significantly reduces GDP growth. The Autocracy-Democracy Index shows a positive and significant effect at the 1% level, suggesting that more democratic regimes are linked to higher economic growth in post-conflict periods.

One of the key limitations of this empirical strategy is the potential endogeneity between economic growth and the post-conflict period. The post-conflict environment may create favorable conditions for economic recovery, as stability often facilitates investment, reconstruction, and institutional strengthening. However, the relationship can also work in the opposite direction—economic growth itself may contribute to sustained stability in post-conflict settings, as a stronger economy can reduce the likelihood of renewed conflict. Since economic conditions are one of the major determinants of conflict, failing to account for this two-way causality could lead to biased estimates. The issue of endogeneity has been highlighted in several previous studies, including Collier et al. (2008); Hartzell et al. (2001); Licklider (1995), which emphasize that economic factors play a crucial role in both conflict and post-conflict stability. The Ordinary Least Squares (OLS) method does not control for potential reverse causality between economic growth and post-conflict.

Furthermore, another methodological concern arises from the potential correlation between the lagged dependent variable and the fixed effects, as pointed out by Nickell (1981). This correlation can introduce a bias in the estimation, particularly in dynamic panel models where fixed effects are included. If not properly accounted for, these limitations may compromise the validity of the results. We employ the entropy balancing method to mitigate these biases and improve the reliability of our estimates. This approach ensures that the treatment and control groups are balanced across key covariates, helping to reduce selection bias and improve causal inference. By applying this method, we aim to strengthen the robustness of our findings and provide a more accurate assessment of the relationship between economic growth and post-conflict recovery.

3.4.2 Addressing the endogeneity issue: Entropy Balancing Method

One of the more sophisticated matching methods is entropy balancing Hainmueller (2012). Compared to the difference-in-difference propensity score matching, entropy balancing does not require the specification of an empirical model for treatment group selection. Entropy balancing is a data-matching method that balances covariates between treatment and control groups. It reduces selection bias by ensuring that covariate distributions are similar in both groups. For balanced matching, the entropy method adjusts the covariate weights in the control group to match the covariate distributions in the treatment group. The occurrence of post-conflict represents the treatment. Observations with post-conflict represent the treated group, and observations without post-conflict represent the non-treated group. The following equation defines the average treatment effect (ATT) on government spending.

$$ATT = E[Yi1Ti = 1] - E[Yi0Ti = 1] \tag{3.2}$$

Yi represents our primary outcome variable (the GDP per capita growth). Ti represents our treatment variable (1 post-conflict and 0 otherwise). $E[Yi1Ti = 1]$ is the expected outcome after treatment and $E[Yi0Ti = 1]$ is the counterfactual outcome, i.e. the outcome in post-conflict countries if they had not experienced to conflict.

Post-conflict is not a random event. To consider the endogeneity problem, the matching approach creates a situation similar to random assignment with treated

and untreated units with similar pre-treatment characteristics. The resulting average treatment effect (ATT) can be formalized as follows.

$$ATT(x) = E[Yi1Ti = 1, X = x] - E[Yi0Ti = 0, X = x] \tag{3.3}$$

Table 3.2: Before: without weighting

	-1	-2	(3) = (2) - (1)		
	Post-conflict	No Post-conflict	Difference	T-test	P-value
L.GDP per capita	1636	1452	-184	-2.711	0.006
L.Natural Resources Rents of GD	10,47	15,28	4,81	7.039	0.000
L.Political Stability/Absence of Terrorism	-0,444	-1,225	-0,801	-14.402	0.000
L.Government Effectiveness	-0,650	-0,844	-0,194	-6.004	0.000
L.Unemployment	8,090	6,676	-1,414	-1.351	0.177
L.Country Economic Uncertainty Index	0,155	0,174	0,019	1.732	0.083
L.Autocracy Democracy Index	0,935	0,356	-0,579	-2.185	0.029

Source : Author's calculations.

Table 3.3: After: with weighting

	-1	-2	(3) = (2) - (1)		
	Post-conflict	No Post-conflict	Difference	T-test	P-value
L.GDP per capita	1636	1634	-2	0.01	0.988
L.Natural Resources Rents of GD	10,47	10,56	0,09	-0.13	0.895
L.Political Stability/Absence of Terrorism	-0,454	-0,468	-0,014	0.26	0.796
L.Government Effectiveness	-0,650	-0,653	-0,003	0.06	0,951
L.Unemployment	8,090	8,064	-0,026	0.05	0.959
L.Country Economic Uncertainty	0,155	0,155	0,000	-0.01	0.992
L.Autocracy Democracy Index	0,935	0,925	-0,01	0.03	0.977

Source : Author's calculations.

Where x is a vector of pretreatment covariates correlated with post-conflict and GDP growth. The entropy balancing method is a two-step process. The first step involves calculating and assigning covariate weights to the untreated units. The weight calculation is based on moments (mean, variance). To ensure good matching, the means of the covariates in the treatment groups must be equal to or very close to the means of the covariates in the control group after the weights have been added. So, the main difference between the two groups is post-conflict occurrence (Covariate Tables before 3.2 and after 3.3 adding weights, respectively).

In the second step, the weight obtained from entropy balancing is included in equation 1 to estimate the post-conflict growth. $E[Yi1Ti = 1, X =]$ is the GDP

growth for units that experienced post-conflict, $E[Yi0Ti = 0, X =]$ is the expected GDP growth for the control units. The study's unit of observation is the country-year level. Panel data are used to account for unobservable individual and temporal characteristics.

Table 3.4: Effects of Post-internal armed conflicts on growth (Entropy balancing method)

Dependent variable: GDP Growth per capita	1	2	3
Postconflict	2.122***	2.142**	2.203***
	(0.606)	(1.020)	(0.798)
Observations	906	906	906
R-squared	0.013	0.224	0.642
Control Variables	No	Yes	Yes
Year Fixed Effects	No	No	Yes
Fixed Effects	No	No	Yes

Source : Author's calculations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.4 presents the results obtained using the Entropy Balancing method, which offers a more robust estimation compared to the Ordinary Least Squares (OLS) method. The findings indicate that the coefficients estimated through entropy balancing are higher than those derived from OLS (2.2 versus 1.7), suggesting a post-conflict growth rate of 2.2 percentage points. Since entropy balancing effectively addresses endogeneity concerns, these results imply that the OLS estimates may have underestimated the true impact of post-conflict growth.

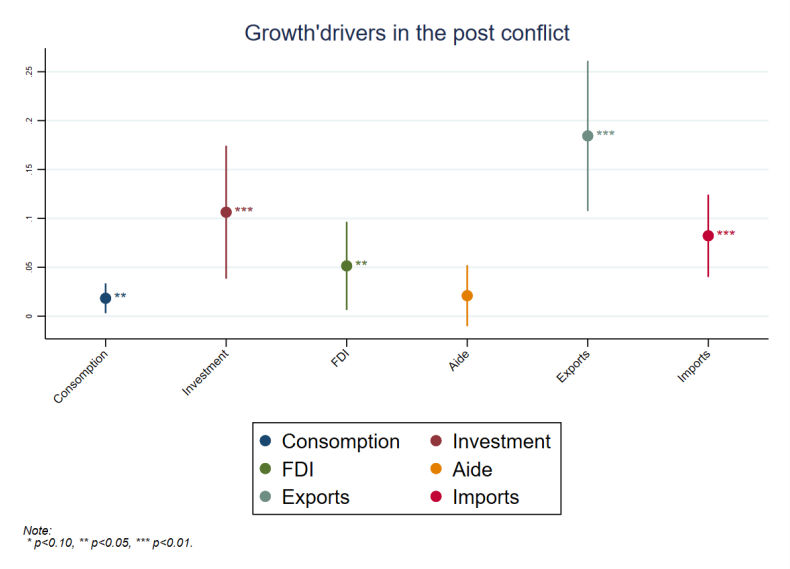
To further assess the robustness of these findings, we estimate different specifications. The results indicate post-conflict growth rates of 2.14 percentage points in Column 1 and 2.20 percentage points in Column 3. This consistency across specifications reinforces the conclusion that, following an internal conflict, countries tend to experience higher GDP per capita growth, assuming all other factors remain constant.

Moreover, the model's explanatory power significantly improves when applying entropy balancing. The R^2 increases from 0.224 in Model (1) to 0.642 in Model (2), demonstrating that incorporating fixed effects and using a more robust estimation technique enhances the model's ability to explain variations in GDP per capita growth. This further supports the argument that post-conflict economies

undergo a significant recovery process, which may be underestimated when using less sophisticated econometric techniques such as OLS. The increase in economic growth is likely driven by reconstruction efforts, post-crisis investments, and the restoration of economic stability.

3.4.3 Transmission Channels: What macroeconomic aggregates are driving growth after armed conflict?

Figure 3.4: Transmission Channels



Source : Author's calculations.

Understanding which macroeconomic aggregates drive growth in the post-conflict period is essential for shaping effective economic policies. Analyzing transmission channels allows us to determine how post-conflict growth is facilitated. To achieve this, we examine key macroeconomic aggregates: consumption, investment, aid, foreign direct investment (FDI), exports, and imports. Among these, investment and exports emerge as the primary drivers of post-conflict growth. Figure 3.4 presents the estimated macroeconomic aggregate during the post-conflict period. Empirical results indicate that consumption contributes significantly by 0.05 percentage points to economic growth. This finding aligns with existing literature Barro (1991), which suggests that while consumption can stimulate short-term growth, sustained economic expansion requires productive investment. Investment exhibits a strong positive and highly significant effect on post-conflict growth, contributing 1.3 percentage points. It is the second most important driver of growth in post-conflict economies in Africa. Investment plays a crucial role in rebuilding infrastructure

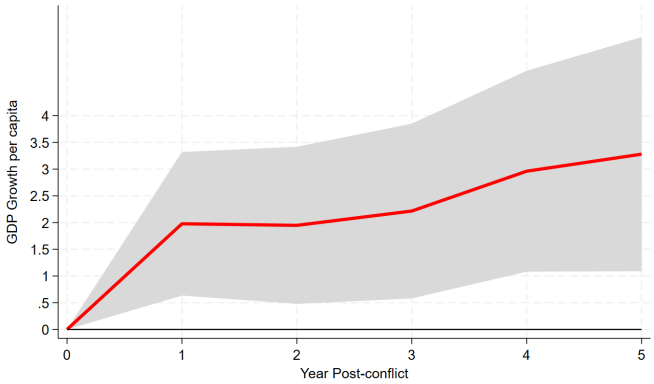
and restoring business confidence Collier (2004). Economic theory by Solow (1956) underscores the importance of investment in fostering long-term growth through capital accumulation and productivity enhancement. Foreign direct investment (FDI) contributes significantly to post-conflict growth, with an estimated impact of 0.5 percentage points. This effect can be attributed to the renewed attractiveness of the country during the post-conflict period, particularly in Africa. Borensztein et al. (1998) highlight that FDI provides capital and facilitates technology transfer and knowledge spillovers, which can enhance productivity and economic resilience. The impact of aid is positive but not statistically significant. However, in post-conflict settings, aid can stabilize by financing reconstruction and supporting essential public services Collier and Hoeffler (2002a). While aid inflows can provide short-term relief, their long-term effectiveness remains debated in the literature. Exports emerge as the primary driver of post-conflict growth in Africa, contributing an average of 1.7 percentage points. This result is consistent with Balassa (1978) findings. The continent's heavy dependence on raw material exports likely explains this result. Imports also significantly affect post-conflict growth, contributing 0.8 percentage points. However, their impact is lower than that of exports. This suggests that during the conflict phase, public decision-makers seek financing to sustain economic activity, and one major source of such financing comes from commodity trade through export revenues.

3.4.4 What is the effect of post-conflict growth over time?

We conclude that the post-conflict significantly positively impacts GDP per capita growth. However, we ask the following question:What is the effect of post-conflict growth over time? We use the local projections method Jordà (2005b) to consider the post-conflict over time. This method is based on impulse response functions (IRF) and allows us to capture the effect of a shock over time. The advantage of the local projections' method is that it considers the cumulative effects of the post-conflict period on growth and is robust to specification errors. It also captures the heterogeneity between post-conflict countries over the study period.

Figure 3.5 illustrates the impact of the post-conflict period on economic growth over time. The red line represents the central estimate, while the gray shaded areas indicate the 95% confidence intervals around these estimates. The results suggest that the positive effect of post-conflict situations on economic growth persists over time. The cumulative impact of growth is estimated at 2 percentage points in the first year, increasing only slightly to 2.5 percentage points by the fifth year. This

Figure 3.5: Local projection



Source : Author's calculations.

modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict. The combined impact of reconstruction efforts, international aid, the resurgence of investment, and trade primarily drive the recovery. However, the growth effect is not immediate—while there is an initial surge, it takes time to realize sustained improvement fully. Moreover, institutional and political factors play a critical role in shaping the trajectory of this recovery. Variations in the confidence intervals suggest that differences in governance, economic policies, and institutional reforms may influence how effectively post-conflict economies stabilize and grow. Overall, Figure 3.5 confirms that the post-conflict period is typically characterized by economic recovery, albeit following a non-linear trajectory. While an initial rebound is observed, the long-term growth prospects depend heavily on the institutional and economic policies adopted in the aftermath of the conflict. These results underscore the crucial role of stabilization and reconstruction strategies in ensuring a sustainable recovery in post-conflict African economies.

3.5 Robusness check

3.5.1 Heterogeneity Analysis

In the heterogeneity analysis, we consider the intensity and duration of the conflict. The post-armed-conflict period is marked by extreme fragility and uncertainty. We consider conflict intensity, duration, and Weight of conflict index in the post-conflict period to test the sensitivity of the results. Table 3.5, Column 1 shows that,

controlling the model by conflict intensity, the post-conflict period is positive and significant for growth. As the African continent is mainly affected by low-intensity conflicts, we can deduce that the internal post-conflict period is favorable to the recovery of economic activity. In column 2, controlling for conflict duration, we find that the post-conflict period is not statistically significant. In column 3, we have the Weight of Conflict Index. The post-conflict period remains favorable for growth. In Africa, the intensity of conflict is mainly low, which does not affect statistical economic recovery. However, the duration of the conflict significantly hinders economic recovery. A prolonged conflict creates more significant economic uncertainty and leads to population displacement.

Table 3.5: Sensitivity Analysis: Conflict Intensity, Duration, and Weight of Conflict Index

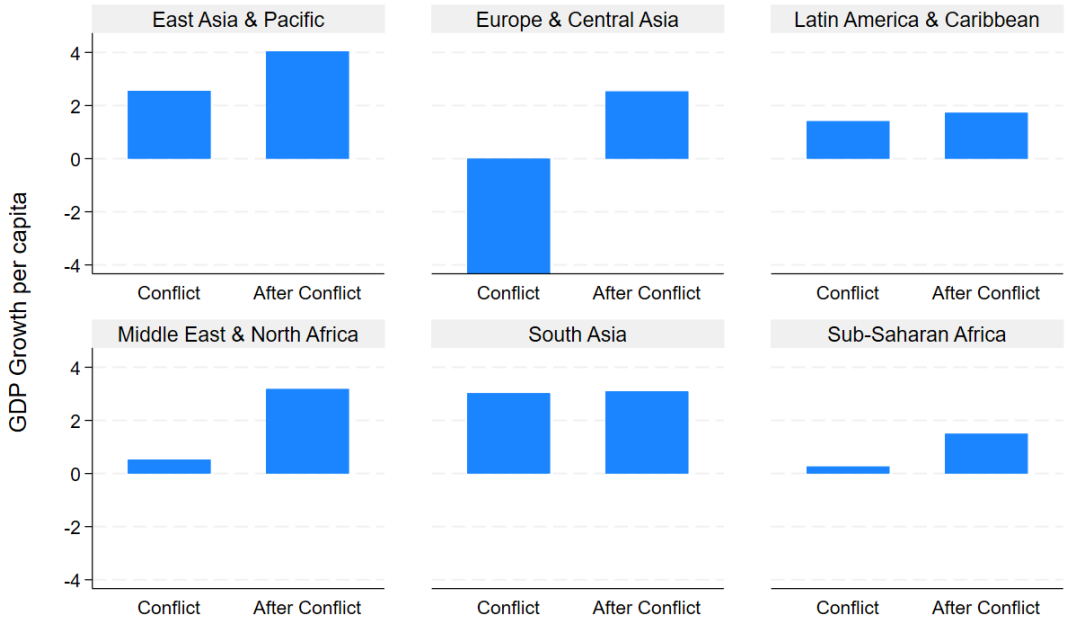
VARIABLES: GDP Growth per capita	1	2	3
Post-conflict	2.160***	2.068	2.200***
	(0.783)	(1.445)	(0.797)
Conflict intensity	-0.00012		
	(0.00012)		
Conflict duration		-0.00978	
		(0.07580)	
Weight of Conflict Index			-0.00001
			(0.00002)
Observations	906	906	846
R-squared	0.642	0.642	0.601
Control variables	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes

Source : Author's calculations. Robust standard errors in parentheses. ***p<0.01,**p<0.05,*p<0.1

We also explore differences by level of development. Table C3 in the appendix reports the results by countries' level of development, proxied by GDP per capita. Countries are classified by average GDP per capita, distinguishing those with above-average income (middle-income) from those with average or below-average income (low-income). This categorization allows us to assess whether countries with the highest GDP per capita in Africa disproportionately drive our baseline results. In middle-income countries (Column 1), the estimated effect of post-conflict periods on economic growth is weak and statistically insignificant. This indicates that exiting a conflict does not significantly impact economic growth in these nations, likely

due to their greater economic resilience and more diversified economies, which help to mitigate the adverse effects of conflict. In contrast, in low-income countries (Column 2), the post-conflict effect is substantial and statistically significant, with an estimated growth increase of 2.6 percentage points. This suggests that these economies experience a significant catch-up effect, with post-conflict recovery driven by increased investment, trade, and reconstruction efforts.

Figure 3.6: Beyond Africa: Growth after conflict by Region



Source : Author's calculations.

Figure 3.6 illustrates the differences in average GDP per capita growth during and after conflicts across various regions, highlighting significant variations in post-conflict economic performance. This variation aligns with the main findings, which indicate that African countries typically experience only a modest and short-lived recovery following conflict—approximately a 0.5 percentage point increase in cumulative growth between the first and fifth years after the conflict ends. Figure 3.6 shows that Sub-Saharan Africa has the weakest recovery among regions, with growth remaining close to zero during conflict and improving only marginally afterward. This pattern is consistent with the thesis's empirical evidence that post-conflict rebounds in Africa tend to be fragile, volatile, and easily reversed, reflecting persistent structural vulnerabilities such as low diversification, weak institutional capacity, and recurrent political instability.In contrast, regions such as East Asia & Pacific, Europe and Central Asia and South Asia demonstrate more robust post-conflict growth, which

aligns with the broader comparative literature suggesting that stronger institutions, deeper markets, and greater state capacity can facilitate faster reconstruction Del Castillo (2001); Cerra and Saxena (2008). Figure 3.6 visually reinforces a key conclusion: post-conflict recovery varies by region, with African countries generally experiencing the slowest and least sustained growth. These stylized regional patterns strengthen the thesis's argument that improving institutions, diversifying economies, and enhancing state capacity are critical for fostering a more durable recovery in conflict-affected African economies.

3.5.2 Alternative method

In this subsection, we use the GMM method to estimate the effects of armed post-conflict on growth Cevik and Rahmati (2015). The GMM approach explicitly addresses potential endogeneity concerns arising from reverse causality and unobserved heterogeneity between economic growth and post-conflict dynamics. To ensure comparability, we adopt the same baseline specification as in the main analysis. Table C4 reports the results obtained using both one-step GMM and System GMM estimators. Across both specifications, the Post-conflict variable remains positive and highly statistically significant, with estimated coefficients of 2.29 and 1.87 percentage points in the one-step and system GMM models, respectively. These results provide robust evidence of a post-conflict rebound in GDP per capita growth, consistent with the catch-up hypothesis documented in the literature. The slightly smaller coefficient in the system GMM specification likely reflects differences in instrument sets and estimation efficiency rather than substantive changes in the underlying relationship. Importantly, although growth accelerates following conflict cessation, the magnitude of the effect suggests that the recovery remains modest and short-lived, particularly in low-income and institutionally fragile contexts, as discussed elsewhere in the thesis. Overall, Table C4 reinforces a central conclusion of the thesis: post-conflict growth is real but fragile, driven by short-term catch-up effects and conditional on institutional quality and macroeconomic stability. Without sustained improvements in governance and reductions in uncertainty, early post-conflict growth gains are unlikely to translate into durable economic resilience.

3.6 Conclusion

This study estimates the economic recovery trajectory following internal conflicts, addressing potential endogeneity concerns arising from reverse causality. We use the

entropy balancing method to find evidence of an economic catch-up effect in the post-conflict period. The analysis of transmission channels reveals that increased investment and trade are the primary drivers of post-conflict economic expansion, particularly in Africa. The cumulative impact of growth is estimated at 2 percentage points in the first year, increasing only slightly to 2.5 percentage points by the fifth year. This modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict.

This study provides clear evidence of the economic growth trajectory of African countries following internal conflicts. It examines the key factors that drive post-conflict recovery, focusing on investment, consumption, and trade as the primary channels for revitalizing economies. The findings highlight the crucial role of financial support from the international community in facilitating sustainable recovery. The study recommends providing targeted financial assistance to help post-conflict countries stabilize their economies, rebuild infrastructure, and promote long-term growth. Ultimately, this support can contribute to lasting peace and economic resilience.

This research enhances our understanding of economic growth in Africa after experiencing internal armed conflicts. However, we must approach the study's results with caution. Conflicts often impact specific regions within a country and may not affect the overall trend of economic growth. Several limitations need to be acknowledged, highlighting important directions for future research. First, the analysis is conducted at the national level, which may obscure significant subnational differences in conflict exposure and recovery. Armed conflicts typically affect specific regions or localities within a country—often rural or peripheral areas—without disrupting national aggregate indicators to the same extent (Justino, 2009). As a result, a country may exhibit positive GDP per capita growth even while large segments of the population continue to face severe post-conflict hardships. This limitation underscores the need for future research using geocoded conflict data (ACLED; UCDP-GED) combined with subnational economic indicators, such as household surveys or nighttime lights (Henderson et al., 2012). Second, the study primarily focuses on macroeconomic outcomes, which do not necessarily reflect improvements in living conditions and welfare after conflict. An increasing body of literature shows that economic recovery often does not translate into immediate enhancements in household welfare, particularly when conflicts lead to forced displacement, asset destruction, social fragmentation, and long-term psychological

trauma (Bundervoet et al., 2009; Shemyakina, 2011). Therefore, interpreting aggregate GDP rebounds as indications of broad-based recovery may be misleading. In reality, conflicts generate severe and persistent humanitarian and social losses (Blattman and Miguel, 2010) that can hinder recovery for years or even decades, despite macroeconomic growth. Third, this study does not explicitly account for the role of informal economic activity, which constitutes a substantial portion of output in many African economies (La Porta and Shleifer, 2014). Since conflicts often disrupt formal markets more severely than informal sectors, focusing solely on official GDP figures may underestimate resilience mechanisms such as informal trade, remittances, or community-based coping strategies. Finally, these limitations suggest several promising avenues for future research. One important direction is the examination of post-conflict living conditions. Future studies could investigate whether households return to pre-conflict welfare levels, focusing on indicators such as poverty, food security, child nutrition, health status, educational outcomes, labor market participation, and forced displacement. This is particularly relevant given that food insecurity, poverty traps, and reduced human capital accumulation often persist long after conflicts formally end (Martin-Shields and Stojetz, 2019). Micro-level analyses allow researchers to evaluate whether economic growth post-conflict is inclusive, offering a more understanding of resilience and recovery processes.

C Appendix

Table C1: Transmission Channels

	1	2	3	4	5	6
	GDP Growthper after armed conflict					
FDI			0.051**			
			(0.023)			
Consomption	0.018**					
	(0.008)					
Investment		0.106***				
		(0.035)				
Aid				0.021		
				(0.016)		
Export					0.184***	
					(0.039)	
Import						0.082***
						(0.021)
Constant	63.019***	47.207***	52.007***	63.888***	59.388***	61.732***
	(12.615)	(12.500)	(11.305)	(12.808)	(11.159)	(12.209)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	814	781	891	808	814	814
R-squared	0.652	0.612	0.589	0.655	0.691	0.662
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Source : Author's calculations. Robust standard errors in parentheses. ***p<0.01,**p<0.05,*p<0.1

Table C2: Variables, definitions and sources

Variables	**Explanations**	**Sources**
Unemployment Rate	It measures the percentage of the labor force that is unemployed but actively seeking employment and available to work.	World Development Indicators
Autocracy Democracy Index	This variable captures the political regime. It combined the autocracy score and the democracy score over the period.	Polity IV Project
Country Uncertainty Index	Measures economic and policy uncertainty across countries using the frequency of the term "uncertainty" in Economist Intelligence Unit (EIU) reports.	World Uncertainty Index
GDP growth per capita	GDP per capita is GDP divided by midyear population, adjusted in constant 2015 USD.	World Development Indicators
Government Effectiveness	Measures the quality of public services, independence from political pressures, and credibility of policies.	World Bank Governance Indicators
Internal Armed Conflicts	Armed conflicts involving a government with at least 25 battle-related deaths per year.	UCDP/PRIO Dataset
Natural Resources/GDP	Total natural resource rents as a percentage of GDP (oil, gas, minerals, forests).	World Development Indicators
Political Stability/Absence of Terrorism	Likelihood of government destabilization by unconstitutional or violent means, including terrorism.	World Bank Governance Indicators
After Armed Conflicts	Dummy variable indicating whether a conflict remains inactive in the following year.	UCDP/PRIO Dataset

Table C3: Sensitivy Analysis: Income Level

	Middle income	Low income
VARIABLES	1	2
Post-conflict	0.42712	2.63152***
	(0.50734)	(0.82512)
Observations	520	386
R-squared	0.122	0.739
Control Variables	Yes	Yes
Fixed Effects	Yes	Yes

Source : Author's calculations. Robust standard errors in parentheses. ***p<0.01,**p<0.05,*p<0.1

Table C4: GMM Method

	1	2
Method	GMM One Step	System GMM
Dependante variable : GDP Growth per		
L.GDPGrowthper	-0.211***	-0.028**
	(0.028)	(0.022)
Post conflict	2.292***	1.866***
	(0.656)	(0.656)
Lag.GDP per capita	0.008***	-0.000*
	(0.000)	(0.000)
Natural Resources Rents of GDP	-0.019	0.197***
	(0.037)	(0.058)
Political Stability and Absence of Terrorism	-2.732***	-0.440
	(0.538)	(0.737)
Government Effectiveness	0.521	2.996**
	(0.913)	(1.093)
Unemployment Rate	0.023	-0.015
	(0.167)	(0.029)
Country Uncertainty Index	-4.108***	-2.749
	(1.590)	(3.038)
Autocracy Democracy Index	0.376***	0.101
	(0.092)	(0.066)
Constant	-3.596*	0.150
	(2.081)	(0.628)
Observations	875	906
Number of country	31	31
Country fixed effects	No	Yes
Year fixed effects	No	Yes
Test Wald	0.000	AR(1) 0.057
		AR(2) 0.275

Source : Author's calculations. Robust standard errors in parentheses. ***p<0.01,**p<0.05,*p<0.1

Table C5: Worldwide Post-Conflict Growth

	1	2	3
VARIABLES	GDP Growth per	GDP Growth per	GDP Growth per
Post-conflict	1.498***	1.862***	1.681***
	(0.354)	(0.446)	(0.610)
GDP per capita constant		-0.000*	0.000
		(0.000)	(0.000)
Natural Resources Rents of GD		0.031	0.075
		(0.039)	(0.076)
Political Stability		-1.017***	-0.105
		(0.267)	(0.411)
Government Effectiveness		1.204***	-0.275
		(0.366)	(0.489)
Unemployment Rate		-0.041**	0.021
		(0.021)	(0.064)
Country Uncertainty Index		-4.462***	-3.342***
		(0.778)	(0.851)
Autocracy Democracy Index		0.030	0.079
		(0.028)	(0.065)
Constant	0.710**	1.405**	3.826*
	(0.306)	(0.702)	(2.133)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	2427	1950	1950
R-squared	0.008	0.030	0.179
Country Fixed Effects	Yes	Yes	Yes

Source : Author's calculations. Robust standard errors in parentheses. ***p<0.01,**p<0.05,*p<0.1

General Conclusion

4.1 Summary

This thesis provides an in-depth examination of the complex interactions between conflict, military spending, coups d'État, and economic resilience. It can be summarized in three main parts. First, the thesis investigates the effectiveness of military spending and the intensity of conflicts in sub-Saharan African countries. These countries are consistently characterized by ongoing conflict. The existing literature mainly uses a static model that does not account for the effect of conflict persistence, which is particularly significant for countries already in armed conflict. In sub-Saharan Africa, access to security (a public good) is problematic today because of armed conflicts. To satisfy this need, the State relies mainly on public expenditure, particularly military expenditure. The thesis demonstrates that military expenditures reduce the intensity of armed conflicts by 0.012 percentage points. It significantly reduces low-intensity conflicts more than high-intensity conflicts, with 25-999 and more than 1000 deaths, respectively. The effectiveness is strongly conditioned by both the level of spending and the quality of institutions. The analysis reveals that military capabilities are the primary channel through which defense expenditures influence conflict dynamics. However, an excessive focus on military spending may crowd out investments in critical sectors such as education, health, and infrastructure, highlighting a fundamental trade-off between security and development. Second, the thesis shifts attention to the consequences of coups d'État on macroeconomic performance. Despite substantial progress, several important gaps remain in the literature on the economic consequences of coups d'État. Existing studies consistently highlight the endogeneity problem and provide limited evidence on how coups affect the components of GDP and key macroeconomic sectors. Research to date has reached little consensus on the key transmission channels through which coups d'État affect the economy. Using the entropy-balancing method, the analysis shows that coups significantly reduce GDP per capita growth by about 2.3 percentage points in the coup year—with persistent effects in subsequent years. These negative impacts are particularly pronounced in private consumption and investment, whereas monetary and fiscal aggregates are less immediately affected.

Successful coups and low-income country contexts exacerbate these economic costs, while sanctions imposed following coups further depress growth, emphasizing the broader economic vulnerability induced by political disruptions. Three, the thesis investigates post-conflict economic recovery, accounting for potential endogeneity and reverse causality. Existing studies provide mitigating evidence on the ability of economies to recover, with substantial heterogeneity in the speed, magnitude, and durability of recovery across countries and conflict episodes. The literature also lacks consensus on the key channels underlying resilience internally after armed conflict. The thesis's results indicate that African countries exhibit a modest "catch-up" effect, driven primarily by investment, consumption, and trade, with cumulative GDP growth increasing by approximately 2 percentage points in the first year post-conflict and reaching 2.5 percentage points by the fifth year. This modest 0.5 percentage point increase over five years indicates that post-conflict growth remains volatile and unsustainable, reflecting the persistent effects of conflict. Despite this recovery, growth remains fragile and volatile, reflecting the enduring consequences of conflict and the necessity for sustained policy interventions. The thesis's findings reveal a coherent pattern: while military spending can mitigate conflict intensity and post-conflict recovery is possible, coups d'état create substantial and persistent economic costs and can undermine development objectives. These results underscore the importance of integrated policies that simultaneously address security, institutional quality, and economic resilience, emphasizing the interconnectedness of conflict, political shocks, and post-conflict reconstruction in shaping sustainable development trajectories.

Policy Recommendations

The empirical findings of this thesis carry important implications for public policy, particularly for governments and international institutions operating in fragile and conflict-affected contexts. The results demonstrate that military spending can reduce conflict intensity when supported by strong institutions, that coups d'État entail substantial and persistent economic losses, and that post-conflict recoveries remain fragile and short-lived. These insights highlight the need for integrated policy approaches that simultaneously enhance security, strengthen governance, and build economic resilience. The following recommendations outline strategic priorities to mitigate the economic consequences of political instability and foster development in areas prone to conflict.

Integrate Security and Development Strategies

The findings of the first chapter highlight that military spending can reduce conflict intensity—when combined with strong institutional quality. Therefore, security policies must be embedded within broader development strategies, consistent with the following works (OECD, 2025; World Bank, 2024; Collier and Hoeffler, 2002b; Crost et al., 2014; Besley and Persson, 2011)

- Strengthen state capacity and governance during and after conflict escalation. Improving fiscal management, accountability, and institutional oversight enhances the effectiveness of military expenditure and prevents the misuse of security budgets. Governance quality is central to conflict prevention and management (Fearon and Laitin, 2003; Acemoglu and Robinson, 2019).
- Good balance between military and productive spending. While defense expenditure can reduce violence, excessive allocation to the military may crowd out essential investments in high-multiplier sectors such as education, health, and infrastructure (Ferdi, 2021; Collier and Hoeffler, 2002b).
- Address root causes of conflict. Policies tackling poverty, unemployment, inequality, and exclusion are essential to prevent conflict escalation and reduce long-term reliance on military responses. Inclusive growth and equitable access to public services significantly reduce conflict risks Stewart (2016); Østby (2013).

Strengthen State-Building Capacity and Institutional Governance

Evidence from the first and second chapters shows that institutional quality conditions both the effectiveness of military spending and the economic consequences of coups d'État. Weak governance amplifies conflict risks and magnifies economic disruptions, consistent with studies highlighting institutional fragility as a predictor of coups Powell and Thyne (2011); Cebotari et al. (2024).

- Promote institutional resilience in fragile states. Strengthening administrative capacity—particularly in public finance, taxation, and civil service management—mitigates the economic fallout of coups and prevents prolonged stagnation.
- Reinforce the rule of law and conflict-resolution mechanisms. Effective judicial systems, inclusive political institutions, and credible mediation channels reduce the likelihood of coups and the recurrence of armed conflict.
- Enhance transparency and accountability in the public sector. Independent

audits, parliamentary oversight, and digital monitoring of budget execution improve fiscal governance and prevent misuse of military expenditure, particularly during periods of political instability Alesina et al. (2019).

Enhance Economic Resilience

The third chapter shows that post-conflict recovery in African countries is modest, volatile, and short-lived—only a 0.5-point cumulative increase between the first and fifth post-conflict years—indicating the need for strong and sustained economic resilience strategies. This highlights the need for comprehensive strategies to enhance economic resilience (Collier, 2004; Miguel and Roland, 2011; Del Castillo, 2001; Elbadawi et al., 2007)

- Diversify the economy and maintain fiscal buffers. Reducing dependence on volatile sectors, including commodities, shields economies from shocks associated with coups, conflicts, or sanctions. Public investment should prioritize transport, energy, agriculture, health, and education, which are critical for productivity and peacebuilding.
- Strengthen trade facilitation and investment climate reforms. These policies can accelerate recovery by stimulating private consumption and investment—two components most affected by coups.
- Leverage international partnerships. Multilateral institutions (UN, IMF, World Bank, OECD) can provide concessional financing, technical assistance, and policy guidance to support reconstruction and long-term development. International support should complement domestic reforms aimed at rebuilding human capital, restoring institutional credibility, and preventing a relapse into conflict (World Bank, 2024).

Discussion and limitations of the thesis

The analyses conducted in this thesis provide valuable insights into the economic dynamics of conflict, military spending, coups d'État, and post-conflict recovery. However, given the complexity of these phenomena and the inherent constraints of available data and empirical methods, several limitations must be acknowledged to contextualize the findings and guide future research. A central limitation concerns the availability and reliability of data. Information on conflict, military expenditure, and coup events is often missing, inconsistently recorded, or heterogeneous across developing countries. These data gaps can restrict the precision of empir-

ical estimates and may limit cross-country comparability. However, several core variables—such as institutional quality, economic uncertainty, political stability, and conflict spillovers—are inherently multidimensional. Their measurement typically relies on composite indices or proxies that may not fully capture underlying institutional, behavioural, or political dynamics. Such measurement imprecision risks can attenuate estimated effects or obscure important mechanisms. Another limitation concerns the aggregation of diverse types of conflicts and coups. Violent events differ widely in scale, duration, motivation, and geographic concentration, while coups vary in political context and international responses. Treating these heterogeneous events as uniform phenomena may mask substantial variation in their economic impacts. More granular, context-specific analyses could provide deeper insights into the mechanisms through which political instability affects economic activity. Despite employing advanced empirical strategies—including entropy balancing, dynamic probit models, and event-study designs—to address endogeneity concerns, establishing definitive causal relationships remains challenging. Reverse causality, omitted-variable bias, and measurement error may still affect the results. For instance, conflict intensity may affect military spending, while economic downturns can increase the risk of conflict, thereby complicating the identification and interpretation of causal relationships. The dynamics of conflict are also shaped by external shocks such as commodity price volatility, global pandemics, and geopolitical tensions. Although some of these factors are partially controlled for, their full effects are challenging to isolate empirically. These external influences may interact with domestic fragility, amplifying or mitigating the estimated impacts of conflict. Additionally, cross-border consequences—such as refugee flows, trade disruptions, and regional security dynamics—are not explicitly accounted for, yet they may substantially alter local economic outcomes. These limitations highlight the need to extend the analysis beyond strictly macroeconomic indicators and to examine how conflict interacts with other dimensions of development affected by both domestic fragility and external shocks.

4.3 Perspective and Direction for Future Research

Future research could therefore broaden the scope of analysis by exploring how conflict-induced disruptions propagate through critical development outcomes beyond macroeconomic performance. One promising avenue concerns the dynamics of food insecurity in conflict-affected countries, which offer a compelling illustration of how violence interacts with market functioning, household coping strategies, and

state capacity. According to FAO estimates, approximately 2.33 billion people struggled to access adequate food regularly in 2023, with the majority living in fragile contexts marked by conflict, climate shocks, institutional instability, and economic vulnerability. Between 2016 and 2023, global food insecurity affected around 12 % of the world's population, but this proportion rose to 25% in conflict-affected countries. Over the past decades, such countries have received on average 200,000 tons of food aid annually—significantly more than the rest of the world—underscoring the severity and persistence of food crises in conflict zones. A growing body of research shows that conflict and food insecurity are deeply intertwined: violence disrupts agricultural production, market access, and livelihoods, while food scarcity can fuel tensions, grievances, and armed mobilisation (George and Adelaja, 2022; Martin-Shields and Stojetz, 2019; Ujunwa et al., 2019). Beyond conflict, other structural factors—such as climatic shocks, chronic poverty, and commodity price volatility—also shape food insecurity dynamics (Townsend, 1994; Maccini and Yang, 2009; Deaton, 1999). Understanding these relationships requires rigorous empirical strategies capable of disentangling the causal effects of food aid from confounding factors that simultaneously influence both humanitarian needs and aid allocation. Key determinants that need to be carefully accounted for include: (i) domestic agricultural production relative to population size, (ii) overall socio-economic conditions, (iii) food price inflation and market distortions, and (iv) structural vulnerabilities such as conflict intensity and climate-related shocks. Investigating these links would not only extend the empirical and theoretical reach of future research but also contribute to a more comprehensive understanding of the multidimensional consequences of conflict. Studying food insecurity in conflict-affected settings is particularly relevant to development economics and aligns directly with the Sustainable Development Goals—especially Goal 2 "Zero Hunger" and Goal 16 "Peace, Justice and Strong Institutions". By deepening our understanding of the interactions between conflict, food security, and global food aid governance, such research would also inform the design of more effective policy interventions in fragile and crisis-affected environments.

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